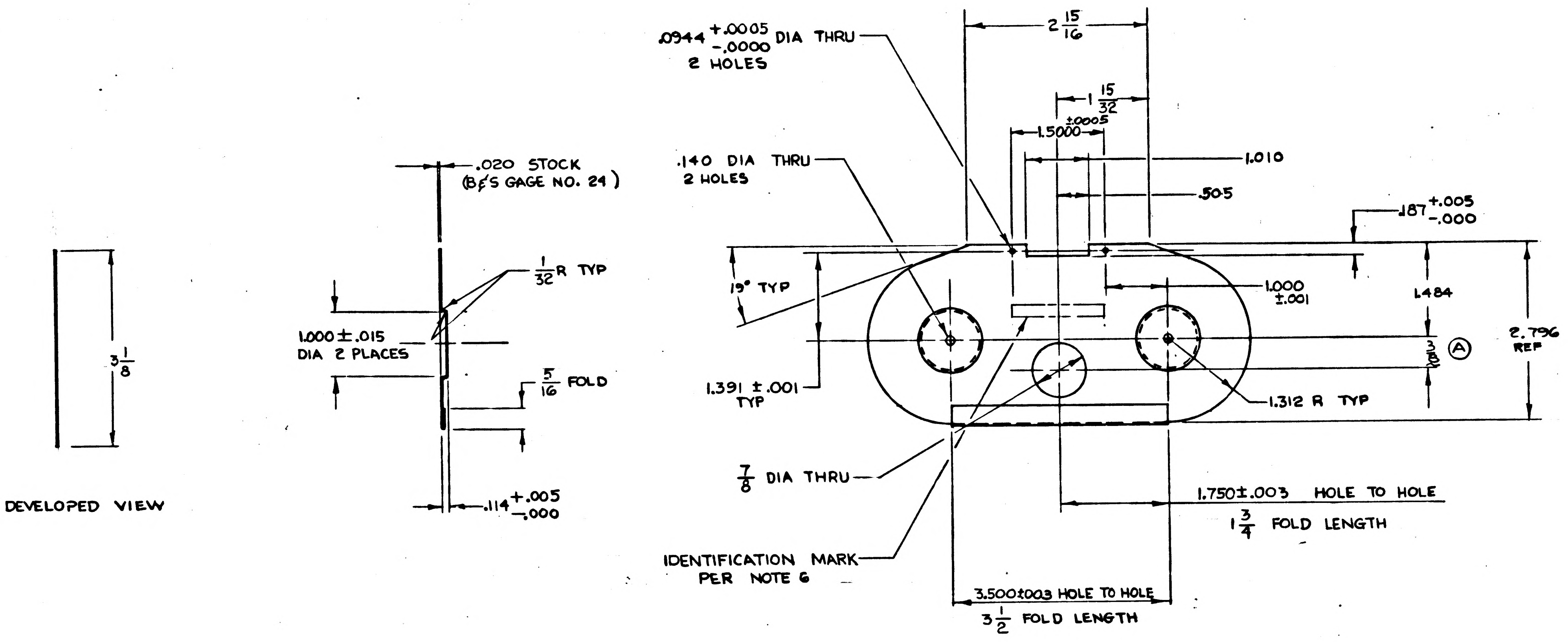
1011400 A

REVISIONS TDRR 01905				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	D-2	3/8 WAS 1/2 TDRR NO. 02274	7-29-63	WK 8/6/63

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   Ⓐ a. PUNCHED, CUT OR MACHINIED SURFACES TO HAVE 125/√ FINISH.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: BLACK ANODIZE (SULFURIC) PER MIL-A-8625, TYPE II BLACK (KPS.1005A.201.
6. IDENTIFY PER ND1002019 WITH NASA PART NO., REV LETTER AND MFRS SYM (KIC).



.0944 +.0005 -.0000 DIA THRU 2 HOLES
2 15/16
1 15/32
±.0005 1.5000
1.010
.505
.140 DIA THRU 2 HOLES
.020 STOCK (B&S GAGE NO. 24)
.187 +.005 -.000
1/32 R TYP
19° TYP
1.000 ±.001
1.484
2.796 REF
3/8 Ⓐ
1.000 ± .015 DIA 2 PLACES
5/16 FOLD
3 1/8
1.391 ± .001 TYP
1.312 R TYP
7/8 DIA THRU
1.750 ± .003 HOLE TO HOLE
1 3/4 FOLD LENGTH
.114 +.005 -.000
DEVELOPED VIEW
IDENTIFICATION MARK PER NOTE 6
3.500 ± .003 HOLE TO HOLE
3 1/2 FOLD LENGTH

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011420	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM
ALLOY 5052-H32
FED SPEC QQ-A-318
TEMPER H32

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 56387000030

DRAWN R CARROLL DATE 6/4/63
CHECKED W. Wizak 6/17/63
APPROVAL M. Werner 6-25-63
APPROVAL E. Wong 6-28-63
NASA APPROVAL 7/3/63
MIT APPROVAL WKoopf 3 July 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
COVER, CARTRIDGE

CODE IDENT NO.
SIZE D
NASA NUMBER 1011400
SCALE 1:1
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

MASTER

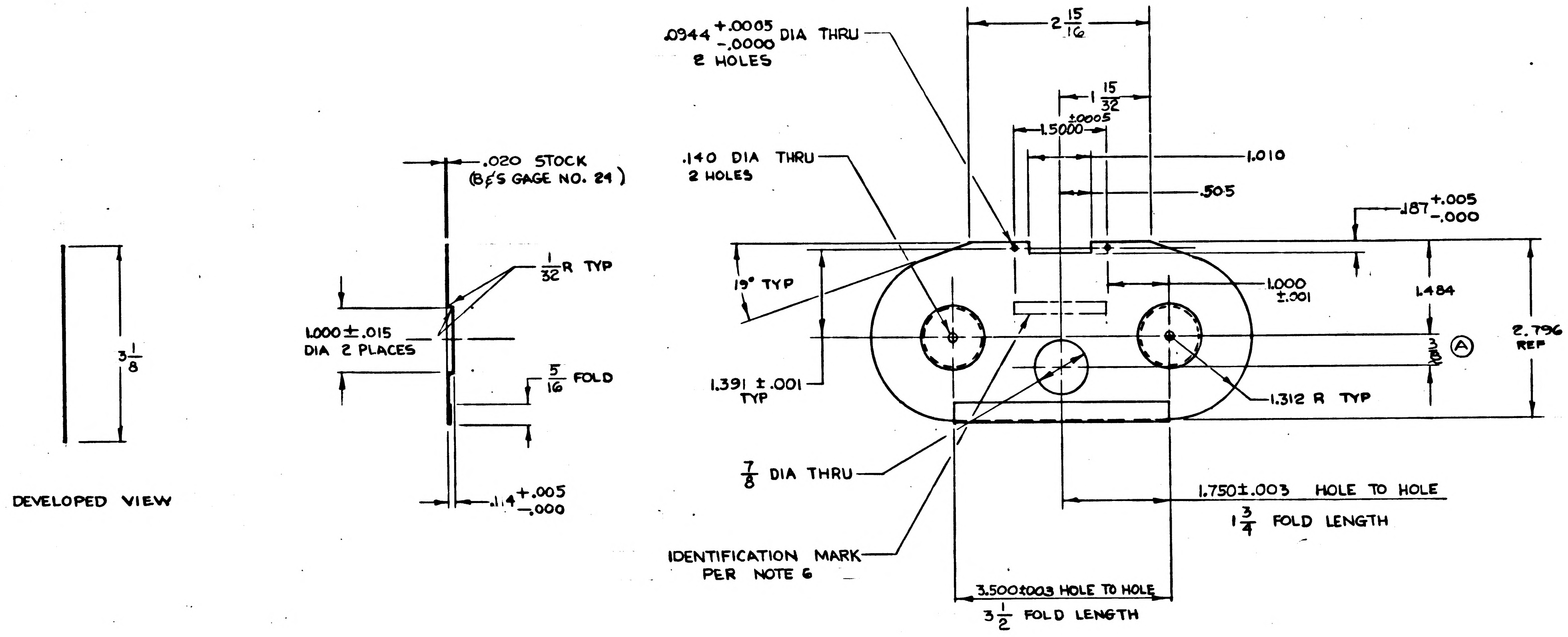
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011400	B

REVISIONS TDRR 01905				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	D-2	3/8 WAS 1/2 TDRR NO. 02274	7-24-63	WK 7/6/63
B		REVISED PEZ TDRR NO. 02686	8/21/6	DW

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   Ⓑ a. PUNCHED, CUT OR MACHINIED SURFACES TO HAVE 125√ FINISH.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: BLACK ANODIZE (SULFURIC) PER MIL-A-8625, TYPE II BLACK (KPS.1005A.201.
6. IDENTIFY PER ND1002019 WITH NASA PART NO., REV LETTER AND MFRS SYM (KIC).


3 1/8
DEVELOPED VIEW
.020 STOCK (B&S GAGE NO. 24)
1/32 R TYP
1.000 ± .015 DIA 2 PLACES
5/16 FOLD
.14 +.005 -.000
.0944 +.0005 -.0000 DIA THRU 2 HOLES
.140 DIA THRU 2 HOLES
19° TYP
1.391 ± .001 TYP
7/8 DIA THRU
IDENTIFICATION MARK PER NOTE 6
2 15/16
1 15/32
1.5000 ±.0005
1.010
.505
.187 +.005 -.000
1.000 ±.001
1.484
3/8
Ⓐ
2.796 REF
1.312 R TYP
1.750±.003 HOLE TO HOLE
1 3/4 FOLD LENGTH
3.500±.003 HOLE TO HOLE
3 1/2 FOLD LENGTH

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011420	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 5052-H32 FED SPEC QQ-A-318 TEMPER H32

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK

KIC PN 56387000030

DRAWN R CARROLL DATE 6/4/63
CHECKED W. Wiesk 6/17/63
APPROVAL M. Werner 6-25-63
APPROVAL E. Mhaup 6-28-63
NASA APPROVAL W.S. 7/3/63
MIT APPROVAL WKupfer 3/6/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE

COVER, CARTRIDGE

CODE IDENT NO. | SIZE D | NASA NUMBER 1011400

SCALE 1:1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

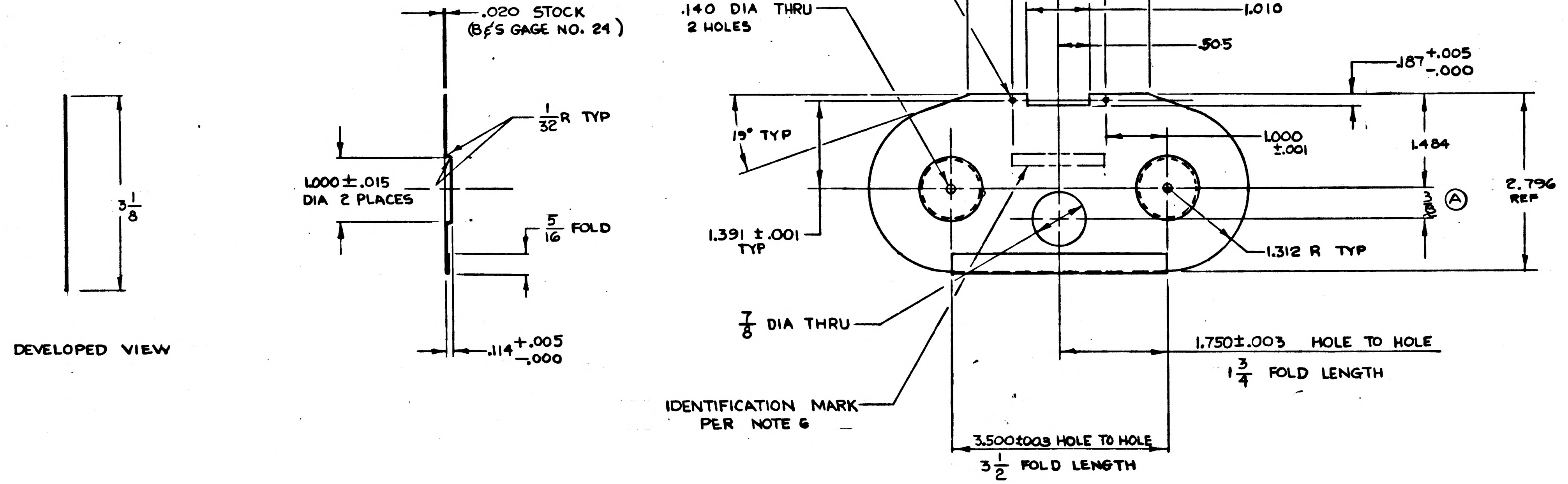
INCHES 0 1 2 PHOTOGRAPHIC SCALE ONLY

1011400 C

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
		REVISIONS TDRR 01905		
A	D-2	3/8 WAS 1/2 TDRR NO. 02274	7-24-63	WK 9/6/63
B		REVISED PER TDRR NO. 02686	12/21/63	
C		REVISED PER TDRR NO. 04634	11/19/63	

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   - Ⓑ a. PUNCHED, CUT OR MACHINIED SURFACES TO HAVE $\overset{125}{\surd}$ FINISH.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: BLACK ANODIZE (SULFURIC) PER MIL-A-8625, TYPE II BLACK (KPS.1005A.201.
6. IDENTIFY PER ND1002019 WITH NASA PART NO., REV LETTER AND MFRS SYM (KIC).



3 1/8
DEVELOPED VIEW
.020 STOCK
(B&S GAGE NO. 24)
1/32 R TYP
1.000 ± .015
DIA 2 PLACES
5/16 FOLD
.114 +.005 -.000
.0944 +.0005 -.0000 DIA THRU
2 HOLES
.140 DIA THRU
2 HOLES
2 15/16
1 15/32
±.0005
1.5000
1.010
.505
.187 +.005 -.000
19° TYP
1.000 ±.001
1.484
2.796 REF
3/8 Ⓐ
1.391 ± .001 TYP
1.312 R TYP
7/8 DIA THRU
1.750 ± .003 HOLE TO HOLE
1 3/4 FOLD LENGTH
IDENTIFICATION MARK
PER NOTE 6
3.500 ± .003 HOLE TO HOLE
3 1/2 FOLD LENGTH

Ⓒ

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

MASTER

1011420 NEXT ASSY	1011559 USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOL ON: FRACTIONS ± 1/64; DECIMALS ± .005; ANGLES ± 1° DO NOT SCALE THIS DRAWING	KOLLSMAN INSTRUMENT CORPORATION ELMHURST NEW YORK KIC PN 5638700 0030	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
APPLICATION		MATERIAL ALUMINUM ALLOY 5052 FED SPEC QQ-A-318 TEMPER O	DRAWN R CARROLL DATE 6/6/63 CHECKED W. Lisitzky 6/17/63 APPROVAL M. Werner 6-25-63 APPROVAL E. Thomas 6-28-63	TITLE COVER, CARTRIDGE
		CONTRACT	NASA APPROVAL 7/3/63 MIT APPROVAL 3 July 63	CODE IDENT NO. — SIZE D — NASA NUMBER 1011400 SCALE 1:1 — WEIGHT CALC ACTUAL — SHEET 1 OF 1

INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

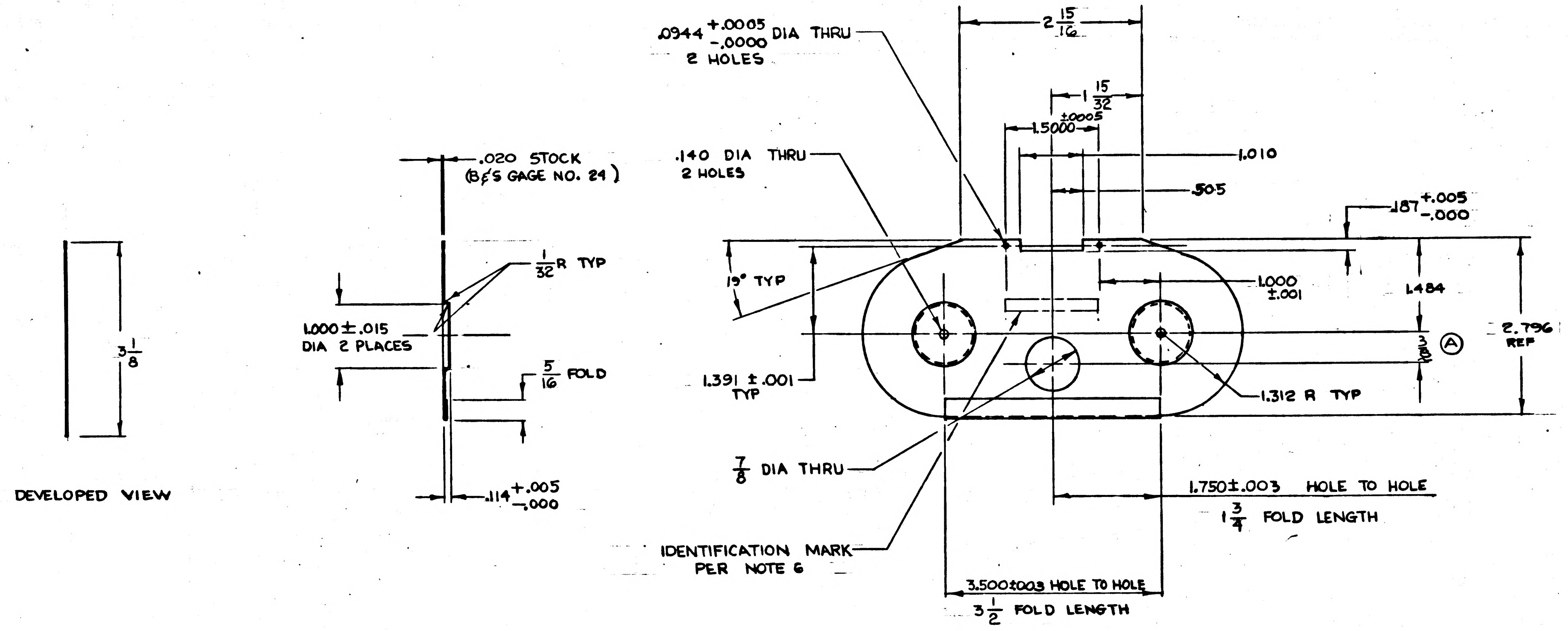
D 1011400

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   Ⓑ a. PUNCHED, CUT OR MACHINED SURFACES TO HAVE $\overset{125}{\surd}$ FINISH.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: BLACK ANODIZE (SULFURIC) PER MIL-A-8625, TYPE II BLACK (KPS.1005A.201.
6. IDENTIFY PER ND1002019 WITH NASA PART NO., REV LETTER AND MFRS SYM (KIC).

REVISIONS TDRR 01905

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	D-2	3/8 WAS 1/2 TDRR NO. 02274	7-24-63	WK 8/6/63
B		REVISED PER TDRR NO. 02686	8/21/63	
C		REVISED PER TDRR NO. 04634	11/14/63	
D		REVISED PER TDRR NO. 07035	3/24/64	WK



.0944 +.0005 −.0000 DIA THRU
2 HOLES
2 15/16
1 15/32
±.0005
1.5000
1.010
.505
.187 +.005 −.000
.020 STOCK
(B&S GAGE NO. 24)
.140 DIA THRU
2 HOLES
1/32 R TYP
19° TYP
1.000 ±.001
1.484
1.000 ±.015
DIA 2 PLACES
3 1/8
3/8
Ⓐ
2.796
REF
5/16 FOLD
1.391 ±.001
TYP
1.312 R TYP
7/8 DIA THRU
DEVELOPED VIEW
.114 +.005 −.000
1.750±.003 HOLE TO HOLE
1 3/4 FOLD LENGTH
IDENTIFICATION MARK
PER NOTE 6
3.500±.003 HOLE TO HOLE
3 1/2 FOLD LENGTH

MASTER

©

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011420	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING
MATERIAL ALUMINUM
ALLOY 5052
FED SPEC QQ-A-318
TEMPER O
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 56387000030
DRAWN R CARROLL DATE 6/4/63
CHECKED W. Wanik 6/17/63
APPROVAL M. Werner 6-25-63
APPROVAL E. Mraup 6-28-63
NASA APPROVAL 7/3/63
MIT APPROVAL 3 July 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
COVER, MAGAZINE

CODE IDENT NO.
SIZE D
NASA NUMBER 1011400
SCALE 1:1
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

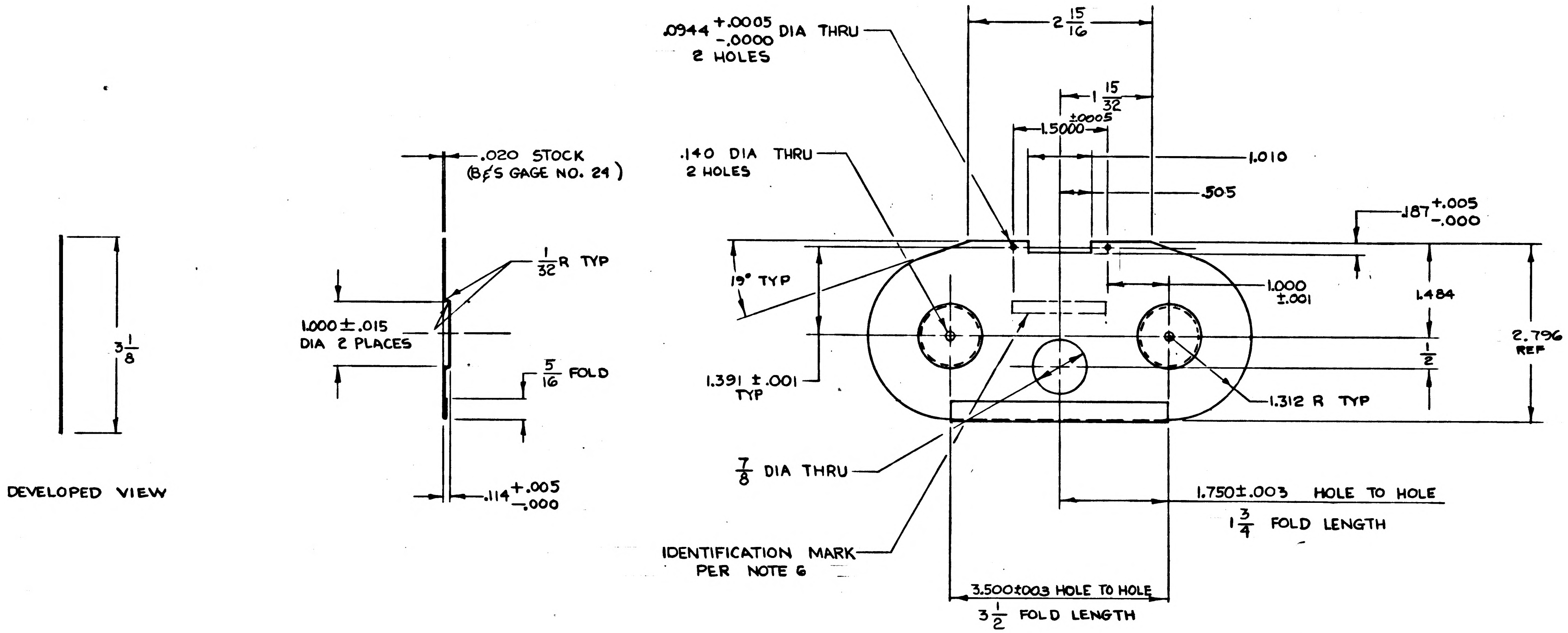
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011400

REVISIONS TDRR 01905				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   - a. PUNCHED, CUT OR MACHINIED SURFACES TO HAVE $\overset{125}{\surd}$ FINISH.
   - b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: BLACK ANODIZE (SULFURIC) PER MIL-A-8625, TYPE II BLACK (KPS.1005A.201.
6. IDENTIFY PER ND1002019 WITH NASA PART NO., REV LETTER AND MFRS SYM (KIC).



3 1/8
DEVELOPED VIEW
.020 STOCK (B&S GAGE NO. 24)
1/32 R TYP
1.000 ±.015 DIA 2 PLACES
5/16 FOLD
.114 +.005 −.000
.0944 +.0005 −.0000 DIA THRU 2 HOLES
2 15/16
1 15/32
1.5000 ±.0005
1.010
.505
.140 DIA THRU 2 HOLES
.187 +.005 −.000
19° TYP
1.000 ±.001
1.484
2.796 REF
1/2
1.391 ±.001 TYP
1.312 R TYP
7/8 DIA THRU
1.750±.003 HOLE TO HOLE
1 3/4 FOLD LENGTH
IDENTIFICATION MARK PER NOTE 6
3.500±.003 HOLE TO HOLE
3 1/2 FOLD LENGTH

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011420	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM
ALLOY 5052-H32
FED SPEC QQ-A-318
TEMPER H32

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK

KIC PN 56387000030

DRAWN	R CARROLL	DATE 6/10/63
CHECKED	W. Wisak	6/17/63
APPROVAL	M. Werner	6-25-63
APPROVAL	E. Thoma	6-28-63
NASA APPROVAL		7/3/63
MIT APPROVAL		7/4/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
COVER, CARTRIDGE

CODE IDENT NO.	SIZE	NASA NUMBER
	D	1011400
SCALE 1:1	WEIGHT	CALC ACTUAL · SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

A	1011401

SPUR GEAR DATA

NO. OF TEETH	5
DIAMETRAL PITCH	10
PRESSURE ANGLE	20°
PITCH DIAMETER (SPECIAL)	.545
OUTSIDE DIAMETER	.750 $^{+.000}_{-.003}$
GEAR TEETH FINISH	$\overset{32}{\checkmark}$

NOTES:

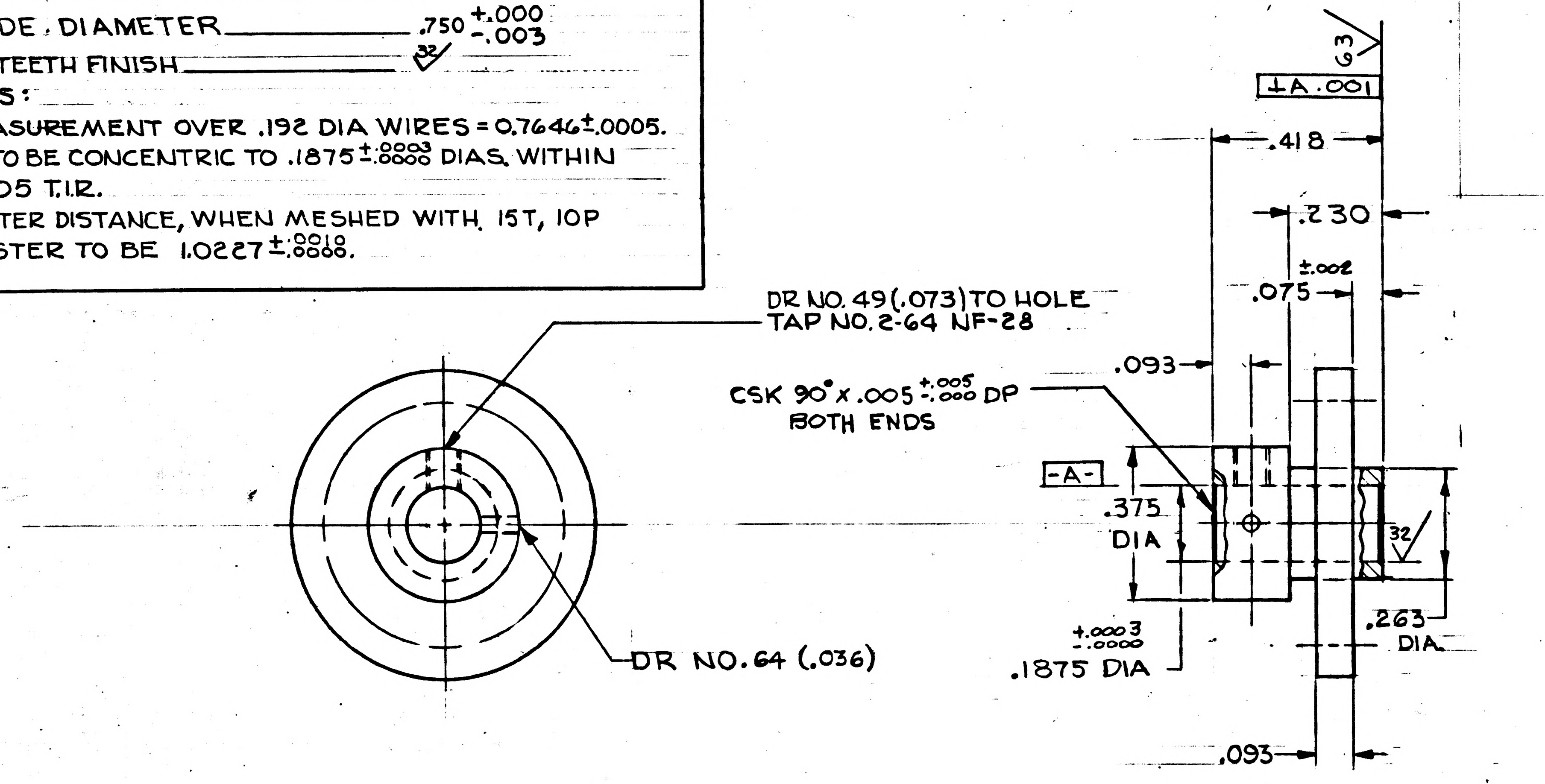
a) MEASUREMENT OVER .192 DIA WIRES = 0.7646 ± .0005.

b) O.D. TO BE CONCENTRIC TO .1875 $^{+.0003}_{-.0000}$ DIAS. WITHIN .0005 T.I.R.

c) CENTER DISTANCE, WHEN MESHED WITH 15T, 10P MASTER TO BE 1.0227 $^{+.0010}_{-.0000}$.

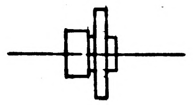
REVISIONS TDRR 01905

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A_2		REVISED PER TDRR NO. 03345	9/2166	DW



6. IDENTIFY PER ND 1002019, WITH NASA PART NO, REV LETTER AND MFRS SYM (KIC).
5. FINISH: BLACK ANODIZE PER MIL-A-8625, TYPE II (KPS-1005A.201)
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
3. UNLESS OTHERWISE SPECIFIED:
    a. $\overset{125}{\checkmark}$ FINISH ALL OVER.
    b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.

NOTES:



ACTUAL SIZE

1/2

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011420	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 2024-T4 FED SPEC QQ-A-268 TEMPER T4

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK

KIC PN 33387000030

DRAWN S. Musso DATE 5-8-63
CHECKED W. Witzky 6-17-63
APPROVAL M. Werner 6-22-63
APPROVAL E. Thorn 6-28-63
NASA APPROVAL 7/3/63
MIT APPROVAL 3/6/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
GEAR, SPUR
5T/10P (SPECIAL)

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011401

SCALE 4:1 WEIGHT CALC ACTUAL SHEET 1 OF 1

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

B 1011401

REVISIONS TDRR 01905				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A_2		REVISED PER TDRR NO. 03345	9/26/63	
B_2		REVISED PER TDRR NO. 05009	12/19/63	

SPUR GEAR DATA

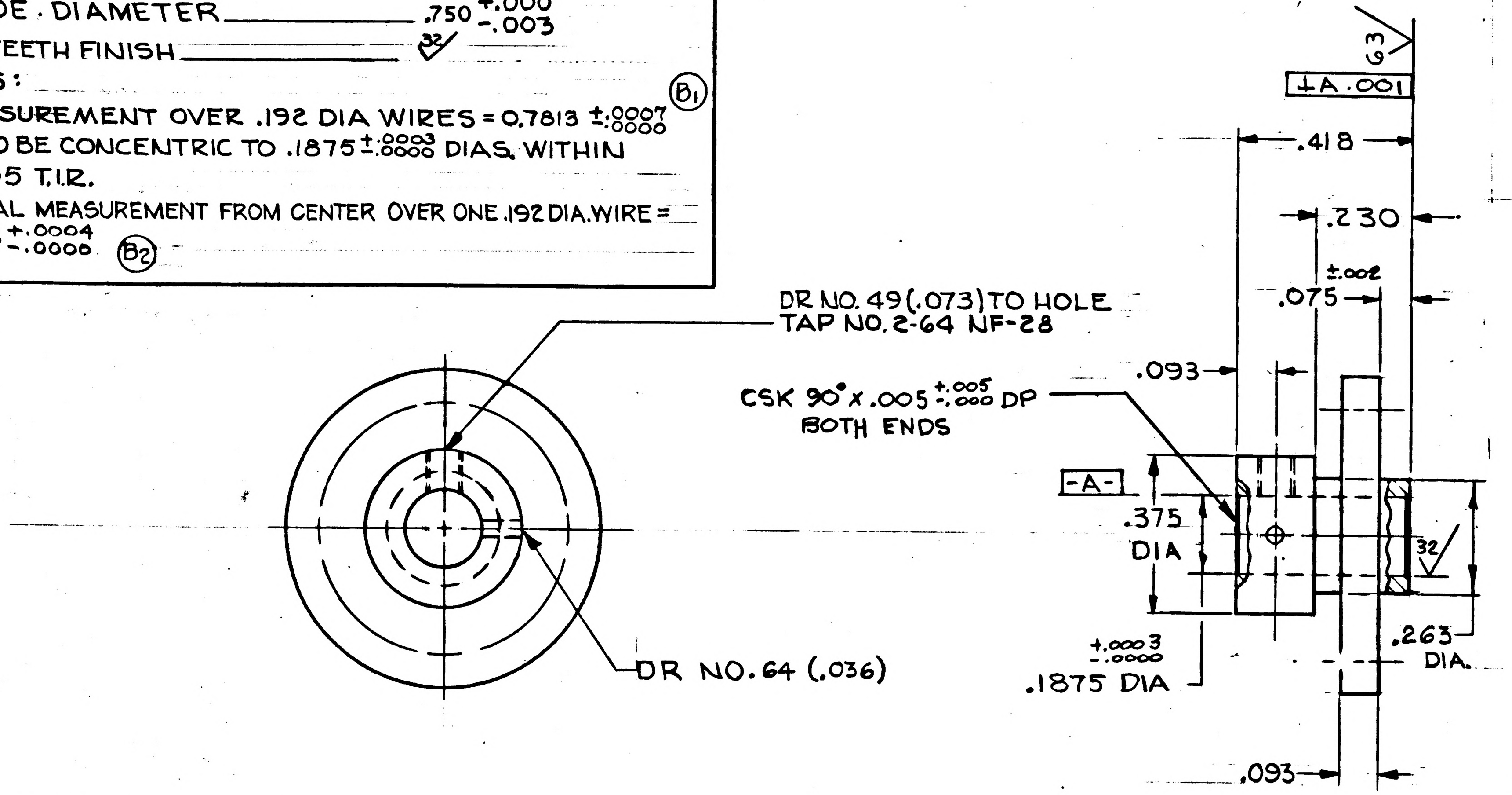
NO. OF TEETH	5
DIAMETRAL PITCH	10
PRESSURE ANGLE	20°
PITCH DIAMETER (SPECIAL)	.545
OUTSIDE DIAMETER	.750 $^{+.000}_{-.003}$
GEAR TEETH FINISH	32√

NOTES: (B1)

a) MEASUREMENT OVER .192 DIA WIRES = 0.7813 $^{+.0007}_{-.0000}$

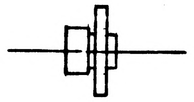
b) O.D. TO BE CONCENTRIC TO .1875 $^{+.0003}_{-.0000}$ DIAS. WITHIN .0005 T.I.R.

c) RADIAL MEASUREMENT FROM CENTER OVER ONE .192 DIA. WIRE = .4085 $^{+.0004}_{-.0000}$ (B2)



6. IDENTIFY PER ND 1002019, WITH NASA PART NO, REV LETTER AND MFRS SYM (KIC).
5. FINISH: BLACK ANODIZE PER MIL-A-8625, TYPE II (KPS-1005A.201)
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
3. UNLESS OTHERWISE SPECIFIED:
   a. 125√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.

NOTES:



ACTUAL SIZE

1/2

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011420	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 2024-T4 FED SPEC QQ-A-268 TEMPER T4

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK

KIC PN 33387000030

DRAWN S. Musso DATE 5-8-63
CHECKED W. Witzky 6-17-63
APPROVAL M. Werner 6-22-63
APPROVAL E. Thomp 6-28-63
NASA APPROVAL 7/3/63
MIT APPROVAL 3/6/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
GEAR, SPUR
5T/10P (SPECIAL)

CODE IDENT NO.
SIZE C
NASA NUMBER 1011401
SCALE 4:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

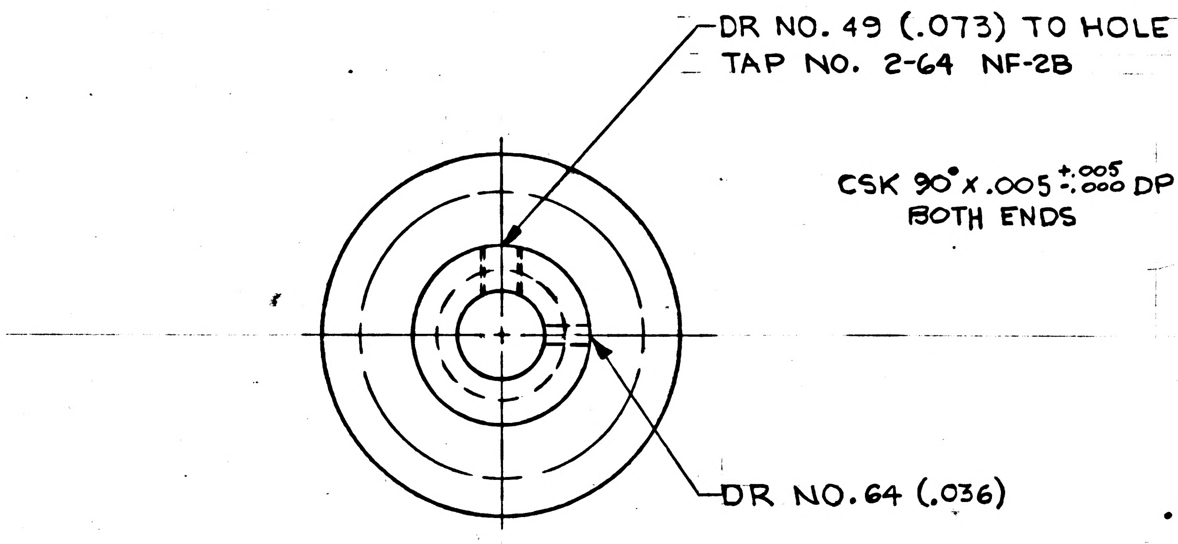
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

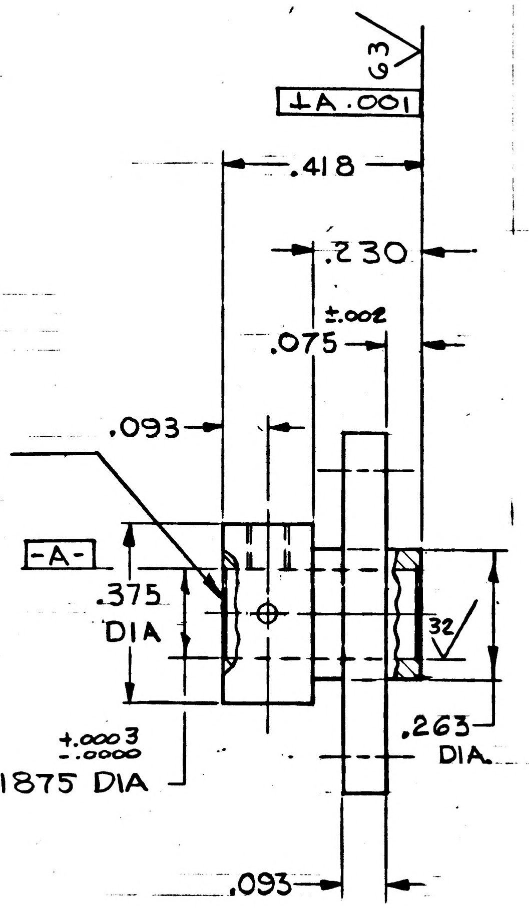
1011401

REVISIONS TDRR 01905				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

SPUR GEAR DATA

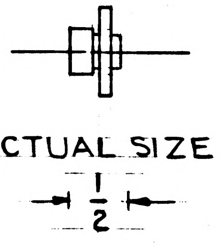
NO. OF TEETH	5
DIAMETRAL PITCH	10
PRESSURE ANGLE	20°
PITCH DIAMETER (SPECIAL)	.545
OUTSIDE DIAMETER	.750 +.000 -.003
AGMA CLASS	1 D
GEAR TEETH FINISH	32√





6. IDENTIFY PER ND1002019, WITH NASA PART NO., REV LETTER AND MFRS SYM (KIC).
5. FINISH: BLACK ANODIZE PER MIL-A-8625, TYPE II (KPS-1005A.201)
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
3. UNLESS OTHERWISE SPECIFIED:
   a. 125√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.

NOTES:



MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011420	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 2024-T4 FED SPEC QQ-A-268 TEMPER T4

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 33387000030

DRAWN S. Musso DATE 5-8-63
CHECKED W. Witzky 6-17-63
APPROVAL M. Werner 6-22-63
APPROVAL E. Dhoung 6-28-63
NASA APPROVAL 7/3/63
MIT APPROVAL W. Kupfer 3/9/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
GEAR, SPUR
5T/10P (SPECIAL)

CODE IDENT NO. | SIZE C | NASA NUMBER 1011401

SCALE 4:1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

E-184

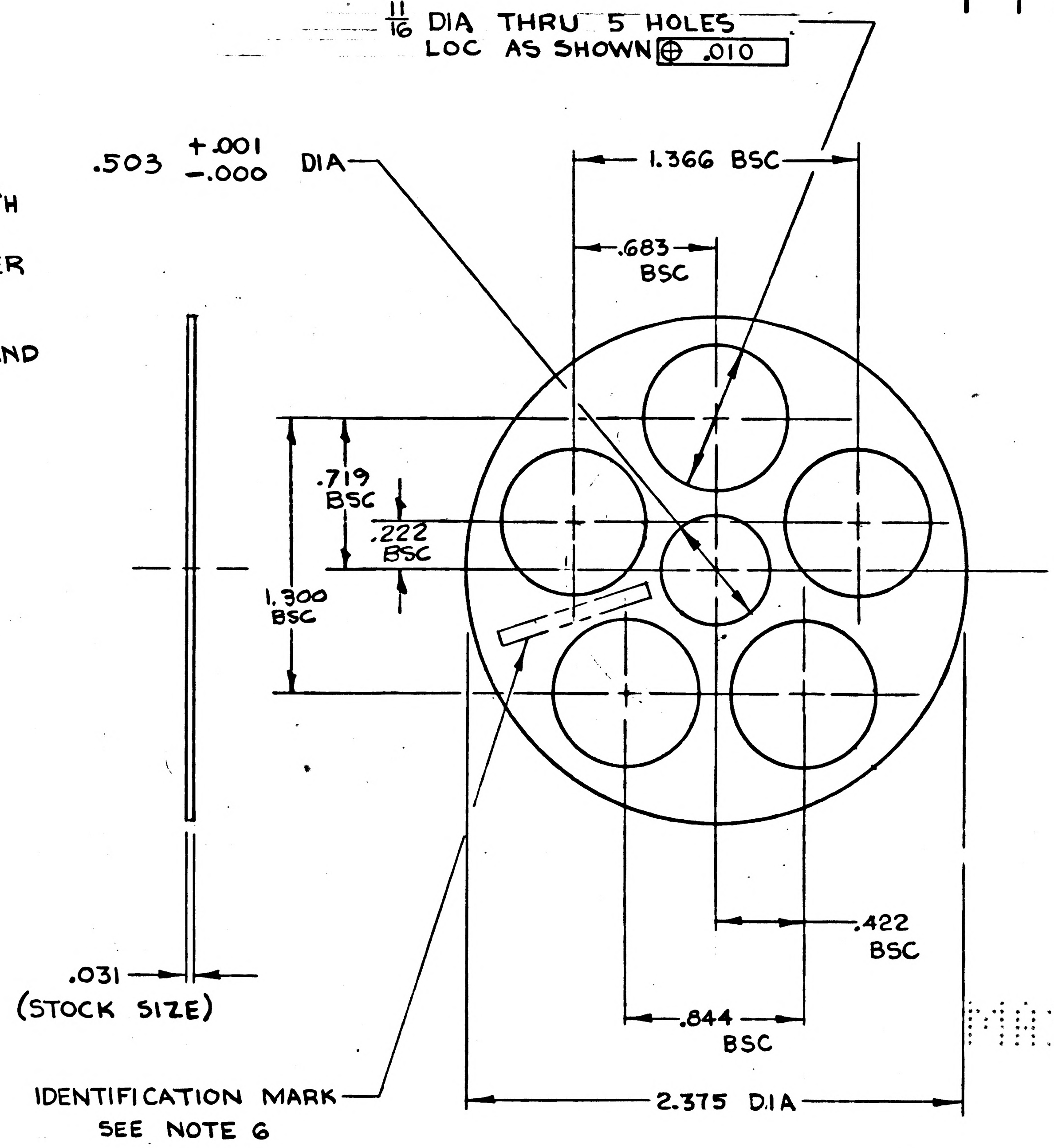
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

REVISIONS TDRR 01905

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

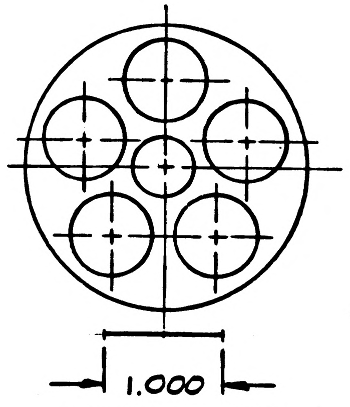
NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   - a. 125/√ FINISH ALL OVER.
   - b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. FINISH: BLACK ANODIZE (SULFURIC) PER MIL-A-8625 TYPE II (KPS1005A.201)
6. IDENTIFY PER ND1002019 WITH NASA PART NO. REV LETTER AND MFRS SYM (KIC).



11/16 DIA THRU 5 HOLES
LOC AS SHOWN ⊕ .010
.503 +.001 −.000 DIA
1.366 BSC
.683 BSC
.719 BSC
.222 BSC
1.300 BSC
.422 BSC
.844 BSC
2.375 DIA
.031
(STOCK SIZE)
IDENTIFICATION MARK
SEE NOTE 6

MASTER



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011420	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON: FRACTIONS ± ~ ; DECIMALS ±.005 ; ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL ALUMINUM ALLOY 2024-T4, FED SPEC QQ-A-355, TEMPER T3
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 58387000040
DRAWN R. CARROLL DATE 5/3/63
CHECKED W. Witzky 6-17-63
APPROVAL M. Werner 6-22-63
APPROVAL E. Dhorup 6-28-63
NASA APPROVAL W. J. S 7/3/63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
FLANGE, SPOOL

CODE IDENT NO. | SIZE C | NASA NUMBER 1011402
SCALE 2:1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

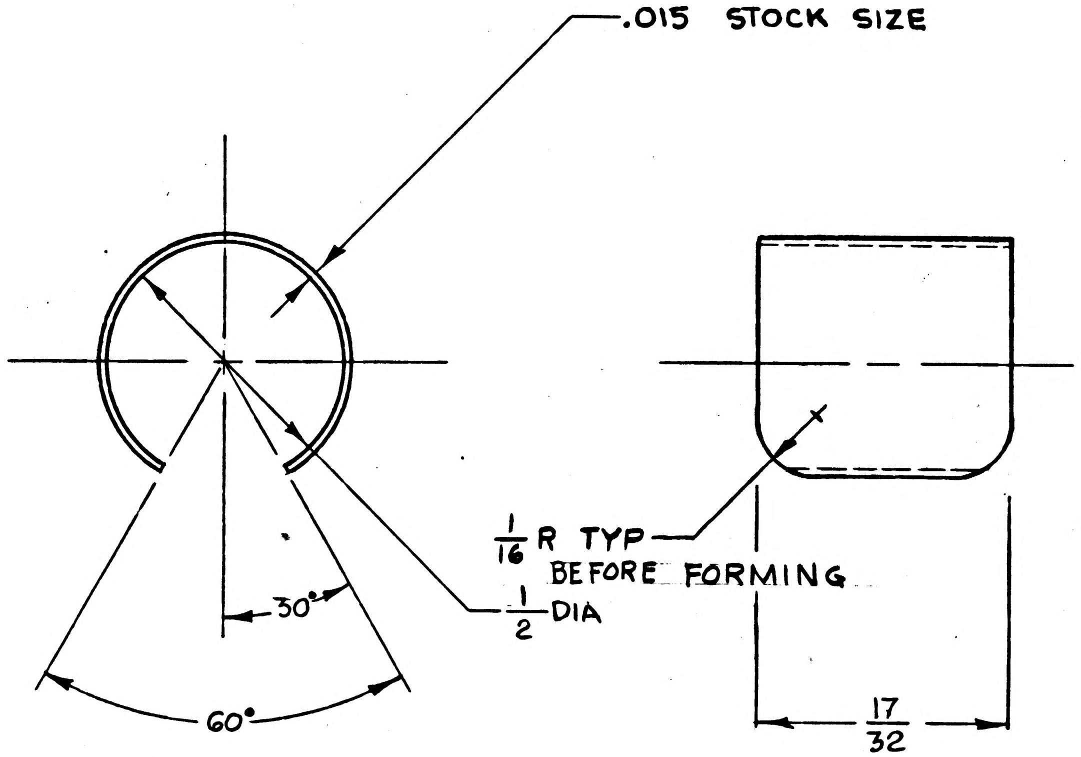
E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

REVISIONS		TDRR 01905		
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. PUNCHED, CUT OR MACHINED SURFACES TO HAVE 125√ FINISH.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. IDENTIFY PER ND1002019 WITH NASA PART NO, REV LETTER AND MFRS SYM (KIC).
6. HEAT TREATMENT: HARDEN AFTER FORMING TO ROCKWELL C-40-45. PER ND1002087 (KPS-10015.440)
7. FINISH - PASSIVATE PER MIL-STD-171 (KPS-10051.200).



MASTER

1.000
ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011420	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ± —; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL: STAINLESS STEEL 440 FED SPEC QQ-S-766 CL 440 COND A
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 59387000020
DRAWN R. CARROLL DATE 6/3/63
CHECKED W. Witzky 6-17-63
APPROVAL M. Werner 6-22-63
APPROVAL E. Dhoug 6-28-63
NASA APPROVAL W. S. 7/3/63
MIT APPROVAL W. Wefer 3 July 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

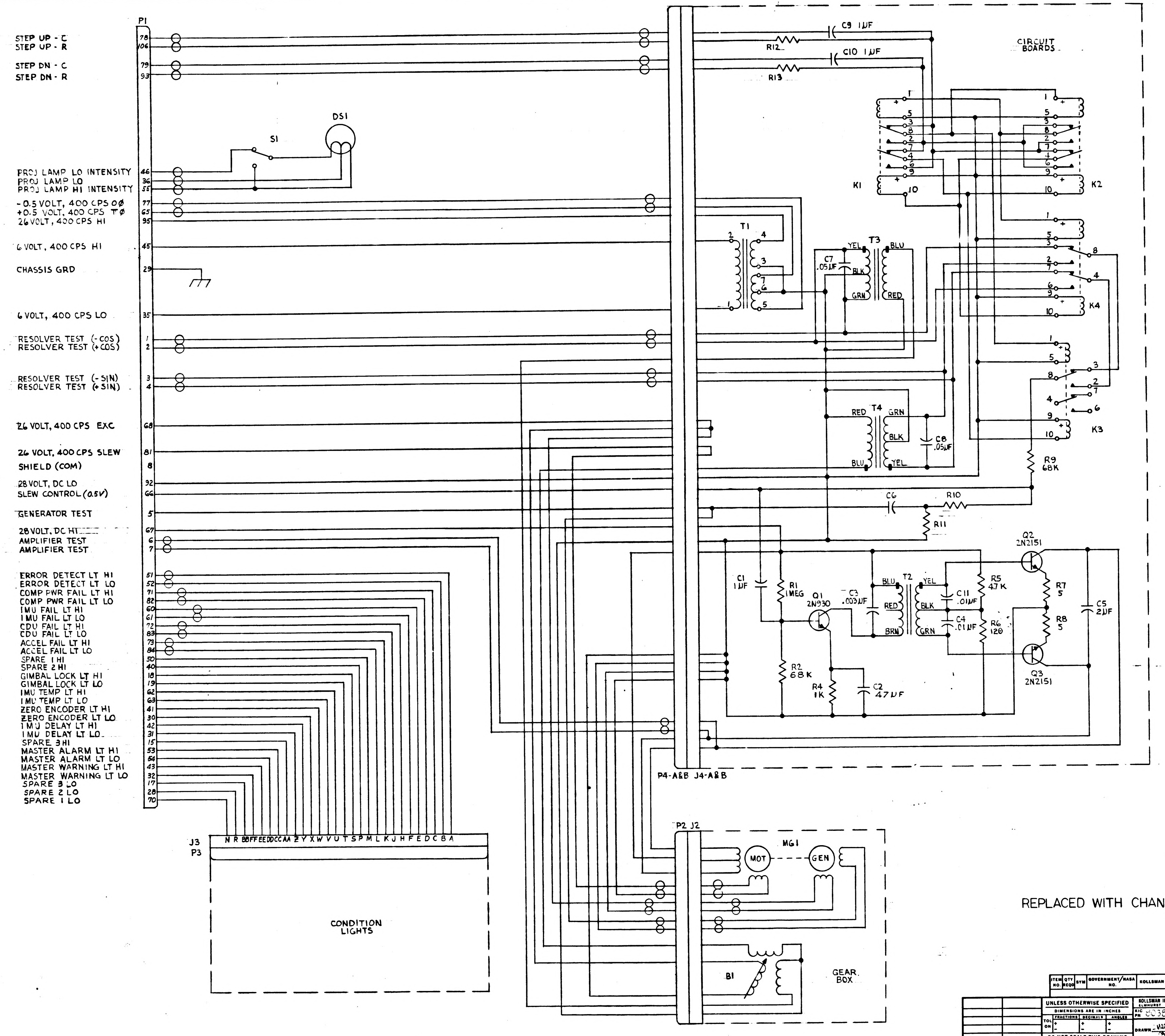
TITLE
CLIP, FILM

CODE IDENT NO.
SIZE C
NASA NUMBER 1011404
SCALE 4:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REPLACED WITH CHANGE BY REV B TDRR 01923		

(M)



P1
STEP UP - C 78
STEP UP - R 106
STEP DN - C 79
STEP DN - R 93
DS1
S1
PROJ LAMP LO INTENSITY 46
PROJ LAMP LO 36
PROJ LAMP HI INTENSITY 55
-0.5 VOLT, 400 CPS 0Ø 77
+0.5 VOLT, 400 CPS TØ 65
26 VOLT, 400 CPS HI 95
6 VOLT, 400 CPS HI 45
CHASSIS GRD 29
6 VOLT, 400 CPS LO 35
RESOLVER TEST (-COS) 1
RESOLVER TEST (+COS) 2
RESOLVER TEST (-SIN) 3
RESOLVER TEST (+SIN) 4
26 VOLT, 400 CPS EXC 68
26 VOLT, 400 CPS SLEW 81
SHIELD (COM) 8
28 VOLT, DC LO 92
SLEW CONTROL (0.5V) 66
GENERATOR TEST 5
28 VOLT, DC HI 67
AMPLIFIER TEST 6
AMPLIFIER TEST 7
ERROR DETECT LT HI 51
ERROR DETECT LT LO 52
COMP PWR FAIL LT HI 71
COMP PWR FAIL LT LO 82
IMU FAIL LT HI 60
IMU FAIL LT LO 61
CDU FAIL LT HI 72
CDU FAIL LT LO 83
ACCEL FAIL LT HI 73
ACCEL FAIL LT LO 84
SPARE 1 HI 50
SPARE 2 HI 40
GIMBAL LOCK LT HI 18
GIMBAL LOCK LT LO 19
IMU TEMP LT HI 62
IMU TEMP LT LO 63
ZERO ENCODER LT HI 41
ZERO ENCODER LT LO 30
IMU DELAY LT HI 42
IMU DELAY LT LO 31
SPARE 3 HI 15
MASTER ALARM LT HI 53
MASTER ALARM LT LO 54
MASTER WARNING LT HI 43
MASTER WARNING LT LO 32
SPARE 3 LO 17
SPARE 2 LO 28
SPARE 1 LO 70
J3
P3
N R BB FF EE DD CC AA Z Y X W V U T S P M L K J H F E D C B A
CONDITION LIGHTS
P4-A&B J4-A&B
P2 J2
MG1
MOT
GEN
B1
GEAR BOX
C9 1μF
R12
C10 1μF
R13
CIRCUIT BOARDS
K1
K2
K3
K4
T1
T2
T3
T4
YEL
BLU
BLK
GRN
RED
BRN
C7 .05μF
C8 .05μF
R9 68K
C6
R10
R11
C1 1μF
R1 1MEG
Q1 2N930
C3 .005μF
C11 .01μF
C4 .01μF
R5 4.7K
R6 120
Q2 2N2151
Q3 2N2151
R7 5
R8 5
C5 2μF
R2 68K
R4 1K
C2 47μF

REPLACED WITH CHANGE BY REV B

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01368 **DATE**

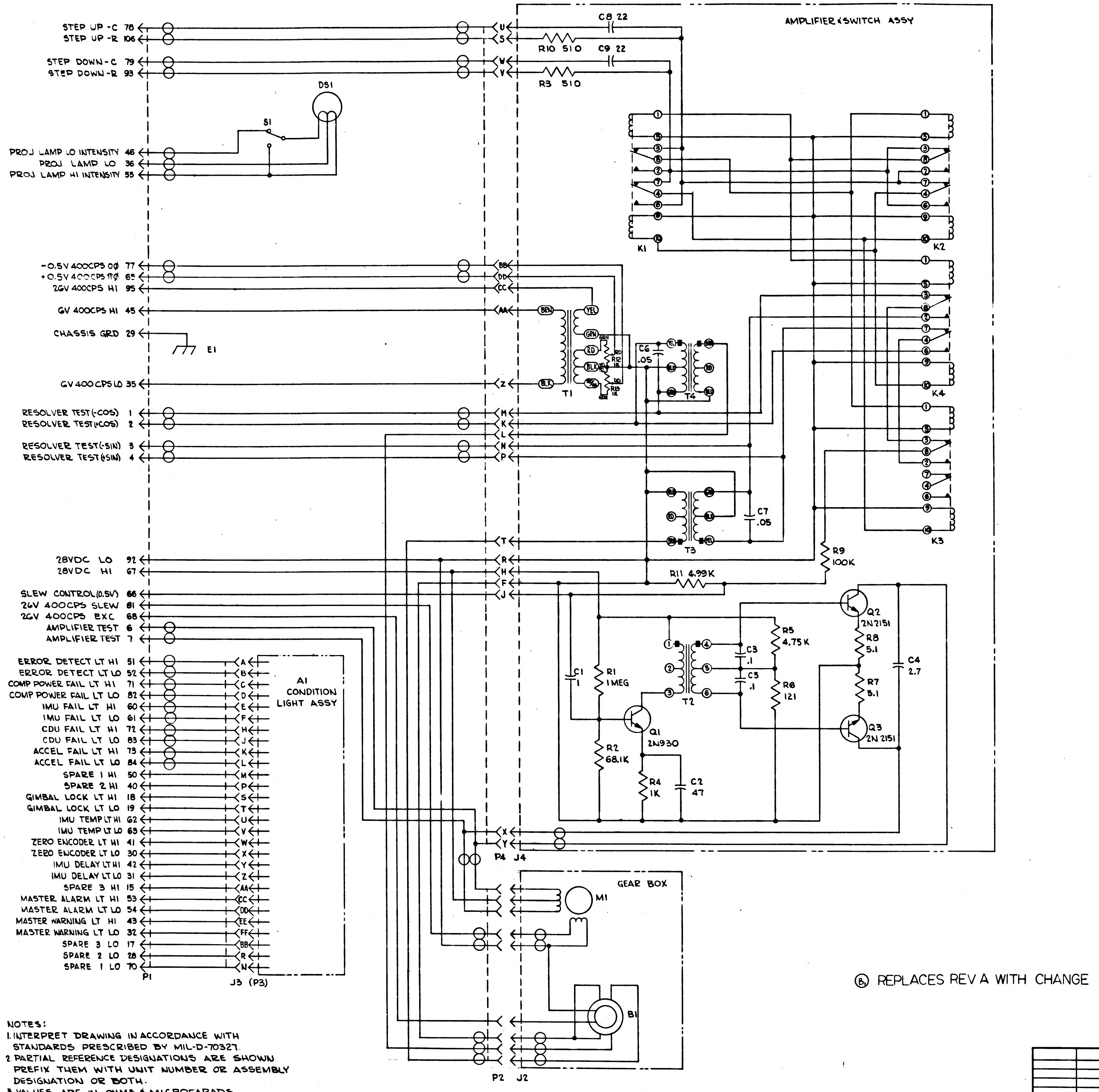
ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOL ON FRACTIONS ± DECIMALS ± ANGLES ±	KOLLSMAN INSTRUMENT CORPORATION ELMHURST NEW YORK KIC PN 8038700000	MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
USED ON	DO NOT SCALE THIS DRAWING	DRAWN MARGIOTTA DATE 5-7-63 CHECKED APPROVAL APPROVAL	TITLE SYSTEM SCHEMATIC MAP AND DATA VIEWER	
APPLICATION	MATERIAL	NASA APPROVAL 5-22-63	CODE IDENT NO.	SIZE E
	CONTRACT	MIT APPROVAL 22 May 63	SCALE NONE	NASA NUMBER 1011405
			WEIGHT CALC ACTUAL	SHEET 1 OF 1

INCHES
PHOTOGRAPHIC SCALE ONLY

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
B.		Ⓑ REPLACES REVISION A WITH CHANGE TDRR 01423	25 June 63	WH



STEP UP -C 78
STEP UP -R 106
STEP DOWN -C 79
STEP DOWN -R 93
PROJ LAMP LO INTENSITY 46
PROJ LAMP LO 36
PROJ LAMP HI INTENSITY 55
-0.5V 400CPS 0Ø 77
+0.5V 400CPS 180Ø 65
26V 400CPS HI 95
GV 400CPS HI 45
CHASSIS GRD 29
GV 400CPS LO 35
RESOLVER TEST(-COS) 1
RESOLVER TEST(+COS) 2
RESOLVER TEST(-SIN) 3
RESOLVER TEST(+SIN) 4
28VDC LO 92
28VDC HI 67
SLEW CONTROL(0.5V) 66
26V 400CPS SLEW 81
26V 400CPS EXC 68
AMPLIFIER TEST 6
AMPLIFIER TEST 7
ERROR DETECT LT HI 51
ERROR DETECT LT LO 52
COMP POWER FAIL LT HI 71
COMP POWER FAIL LT LO 82
IMU FAIL LT HI 60
IMU FAIL LT LO 61
CDU FAIL LT HI 72
CDU FAIL LT LO 83
ACCEL FAIL LT HI 73
ACCEL FAIL LT LO 84
SPARE 1 HI 50
SPARE 2 HI 40
GIMBAL LOCK LT HI 18
GIMBAL LOCK LT LO 19
IMU TEMP LT HI 62
IMU TEMP LT LO 63
ZERO ENCODER LT HI 41
ZERO ENCODER LT LO 30
IMU DELAY LT HI 42
IMU DELAY LT LO 31
SPARE 3 HI 15
MASTER ALARM LT HI 53
MASTER ALARM LT LO 54
MASTER WARNING LT HI 43
MASTER WARNING LT LO 32
SPARE 3 LO 17
SPARE 2 LO 28
SPARE 1 LO 70
P1
J3 (P3)
A1 CONDITION LIGHT ASSY
DS1
S1
E1
AMPLIFIER & SWITCH ASSY
C8 22
R10 510
C9 22
R3 510
K1
K2
K3
K4
T1
T2
T3
T4
BRN
YEL
GRN
RD
BLK
C6 .05
R12 1K
R13 1K
C7 .05
R9 100K
R11 4.99K
C1 1
R1 1MEG
R2 68.1K
Q1 2N930
R4 1K
C2 47
C3 .1
C5 .1
R5 4.75K
R6 121
Q2 2N2151
R8 5.1
R7 5.1
Q3 2N2151
C4 2.7
P4 J4
GEAR BOX
M1
B1
P2 J2

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 21368 (ORIGINAL) DATE

REF DESIG	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	VALUE	TOL ±	RATING	UNIT WT
T4	1010324			↑				
T3	1010324							
T2	1010291							
T1	1011414			TRANSFORMER				
S1	1011368			SWITCH				
R13	1015812-006			RESISTOR, VARIABLE	1K		¾ W	
R12	1015812-006			RESISTOR, VARIABLE	1K		¾ W	
R11	1010363-385			↑	4.99K	↑	¼W	
R10	1010389-49				510		3W	
R9	1010363-635				100K		¼W	
R8	1010389-1				5.1		3W	
R7	1010389-1				5.1		3W	
R6	1010363-75				121		↑	
R5	1010363-381				4.75K			
R4	1010363-251				1K		¼W	
R3	1010389-49				510		3W	
R2	1010363-603				68.1K		¼W	
R1	1010363-827			RESISTOR	1M	1%	¼W	
Q3	1010269-2			TRANSISTOR	2N2151			
Q2				MATCHED PAIR	2N2151			
Q1	1010397-001			TRANSISTOR	2N930			
P4	1015818			↑				
P2	1011411							
P1	1010347-2			CONNECTOR				
M1	1011379			SERVO MOTOR				
K4	1006772-2			↑				
K3	1006772-2							
K2	1006772-2							
K1	1006772-2			RELAY				
J4	1015817			↑				
J3								
J2	1011410			CONNECTOR				
E1				TERMINAL LUG				
DS1				LAMP-PROJECTION				
C9	1006755-134			↑	22	↑	50VDC	
C8	1006755-134				22		50VDC	
C7	1010279-216				.05		35VDC	
C6	1010279-216				.05		35VDC	
C5	1010393-017				.1		↑	
C4	1010393-035				2.7			
C3	1010393-017				.1		50VDC	
C2	1006755-89				47		35VDC	
C1	1010393-029			CAPACITOR	1	10%	50VDC	
B1	1011371			RESOLVER				
A1	1011375			CONDITION LT ASSY				

LIST OF PARTS AND MATERIALS

Ⓑ REPLACES REV A WITH CHANGE

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN PREFIX THEM WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH.
3. VALUES ARE IN OHMS & MICROFARADS.

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL #
CONTRACT #

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80387000010
DRAWN J. MARIGOTTA DATE 5-7-63
CHECKED 6-28-63
APPROVAL 6-28-63
APPROVAL
NASA APPROVAL 7/3/63
MIT APPROVAL 3/1/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

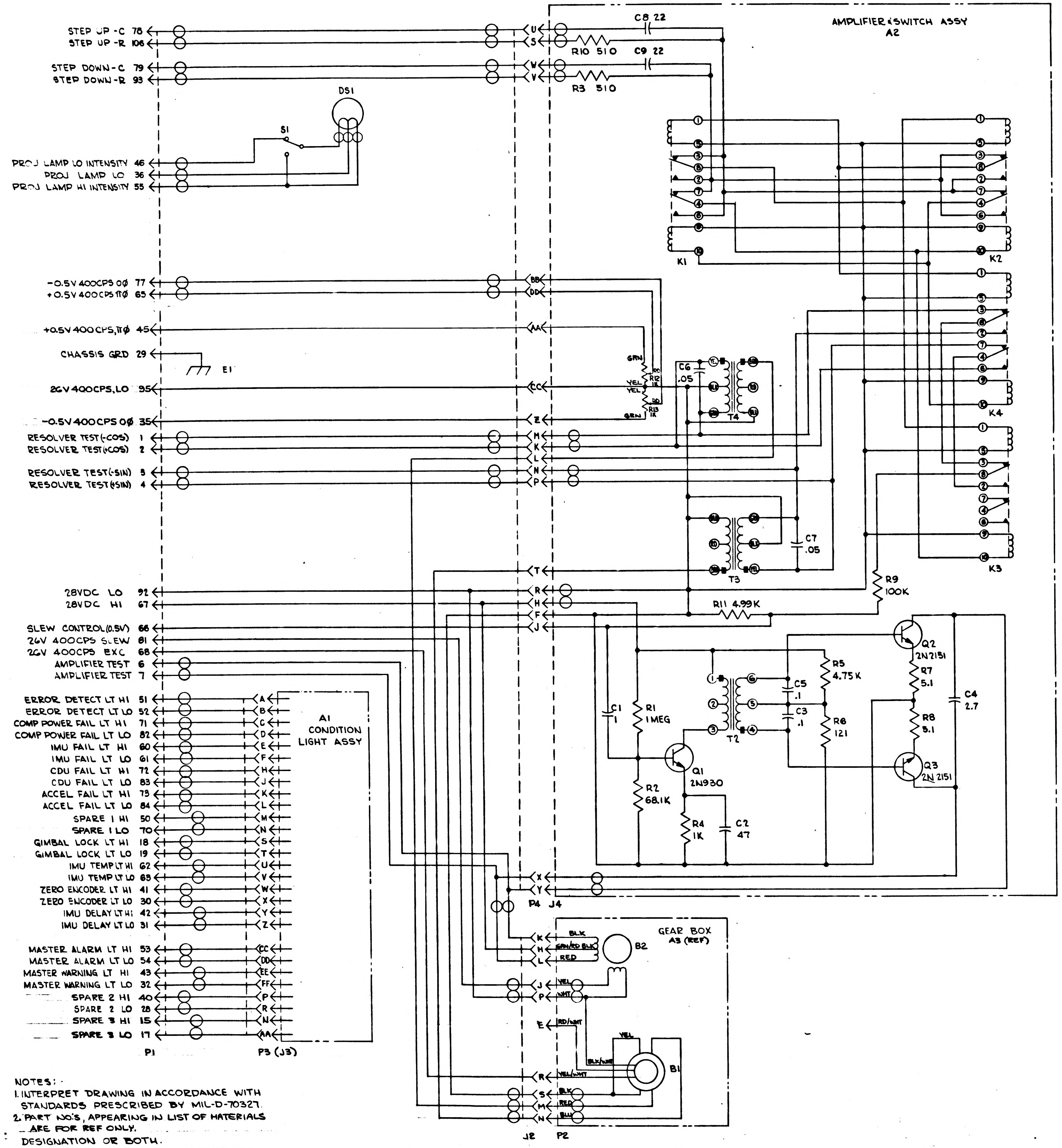
TITLE
SYSTEM SCHEMATIC
MAP AND DATA VIEWER

CODE IDENT NO.
SIZE E
NASA NUMBER 1011405
SCALE #
WEIGHT CALC ACTUAL
SHEET OF

1011405 B

1011405 C

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
B.		Ⓑ REPLACES REVISION A WITH CHANGE TDRR 01423	25 JUNE 63	WH
C		REVISED & UPGRADED TO CLASS "A" PER TDRR NO 03577	3 Oct 63	WK



STEP UP -C 78
STEP UP -R 106
STEP DOWN -C 79
STEP DOWN -R 93
DS1
S1
PROJ LAMP LO INTENSITY 46
PROJ LAMP LO 36
PROJ LAMP HI INTENSITY 55
-0.5V 400CPS 0Ø 77
+0.5V 400CPS 11Ø 65
+0.5V 400CPS,11Ø 45
CHASSIS GRD 29
E1
26V 400CPS,LO 95
-0.5V 400CPS 0Ø 35
RESOLVER TEST(-COS) 1
RESOLVER TEST(+COS) 2
RESOLVER TEST(-SIN) 3
RESOLVER TEST(+SIN) 4
28VDC LO 92
28VDC HI 67
SLEW CONTROL(0.5V) 66
26V 400CPS SLEW 81
26V 400CPS EXC 68
AMPLIFIER TEST 6
AMPLIFIER TEST 7
ERROR DETECT LT HI 51
ERROR DETECT LT LO 52
COMP POWER FAIL LT HI 71
COMP POWER FAIL LT LO 82
IMU FAIL LT HI 60
IMU FAIL LT LO 61
CDU FAIL LT HI 72
CDU FAIL LT LO 83
ACCEL FAIL LT HI 73
ACCEL FAIL LT LO 84
SPARE 1 HI 50
SPARE 1 LO 70
GIMBAL LOCK LT HI 18
GIMBAL LOCK LT LO 19
IMU TEMP LT HI 62
IMU TEMP LT LO 63
ZERO ENCODER LT HI 41
ZERO ENCODER LT LO 30
IMU DELAY LT HI 42
IMU DELAY LT LO 31
MASTER ALARM LT HI 53
MASTER ALARM LT LO 54
MASTER WARNING LT HI 43
MASTER WARNING LT LO 32
SPARE 2 HI 40
SPARE 2 LO 28
SPARE 3 HI 15
SPARE 3 LO 17
P1
P3 (J3)
A1 CONDITION LIGHT ASSY
AMPLIFIER & SWITCH ASSY A2
C8 22
R10 510
C9 22
R3 510
K1
K2
K3
K4
C6 .05
R12 1K
R13 1K
GRN
YEL
T4
T3
C7 .05
R9 100K
R11 4.99K
Q2 2N2151
R7 5.1
C4 2.7
R5 4.75K
C5 .1
C3 .1
R6 121
T2
R8 5.1
Q3 2N2151
C1 1
R1 1MEG
Q1 2N930
R2 68.1K
R4 1K
C2 47
P4
J4
GEAR BOX A3 (REF)
BLK
GRN/RD BLK
RED
B2
YEL
WHT
RD/WHT
YEL/WHT
BLK/WHT
BLU
B1
J2
P2

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. PART NO'S, APPEARING IN LIST OF MATERIALS ARE FOR REF ONLY.
DESIGNATION OR BOTH.
3 VALUES ARE IN OHMS & MICROFARADS.

01368

S1	1011368	68150025701		SWITCH		
P4	1011501			CONNECTOR		
P3	1000119			↕ ↕		
P2	1011410	68502018601				
PL	1010347-1					
J2	1011411	68502018701		CONNECTOR		
E1	MS25036-48			TERMINAL LUG		
DS1	1011413			LAMP-PROJECTION		
B2	1011379	75001010001		MOTOR		
B1	1011371	75002010201		RESOLVER		
A3	1011430	87387000030		GEAR BOX ASSY		
A2	1011479	87387000050		AMP & SW UNIT, ASSY OF		
A1	1011375	75005005601		CONDITION LT ASSY		
	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION		UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOL ON FRACTIONS ± # DECIMALS ± # ANGLES ± # DO NOT SCALE THIS DRAWING MATERIAL # CONTRACT #	KOLLSMAN INSTRUMENT CORPORATION ELMHURST NEW YORK KIC PN 80387000010 DRAWN J. MARIGOTTA DATE 5-7-63 CHECKED C C Hodon 6-28-63 APPROVAL C C Hodon 6-28-63 APPROVAL E. Thorp 10-3-63 NASA APPROVAL 7/3/63 MIT APPROVAL 10/3/63
APPLICATION			

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SYSTEM SCHEMATIC
MAP AND DATA VIEWER

CODE IDENT NO | SIZE E | NASA NUMBER 1011405
SCALE # | WEIGHT | CALC ACTUAL | SHEET 1 OF 1

E-100

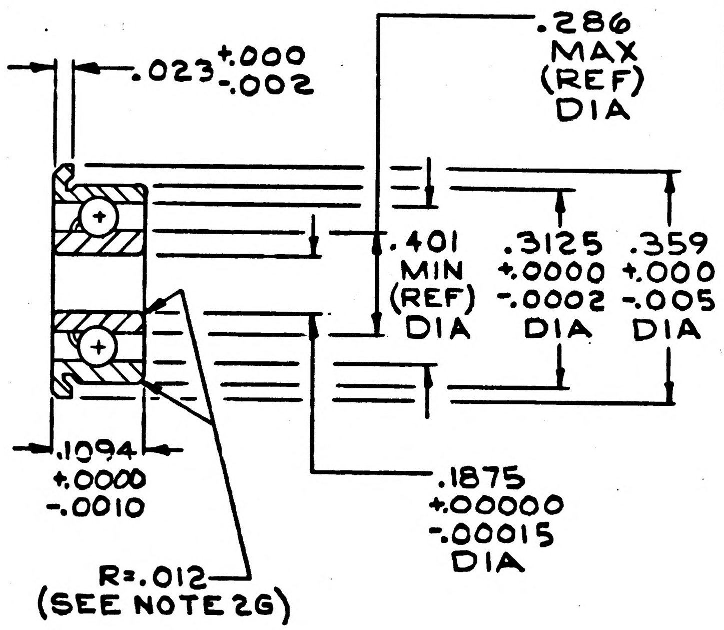
1011406

REVISIONS 01741

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PARTS SHALL BE INDIVIDUALLY PACKED IN SEPARATE HEAT-SEALED POLYETHYLENE BAGS AND SHIPPED PER MIL-B-197C LEVEL C.
2. INSPECTION AND ACCEPTANCE:
   - A. PACKAGE AND SHIPPING CONTAINER SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER, AND MANUFACTURER'S IDENTIFICATION PER MIL-STD-129.
   - B. DIMENSIONS AS SHOWN.
   - C. RADIAL .0003 TO .0005
   - D. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.
   - E. LUBRICATE PER ND 1002077.
   - F. R = MAX RADIUS ON SHAFT OR HOUSING THAT BEARING CORNER WILL CLEAR.
   - G. MAX. .005 FILLET RADIUS INSTEAD OF UNDERCUT ON INSIDE FLANGE FACE IS PERMISSIBLE.
3. DESIGN REQUIREMENTS:
   - A. DEEP GROOVE, CONRAD TYPE
   - B. MATERIALS:
     1. BALLS AND RINGS - CRES AISI 440C, FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITIONS A, RC 56 (MIN) AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151 METHOD 243.
     2. RETAINER - CRES AISI 410 PER QQ-S-763.
   - C. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS + − DECIMALS + − ANGLES + −
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 3
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 30021790120
DRAWN G. KRUK DATE 5-10-63
CHECKED W. Ruggiero
APPROVAL J D Longley 6/25/63
APPROVAL E. Mhoup 6/25/63
NASA APPROVAL W J Rhine 6-26-63
MIT APPROVAL W Kupfer 26 Jun 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE BEARING, BALL, ANNULAR
(METALLIC RETAINER, FLANGED, UNSHIELDED)
(SPECIFICATION CONTROL DRAWING)

CODE IDENT NO. | SIZE C | NASA NUMBER 1011406
SCALE ~ | WEIGHT CALC ACTUAL | SHEET 1 OF 1

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011410

SYM	ZONE	REVISIONS 02560 DESCRIPTION	DATE	APPROVAL

REQUIREMENTS:

1. GENERAL:

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

   C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.

   D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052

   E. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-C-8384

2. INSPECTION AND ACCEPTANCE:

   A. MECHANICAL REQUIREMENTS:

      1. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION PER MIL-STD-129.

      2. PARTS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER PER MIL-STD-130, EXCEPT INK OR PAINT NOT ACCEPTABLE.

      3. MECHANICAL DIMENSIONS AS SHOWN.

      4. CONTACTS 18 #22 PINS .030 ± .001 IN DIAMETER.

      5. ALL PINS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.

      6. ENGAGEMENT: SCREWLOCKS, POLARIZED.

      7. THIS DRAWING SHALL MATE WITH A MATCHING PART NASA DRAWING 1011411 (REF).

      8. WIRE TERMINATION: SOLDER CUP TO ACCOMMODATE #22 AWG STRANDED WIRE.

      9. INSERTION AND WITHDRAWAL FORCE 2 TO 11 OZ/PIN WITH MATING CONNECTOR.

   B. ELECTRICAL REQUIREMENTS:

      1. INSULATION RESISTANCE: 1000 MEGOHMS MIN AT 1000 VDC

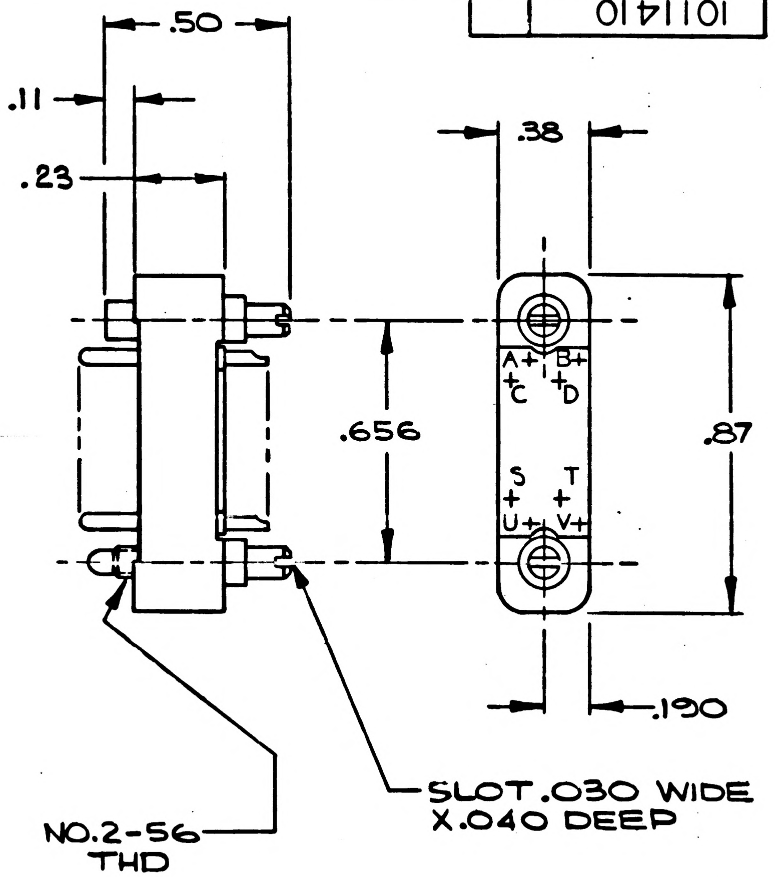
      2. SERVICE RATING: SEA LEVEL 530 V RMS

      3. DIELECTRIC STRENGTH: SEA LEVEL 1600 V RMS

3. DESIGN REQUIREMENTS:

A.	MOUNTING:	PANEL
B.	SERVICE RATING:	70,000 FEET 140 V RMS
C.	DIELECTRIC STRENGTH:	70,000 FEET 425V RMS
D.	INSULATION (BODY):	GLASS FILLED DIALLYL PHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN)
E.	CONTACTS:	PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204, TYPE II, CLASS 2
F.	SCREWLOCKS:	STAINLESS STEEL, PASSIVATED
G.	CONTACT RATING:	3 AMPS
H.	CONTACT CENTER TO CENTER:	3/32 ± .002
I.	SURFACE-CREEPAGE DISTANCE:	1/16 MIN.
J.	AIR SPACE:	.040 MIN.
K.	CONTACT RESISTANCE:	20 MV MAX AT 3 AMPS

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



TOLERANCES:~
TWO PLACE DECIMAL, ±.010
THREE PLACE DECIMAL, ±.005

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOLERANCE	FRACTIONS	DECIMALS	ANGLES
TOL ON	+ -	+ -	+ -

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 68502018601

DRAWN Pizzo DATE
CHECKED
APPROVAL C.F. Costey 8/9/63
APPROVAL E. Thomas 8-12-63
NASA APPROVAL W J Rhine 8-14-63
MIT APPROVAL W Kupfer 14 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE CONNECTOR, ELECTRICAL RECTANGULAR, 18 # 22 PIN CONTACTS SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011410
SCALE ~
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011410

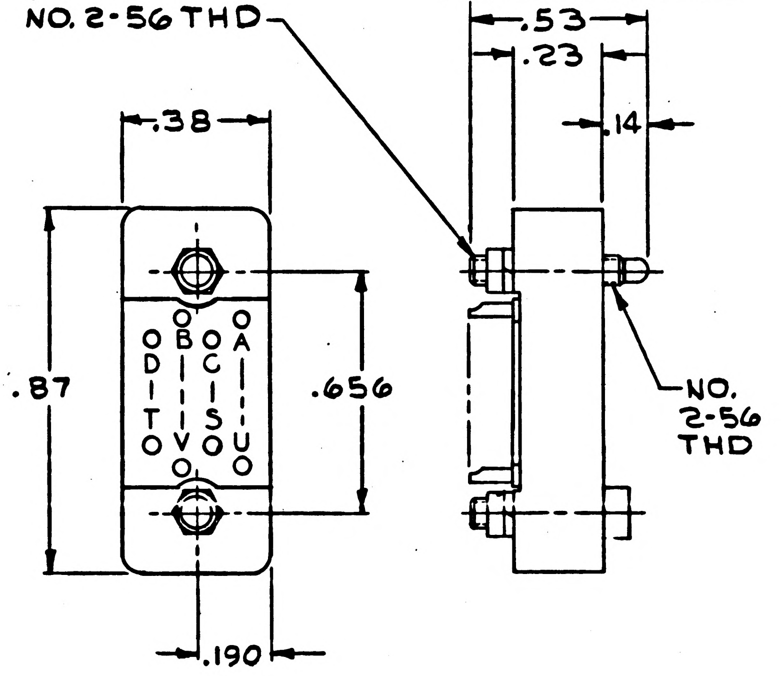
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS 02560				

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.
   - D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052
   - E. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF ______, MIL-C-8384
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS
     1. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION PER MIL-STD-129.
     2. PARTS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER PER MIL-STD-130, EXCEPT INK OR PAINT NOT ACCEPTABLE.
     3. MECHANICAL DIMENSIONS AS SHOWN.
     4. CONTACTS 18 #22 SOCKETS TO ACCOMMODATE .030 ± .001 IN. PIN DIAMETER.
     5. ALL SOCKETS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.
     6. ENGAGEMENT: SCREWLOCKS, POLARIZED.
     7. THIS DRAWING SHALL MATE WITH A MATCHING PART NASA DRAWING 1011410 (REF).
     8. WIRE TERMINATION: SOLDER CUP TO ACCOMMODATE #22 AWG STRANDED WIRE.
     9. INSERTION AND WITHDRAWAL FORCE 2 TO 11 OZ/PIN WITH MATING CONNECTOR.
   - B. ELECTRICAL REQUIREMENTS:
     1. INSULATION RESISTANCE: 1000 MEGOHMS MIN AT 1000 VDC
     2. SERVICE RATING: SEA LEVEL 530 V RMS
     3. DIELECTRIC STRENGTH: SEA LEVEL 1600 V RMS
3. DESIGN REQUIREMENTS:

A.	MOUNTING:	PANEL
B.	SERVICE RATING:	70,000 FEET 140 V RMS
C.	DIELECTRIC STRENGTH:	70,000 FEET 425 V RMS
D.	INSULATION (BODY):	GLASS FILLED DIALLYL PHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN)
E.	CONTACTS:	PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204, TYPE I, CLASS 2
F.	SCREWLOCKS:	STAINLESS STEEL, PASSIVATED
G.	CONTACT RATING:	3 AMPS
H.	CONTACT CENTER TO CENTER:	3/32 ± .002
I.	SURFACE-CREEPAGE DISTANCE:	1/16 MIN.
J.	AIR SPACE:	.040 MIN.
K.	CONTACT RESISTANCE:	20 MV MAX AT 3 AMPS

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



TOLERANCES:~
TWO PLACE DECIMAL, ±.010
THREE PLACE DECIMAL, ±.005

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ −	+ −	+ −

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 68502018701
DRAWN G. KRUK DATE 5-21-63
CHECKED
APPROVAL G. Costey
APPROVAL 8-12-63
NASA APPROVAL W J Rhine 8-14-63
MIT APPROVAL W Kupfer 14 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE CONNECTOR, ELECTRICAL RECTANGULAR, 18 NO. 22 SOCKET CONTACTS SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011411
SCALE ~	WEIGHT CALC ACTUAL	SHEET 1 OF 1

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011411

1011415 A

REVISIONS TDRR 01905

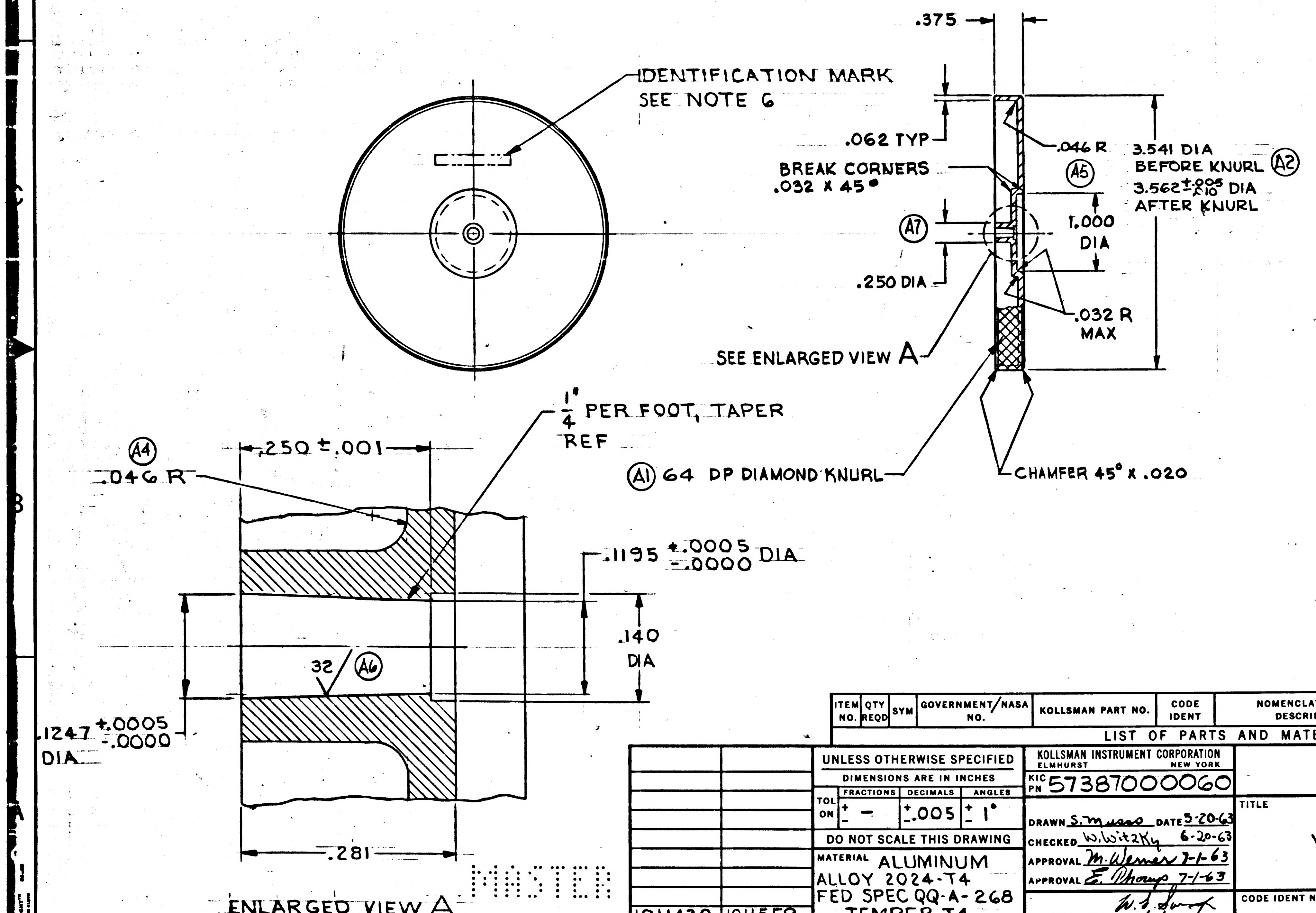
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A7	–	REVISED PER TDRR NO. 03346	9/26/63	

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 125/ FINISH ALL OVER.

(A3)

4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: SULFURIC ANODIZE PER MIL-A-8625, TYPE II (KPS.1005A.200). COLOR NO. 26440 PER FED. STD. 595
6. IDENTIFY PER ND1002019 · NASA PART NO. REV LETTER AND MFR'S SYM (KIC.)


IDENTIFICATION MARK
SEE NOTE 6
.375
.062 TYP
.046 R
(A5)
3.541 DIA BEFORE KNURL (A2)
3.562 +.005 −.010 DIA AFTER KNURL
BREAK CORNERS .032 X 45°
1.000 DIA
(A7)
.250 DIA
.032 R MAX
SEE ENLARGED VIEW A
1/4" PER FOOT, TAPER REF
(A1) 64 DP DIAMOND KNURL
CHAMFER 45° X .020
(A4)
.046 R
.250 ±.001
.1195 +.0005 −.0000 DIA
.140 DIA
32 (A6)
.1247 +.0005 −.0000 DIA
.281
MASTER

ENLARGED VIEW A
SCALE 10:1

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011430	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± –	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 2024-T4 FED SPEC QQ-A-268 TEMPER T4

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK

KIC PN 57387000060

DRAWN S. Museo DATE 5-20-63
CHECKED W. Witzky 6-20-63
APPROVAL M. Werner 7-1-63
APPROVAL E. Thomp 7-1-63
NASA APPROVAL W. S. Swof 7/3/63
MIT APPROVAL W Kupfer 3 July 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE WHEEL, MANUAL

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011415

SCALE 1:1 WEIGHT CALC ACTUAL SHEET 1 OF 1

E-184

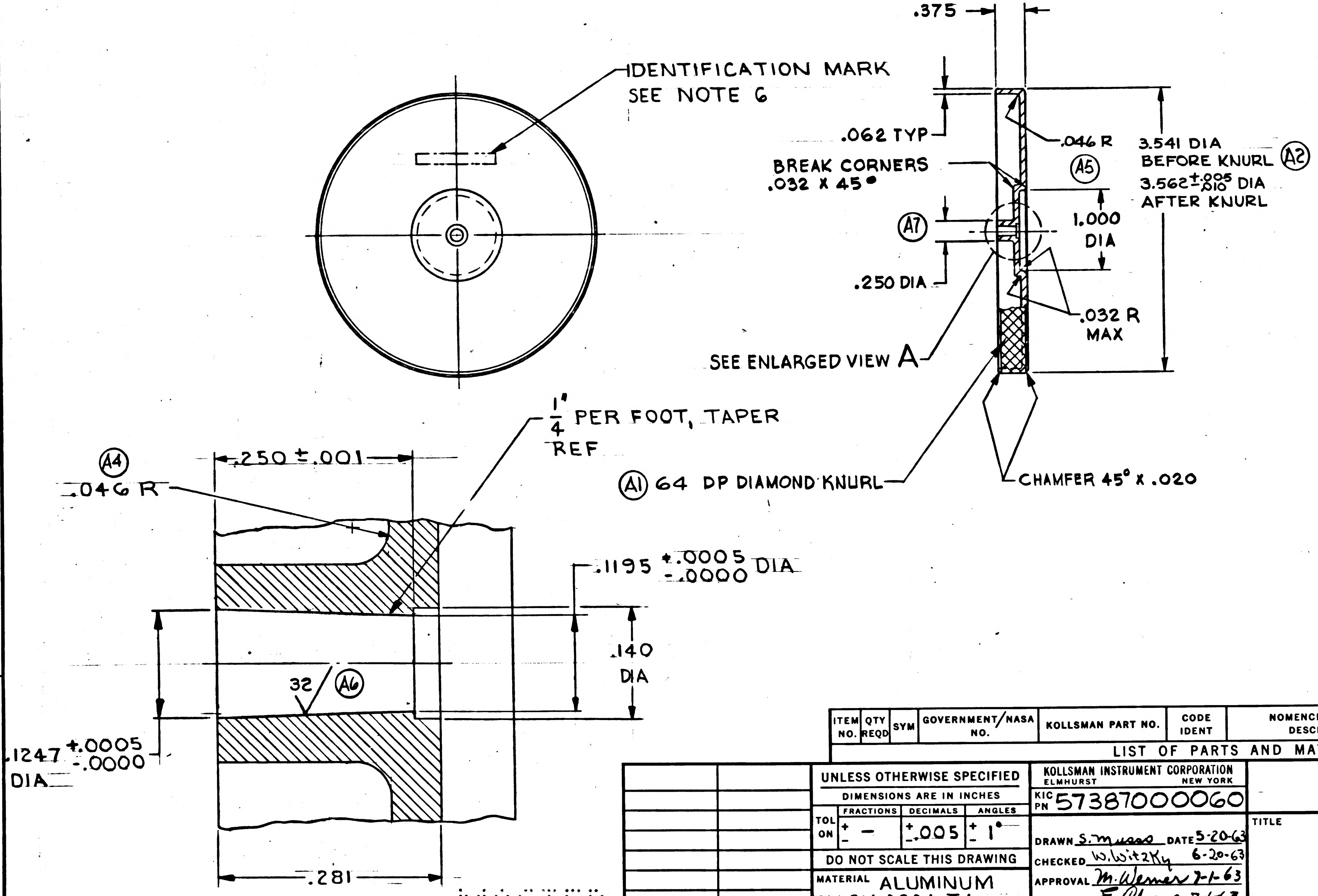
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

B	1011415

REVISIONS TDRR 01905				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A7	-	REVISED PER TDRR NO. 03346	9/26/63	
B		REVISED PER TDRR NO. 05010	12/10/63	

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 125/ FINISH ALL OVER.
   (A3)
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: SULPHURIC ANODIZE PER MIL-A-8625 TYPE II (DYED GRAY) TO APPROXIMATE COLOR NO. 26440 PER FED. STD. 595. (B)
6. IDENTIFY PER ND1002019. NASA PART NO. REV LETTER AND MFR'S SYM (KIC.)


IDENTIFICATION MARK SEE NOTE 6
.375
.062 TYP
.046 R
BREAK CORNERS .032 X 45°
(A5)
3.541 DIA BEFORE KNURL (A2)
3.562 +.005 -.010 DIA AFTER KNURL
(A7)
1.000 DIA
.250 DIA
.032 R MAX
SEE ENLARGED VIEW A
1/4" PER FOOT, TAPER REF
(A1) 64 DP DIAMOND KNURL
CHAMFER 45° X .020
(A4) .046 R
.250 ±.001
.1195 +.0005 -.0000 DIA
.140 DIA
32 (A6)
.1247 +.0005 -.0000 DIA
.281

ENLARGED VIEW A
SCALE 10:1

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011430	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± –	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 2024-T4 FED SPEC QQ-A-268 TEMPER T4

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK

KIC PN 57387000060

DRAWN S. Musso DATE 5-20-63
CHECKED W. Witzky 6-20-63
APPROVAL M. Werner 7-1-63
APPROVAL E. Phoup 7-1-63
NASA APPROVAL W. S. [illegible] 7/3/63
MIT APPROVAL [illegible] 3 July 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE WHEEL, MANUAL

CODE IDENT NO.
SIZE C
NASA NUMBER 1011415
SCALE 1:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-184

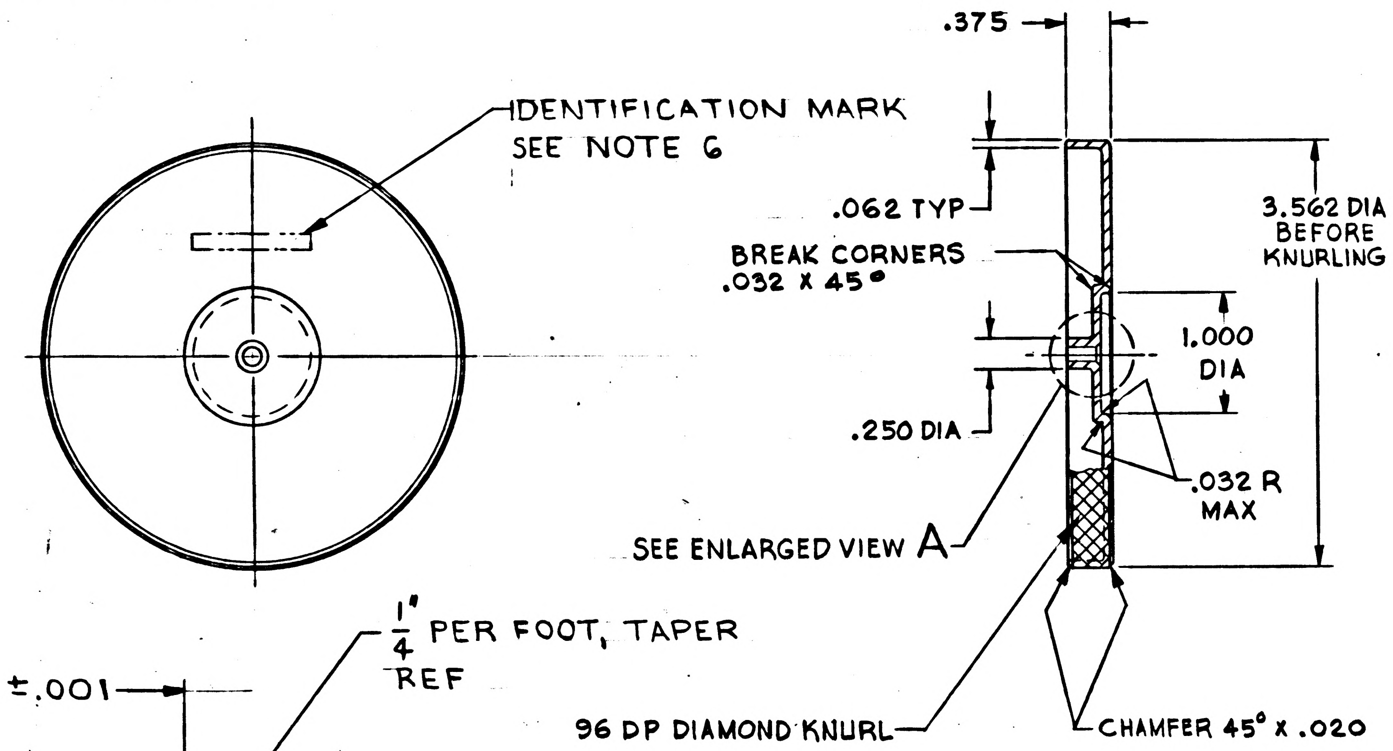
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

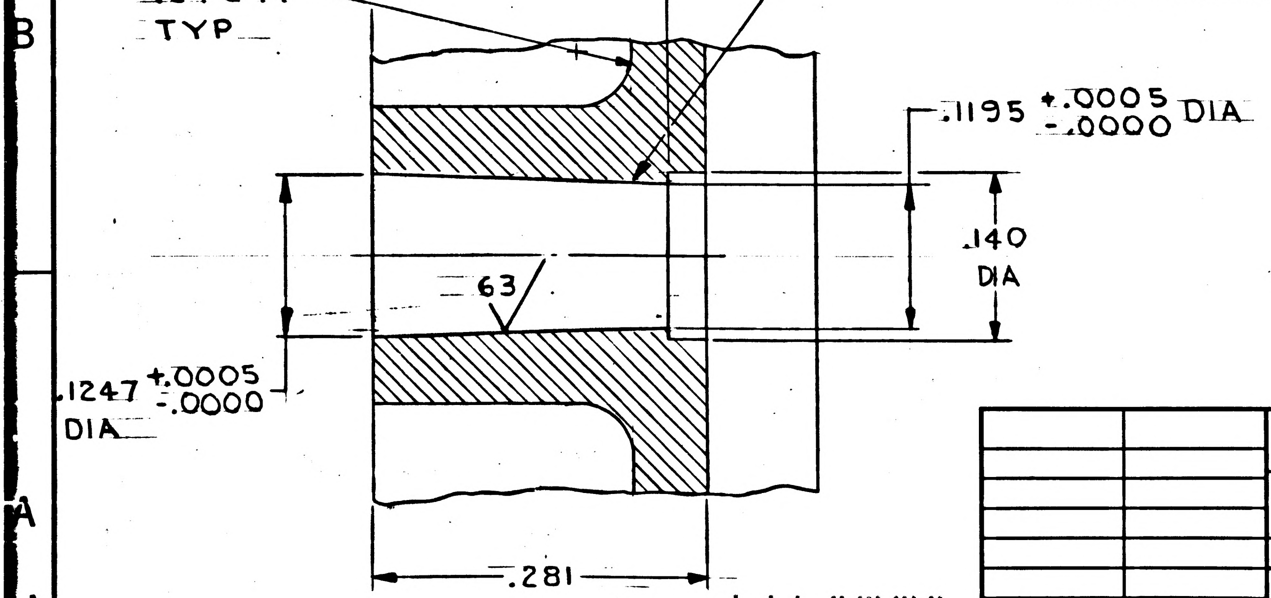
1011415

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS TDRR 01905				

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. $^{125}\surd$ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: SULFURIC ANODIZE PER MIL-A-8625, TYPE II (KPS.1005A.200). COLOR NO. 26440 PER FED. STD. 595
6. IDENTIFY PER ND1002019. NASA PART NO. REV LETTER AND MFR'S SYM (KIC.)


IDENTIFICATION MARK
SEE NOTE 6
.375
.062 TYP
BREAK CORNERS
.032 X 45°
3.562 DIA
BEFORE
KNURLING
1.000
DIA
.250 DIA
.032 R
MAX
SEE ENLARGED VIEW A
96 DP DIAMOND KNURL
CHAMFER 45° X .020


1/4" PER FOOT, TAPER
REF
.250 ±.001
.046 R
TYP
.1195 +.0005 -.0000 DIA
.140
DIA
63
.1247 +.0005 -.0000
DIA
.281

ENLARGED VIEW A
SCALE 10:1

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011430	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± 1°

DO NOT SCALE THIS DRAWING
MATERIAL ALUMINUM ALLOY 2024-T4 FED SPEC QQ-A-268 TEMPER T4
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57387000060

DRAWN S. Musso DATE 5-20-63
CHECKED W. Witzky 6-20-63
APPROVAL M. Werner 7-1-63
APPROVAL E. Thorup 7-1-63
NASA APPROVAL W. S. [illegible] 7/3/63
MIT APPROVAL W. [illegible] 3 July 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
WHEEL, MANUAL

CODE IDENT NO.
SIZE C
NASA NUMBER 1011415
SCALE 1:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

K&E
E-184

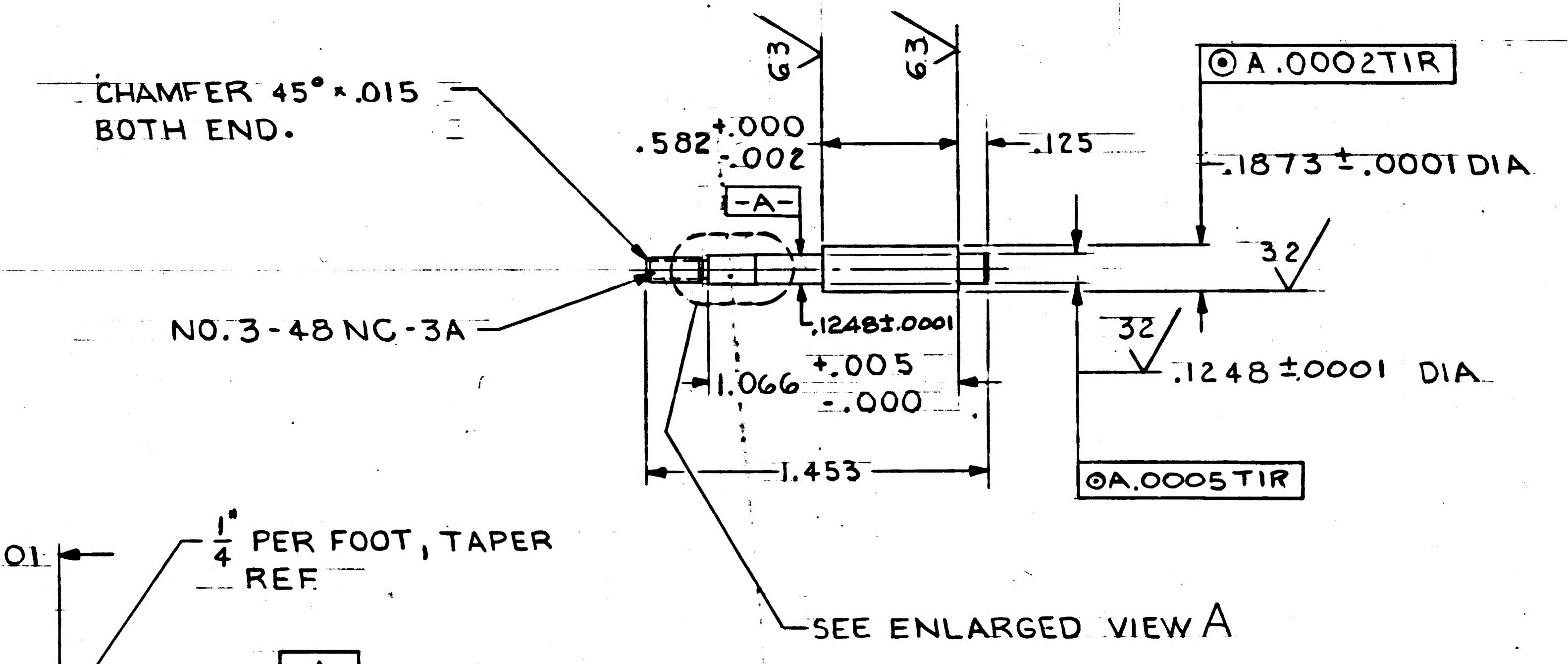
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011415

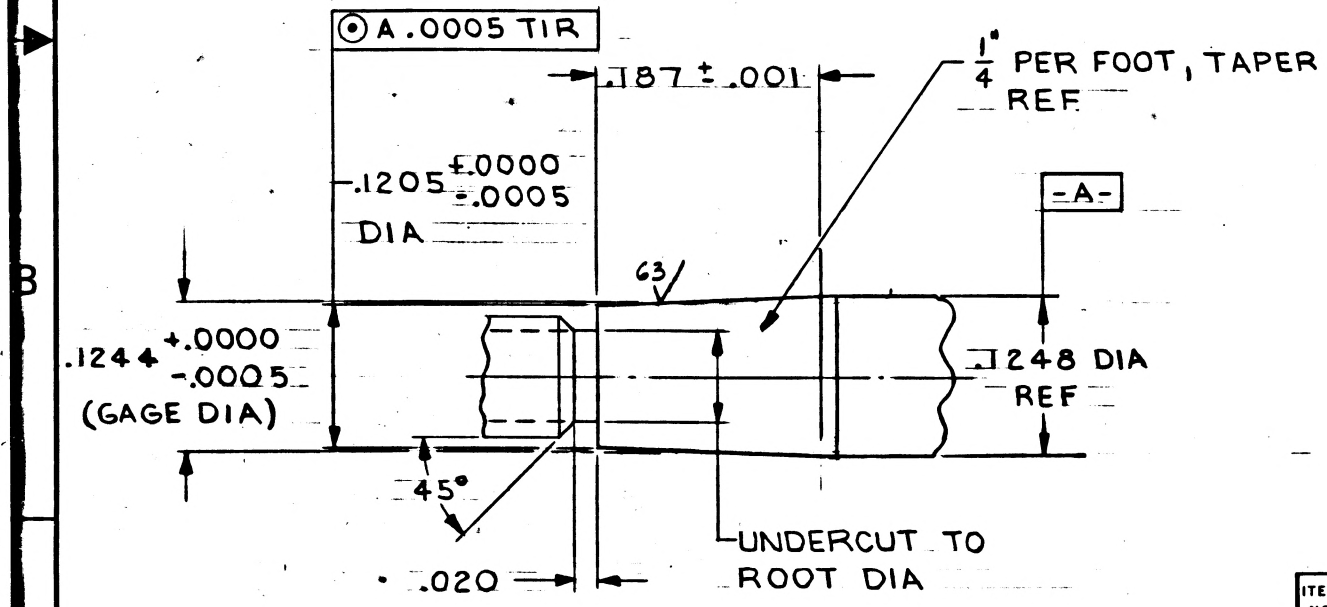
1011417

REVISIONS TDRR 01905				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. .125/ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. FINISH: PASSIVATE PER MIL-STD-171 (KPS1005I.200)
6. IDENTIFY PER ND1002019
   PART NO., REV LETTER AND MFR'S SYM (KIC).



CHAMFER 45° × .015
BOTH END.
NO. 3-48 NC-3A
63
63
.582 +.000 -.002
-A-
.125
⊙ A .0002 TIR
.1873 ±.0001 DIA
32
.1248 ±.0001
32
.1248 ±.0001 DIA
1.066 +.005 -.000
1.453
⊙ A .0005 TIR
SEE ENLARGED VIEW A



⊙ A .0005 TIR
.187 ±.001
1/4° PER FOOT, TAPER
REF
.1205 +.0000 -.0005
DIA
-A-
63
.1244 +.0000 -.0005
(GAGE DIA)
.1248 DIA
REF
45°
.020
UNDERCUT TO
ROOT DIA

ENLARGED VIEW A
SCALE 10:1

ACTUAL SIZE
1.500

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011430	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± -	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL STAINLESS STEEL AISI 303 FED SPEC QQ-S-763, CLASS 303 COND A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 5738700 0070

DRAWN S. Musso DATE 5-18-63
CHECKED W. Witzky 6-20-63
APPROVAL M. Werner 7-1-63
APPROVAL E. Thomp 7-1-63
NASA APPROVAL 7/31/63
MIT APPROVAL W. Kupfer 7/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SHAFT, GEAR
MANUAL

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011417

SCALE 2:1 WEIGHT CALC ACTUAL SHEET 1 OF 1

1011417

K+E
E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

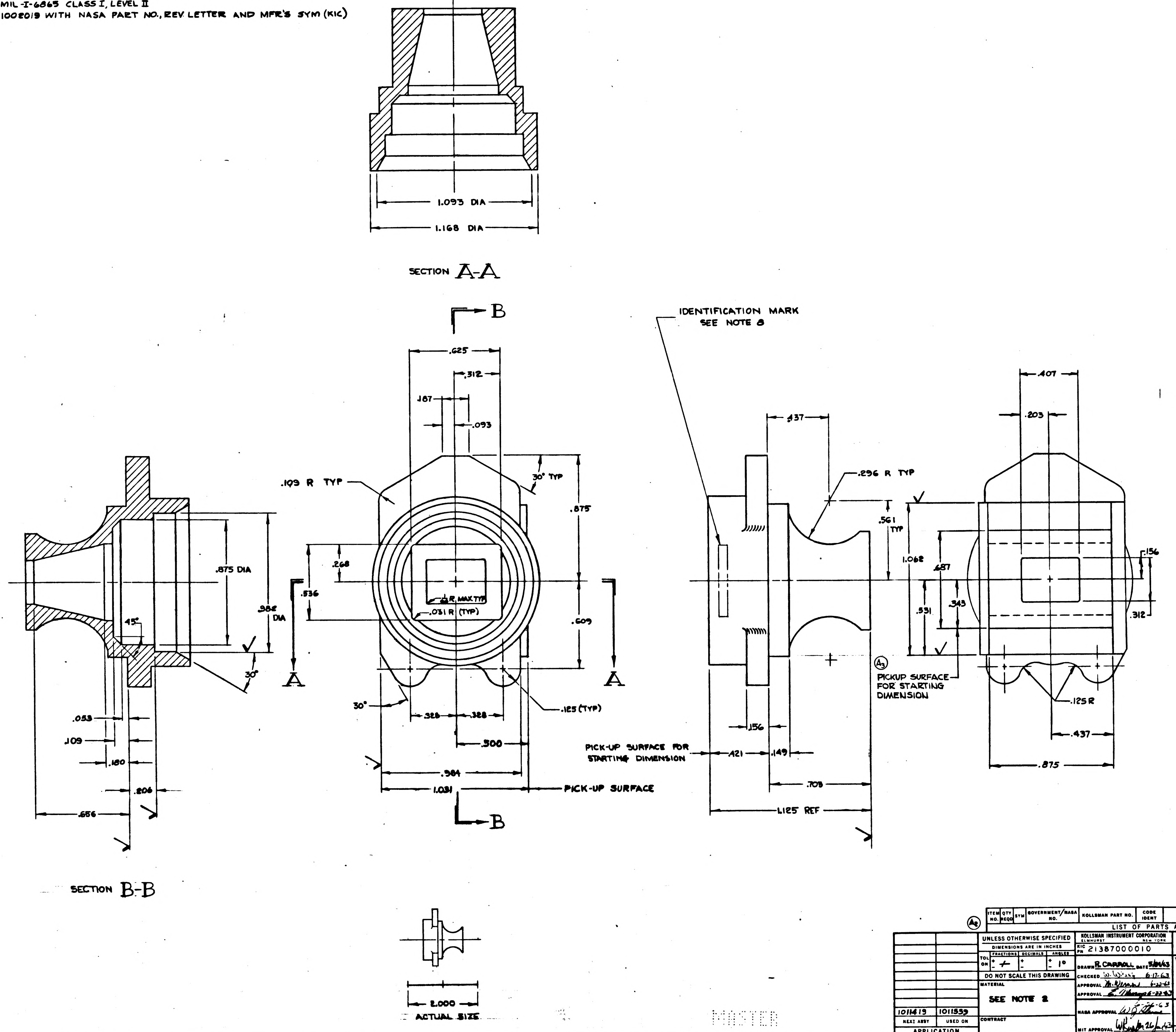
A | 1011418 | Ⓜ

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A_3		REVISED PER TDRR NO. 02963	5/5/63	Lig

REVISIONS 01739

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. MATERIAL: INVESTMENT CASTING, ALUMINUM ALLOY 356-T6
   FED SPEC QQ-A-601C (EQUIVALENT) ALLOY 356 COND T6
3. ALL FILLETS AND RADII TO BE 1/16 MAX UNLESS OTHERWISE NOTED.
4. SURFACES MARKED √ WILL BE MACHINED. .031 MATERIAL HAS BEEN INCLUDED FOR MACHINING
5. (A_1) CASTING DIMENSIONS TO HAVE A TOLERANCE OF ±.005/INCH OR ±.005 WHICHEVER IS GREATER UNLESS OTHERWISE SPECIFIED.
6. CASTING TO BE FREE OF BLOWHOLES, INCLUSIONS, AND OTHER IMPEFECTIONS.
7. PART TO BE PENETRANT INSPECTED PER MIL-I-6866 METHOD II, RADIOGRAPHIC
   INSPECTION MIL-I-6865 CLASS I, LEVEL II
8. IDENTIFY PER ND1002019 WITH NASA PART NO., REV LETTER AND MFR'S SYM (KIC)



1.093 DIA
1.168 DIA
SECTION A-A
B
B
IDENTIFICATION MARK
SEE NOTE 8
.625
.312
.187
.093
.109 R TYP
30° TYP
.875
.268
.536
.875 DIA
.982 DIA
1/32 R MAX TYP
.031 R (TYP)
.609
45°
30°
A
A
30°
.328
.328
.125 (TYP)
.053
.109
.180
.206
.656
.300
.984
1.031
PICK-UP SURFACE
.437
.296 R TYP
.561 TYP
1.062
.687
.531
.343
.407
.203
.156
.312
(A_3) PICKUP SURFACE FOR STARTING DIMENSION
.125 R
.437
.875
.156
PICK-UP SURFACE FOR STARTING DIMENSION
.121
.149
.708
1.125 REF
SECTION B-B
2.000
ACTUAL SIZE

MASTER

(A_2)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011419	1011539

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± | DECIMALS ± | ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL: SEE NOTE 2
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 21387000010
DRAWN R. CARROLL DATE 5/31/63
CHECKED W. Wizang 6-17-63
APPROVAL M. Wesner 6-22-63
APPROVAL E. Tillmanns 6-22-63
NASA APPROVAL W. J. Kline 6-26-63
MIT APPROVAL W Kupfer 26 Jun 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BLOCK, APERTURE
(CASTING)

CODE IDENT NO.
SIZE E
NASA NUMBER 1011418
SCALE 4:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
PHOTOGRAPHIC SCALE ONLY

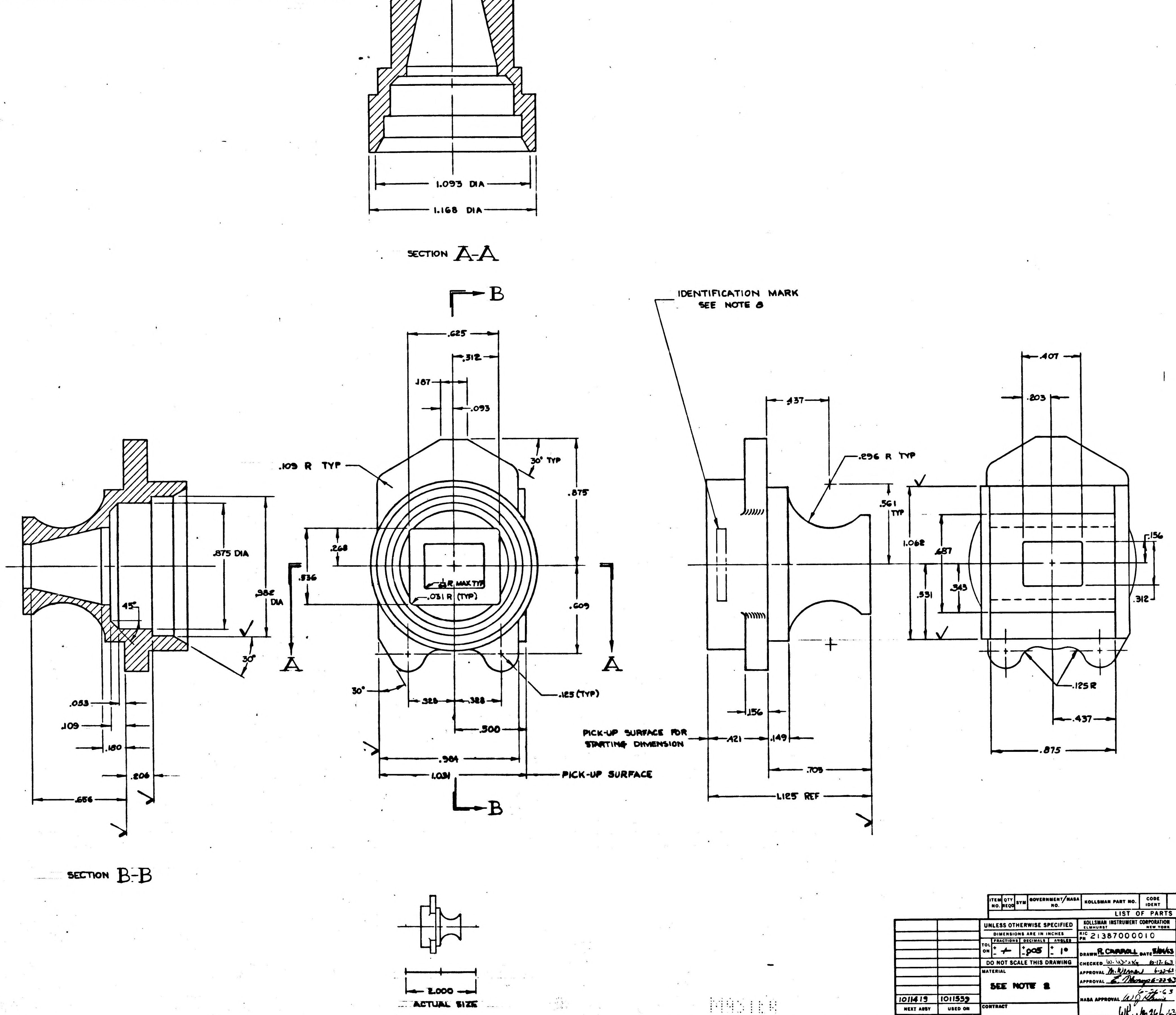
1011418

REVISIONS

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. MATERIAL: INVESTMENT CASTING, ALUMINUM ALLOY 356-T6
   FED. SPEC QQ-A-601C (EQUIVALENT) ALLOY 356 COND T6
3. ALL FILLETS AND RADII TO BE 1/16 MAX UNLESS OTHERWISE NOTED.
4. SURFACES MARKED √ WILL BE MACHINED. .031 MATERIAL HAS BEEN INCLUDED FOR MACHINING
5. CASTING DIMENSIONS TO HAVE A TOLERANCE OF ±.005/INCH OR .005 WHICHEVER IS GREATER. UNLESS OTHERWISE SPECIFIED.
6. CASTING TO BE FREE OF BLOWHOLES, INCLUSIONS, AND OTHER IMPEFECTIONS.
7. PART TO BE PENETRANT INSPECTED PER MIL-I-6866 METHOD II, RADIOGRAPHIC INSPECTION MIL-I-6865 CLASS I, LEVEL II
8. IDENTIFY PER ND1002019 WITH NASA PART NO., REV LETTER AND MFR'S SYM (KIC)


1.093 DIA
1.168 DIA
SECTION A-A
B
.625
.312
.187
.093
.109 R TYP
30° TYP
.875
.268
.536
.609
.875 DIA
.982 DIA
45°
30°
.031 R MAX TYP
.031 R (TYP)
A
A
30°
.328
.388
.125 (TYP)
.500
.984
1.031
PICK-UP SURFACE
.053
.109
.180
.206
.656
B
SECTION B-B
IDENTIFICATION MARK SEE NOTE 8
.437
.296 R TYP
.561 TYP
1.062
.156
PICK-UP SURFACE FOR STARTING DIMENSION
.421
.149
.709
1.125 REF
.407
.203
.687
.531
.343
.156
.312
.125 R
.437
.875
2.000
ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011419	1011559
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — ; DECIMALS ±.005 ; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL: SEE NOTE 2
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 21387000010
DRAWN R. CARROLL DATE 5/31/63
CHECKED W. Wi. [illegible] 6-17-63
APPROVAL M. Wiesman 6-22-63
APPROVAL E. Mangus 6-22-63
NASA APPROVAL W J [illegible] 6-24-63
MIT APPROVAL W Kupfer 26 Jun 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BLOCK, APERTURE
(CASTING)

CODE IDENT NO.
SIZE E
NASA NUMBER 1011418
SCALE 4:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

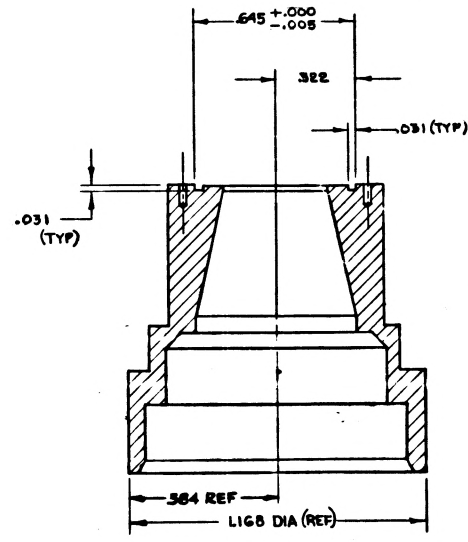
1011418

1011419 A

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A 8		REVISED PER TDRR NO. 0336y	9/25/63	9/26

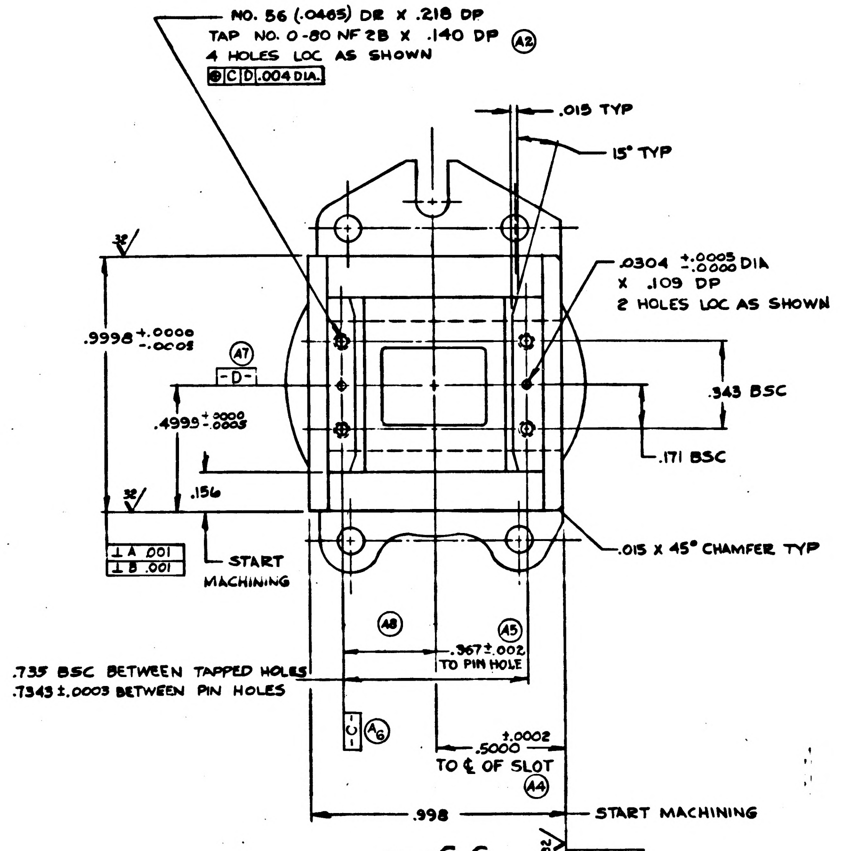
REVISIONS 01739

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 125√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: BLACK ANODIZE (CHROMIC) PER MIL-A-8625, TYPE I BLACK, (KPS-1005A.102)
   ALL UNMACHINED SURFACES TO BE PAINTED PER FED SPEC TT-E-527
   COLOR NO. 37038 PER FED STD 595.
6. IDENTIFY PER ND1002019 WITH NASA PART NO., REV LETTER AND MFR'S SYM (KIC).



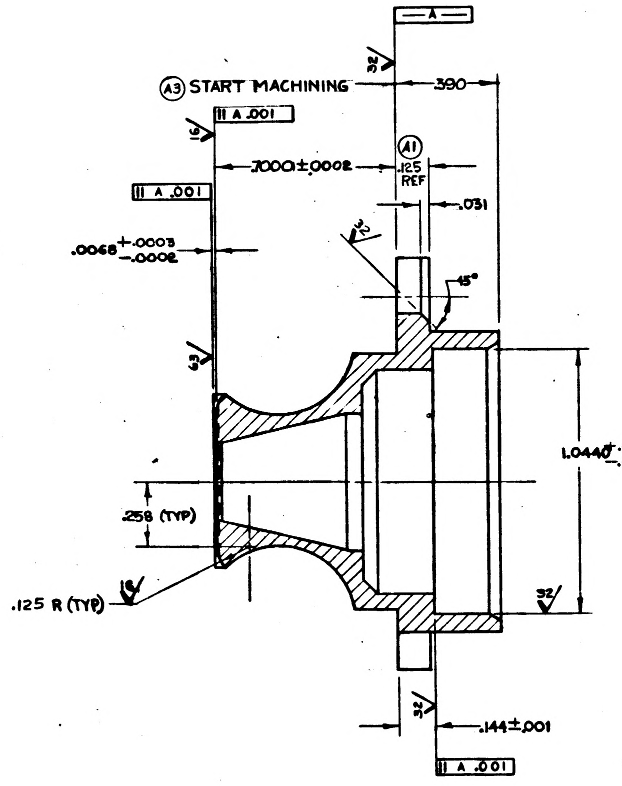
.645 +.000 −.005
.322
.031 (TYP)
.031 (TYP)
.384 REF
1.168 DIA (REF)

SECTION A-A



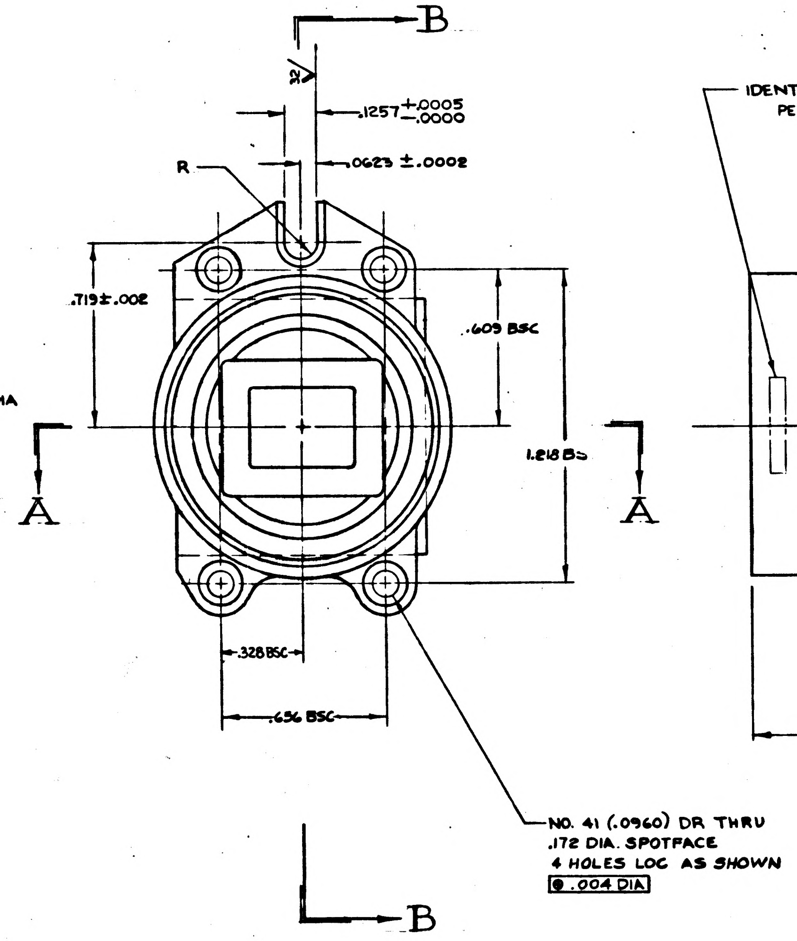
NO. 56 (.0465) DR X .218 DP
TAP NO. 0-80 NF 2B X .140 DP
4 HOLES LOC AS SHOWN
C D .004 DIA.
A2
.015 TYP
15° TYP
.0304 +.0005 −.0000 DIA
X .109 DP
2 HOLES LOC AS SHOWN
.9998 +.0000 −.0005
A7
-D-
.4999 +.0000 −.0005
.343 BSC
.171 BSC
.156
A .001
B .001
START MACHINING
.015 X 45° CHAMFER TYP
A8
A5
.367 ±.002 TO PIN HOLE
.735 BSC BETWEEN TAPPED HOLES
.7343 ±.0003 BETWEEN PIN HOLES
-C-
A6
.5000 ±.0002 TO ℄ OF SLOT
A4
.998
START MACHINING
A .001
-B-

VIEW C-C

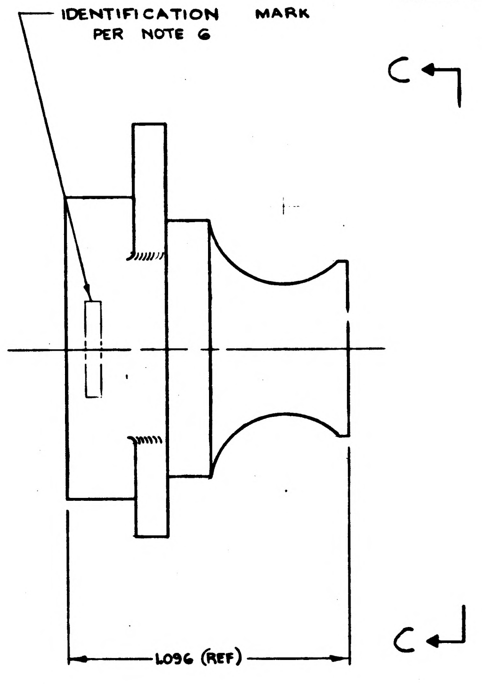


-A-
A3 START MACHINING
A .001
.390
.7000 ±.0002
A1
.125 REF
.031
A .001
.0068 +.0003 −.0002
45°
1.0440 +.0015 −.0000 DIA
.258 (TYP)
.125 R (TYP)
.144 ±.001
A .001

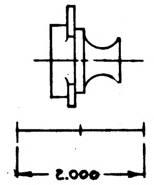
SECTION B-B



B
R
.1257 +.0005 −.0000
.0623 ±.0002
.719 ±.002
.609 BSC
1.218 BSC
A
A
.328 BSC
.656 BSC
NO. 41 (.0960) DR THRU
.172 DIA. SPOTFACE
4 HOLES LOC AS SHOWN
.004 DIA
B



IDENTIFICATION MARK
PER NOTE 6
C
C
1.096 (REF)



ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011420	1011359

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64, DECIMALS ±.005, ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL 1011418
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 50387000020
DRAWN B. CARROLL DATE 5/20/63
CHECKED W. Witsky 6-17-63
APPROVAL 6-13-63
APPROVAL E. Thomas 6-22-63
NASA APPROVAL 6-26-63
MIT APPROVAL 26 Jun 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BLOCK, APERTURE
(MACHINING)

CODE IDENT NO.
SIZE E
NASA NUMBER 1011419
SCALE 4:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

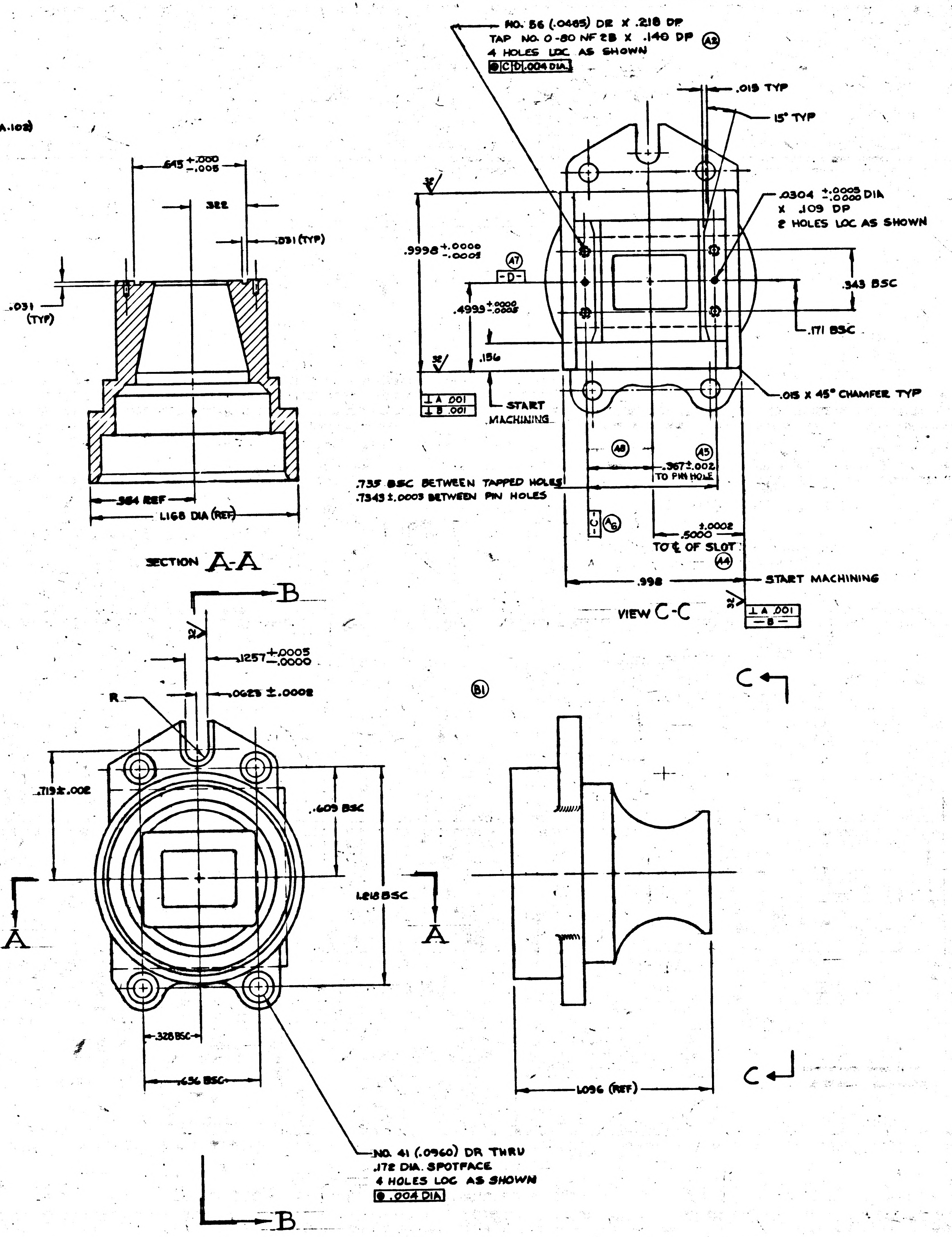
INCHES
PHOTOGRAPHIC SCALE ONLY

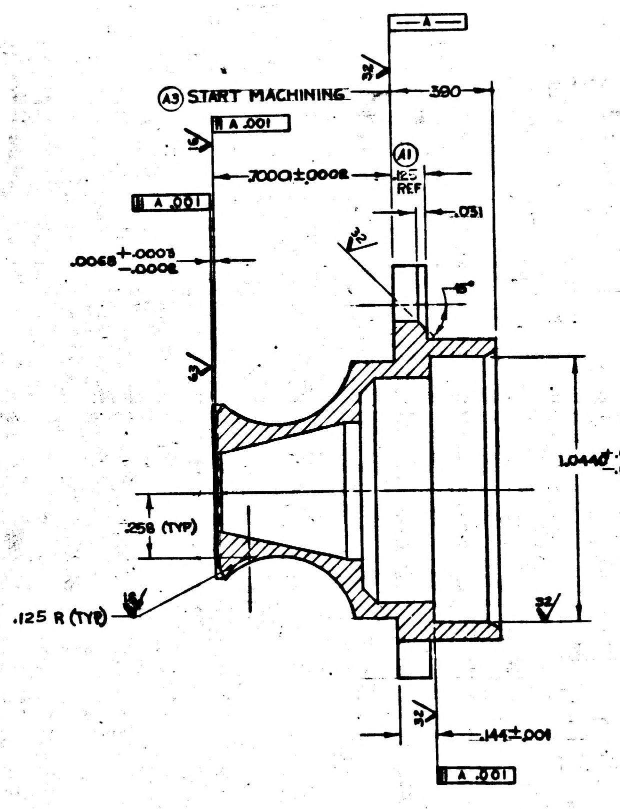
B 1011419

REVISIONS 01739				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A8		REVISED PER TDRR NO. 03364	9/25/63	9/20
B3		REVISED PER TDRR NO. 07141	3/31/64	WK

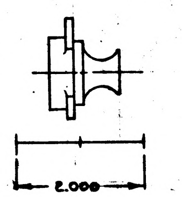
NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 125√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: BLACK ANODIZE (CHROMIC) PER MIL-A-8625, TYPE I BLACK, (KPS-1005A.102) ALL UNMACHINED SURFACES TO BE PAINTED PER FED SPEC TT-E-527 COLOR NO. 37038 PER FED STD 595.

Ⓑ2


.645 +.000 −.005
.322
.031 (TYP)
.031 (TYP)
.364 REF
1.168 DIA (REF)
SECTION A-A
NO. 56 (.0465) DR X .218 DP
TAP NO. 0-80 NF 2B X .140 DP Ⓐ2
4 HOLES LOC AS SHOWN
◎ C D .004 DIA.
.015 TYP
15° TYP
.0304 +.0005 −.0000 DIA
X .109 DP
2 HOLES LOC AS SHOWN
.9998 +.0000 −.0005
Ⓐ7
-D-
.4999 +.0000 −.0005
.343 BSC
.171 BSC
.156
32
⊥ A .001
⊥ B .001
START MACHINING
.015 X 45° CHAMFER TYP
Ⓐ8
Ⓐ5
.367 ±.002 TO PIN HOLE
.735 BSC BETWEEN TAPPED HOLES
.7343 ±.0003 BETWEEN PIN HOLES
-C- Ⓐ6
±.0002 .5000
TO ℄ OF SLOT
Ⓐ4
.998
START MACHINING
⊥ A .001
—B—
VIEW C-C
B
32
.1257 +.0005 −.0000
R
.0625 ±.0002
.719 ±.002
.609 BSC
1.218 BSC
A
A
.328 BSC
.656 BSC
NO. 41 (.0960) DR THRU
.172 DIA. SPOTFACE
4 HOLES LOC AS SHOWN
◎ .004 DIA
B
Ⓑ1
C
1.096 (REF)
C


—A—
32
Ⓐ3 START MACHINING
.390
∥ A .001
16
Ⓐ1
.7000 ±.0002
.125 REF
∥ A .001
.031
32
.0068 +.0003 −.0002
15°
63
1.0440 +.0015 −.0000 DIA
.258 (TYP)
16
.125 R (TYP)
32
32
.144 ±.001
∥ A .001

SECTION B-B



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011444	1011359
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING
MATERIAL 1011418
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 50387000020
DRAWN B. CARROLL
CHECKED W. Witzky 6-11-63
APPROVAL 6-20-63
APPROVAL 6-22-63
NASA APPROVAL W.G. 6-26-63
MIT APPROVAL 26 Jun 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BLOCK, APERTURE
(MACHINING)

CODE IDENT NO.
SIZE E
NASA NUMBER 1011419
SCALE 4:1
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

Ⓑ2

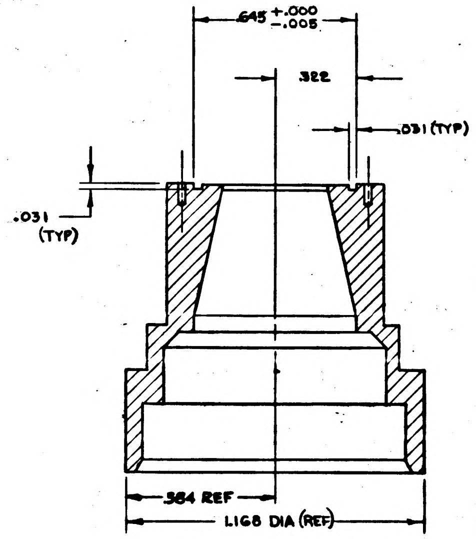
MASTER

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 125√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
(C1) 5. FINISH: ANODIZE (CHROMIC) PER MIL-A-8625, TYPE I, DYED BLACK.
(B2)

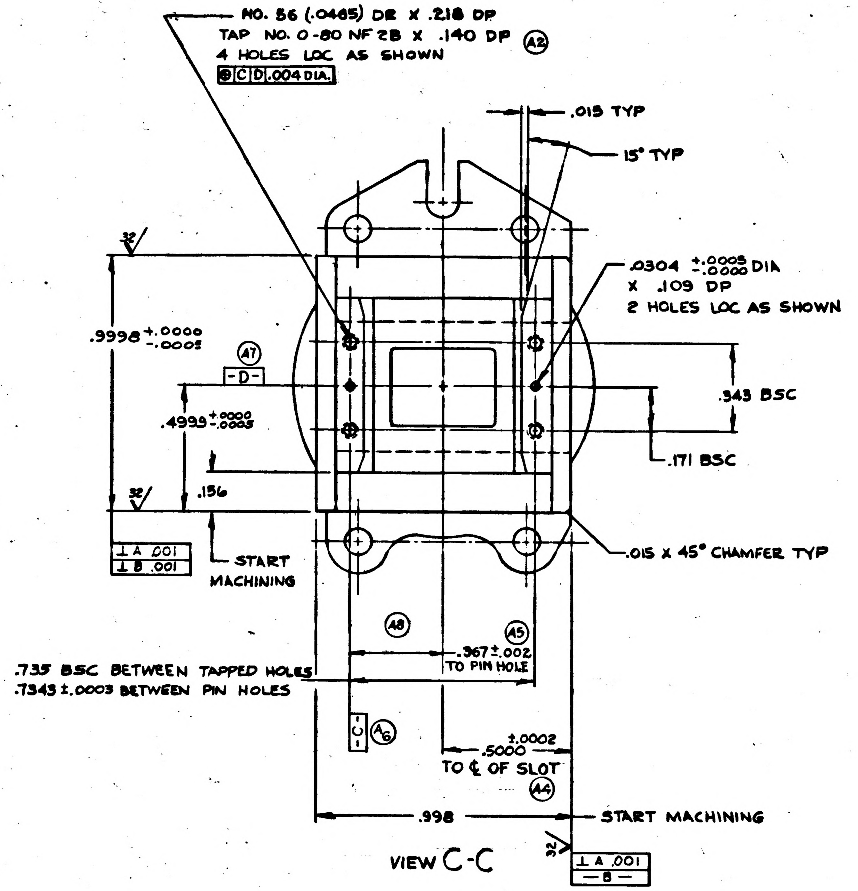
1011419 C

REVISIONS 01739

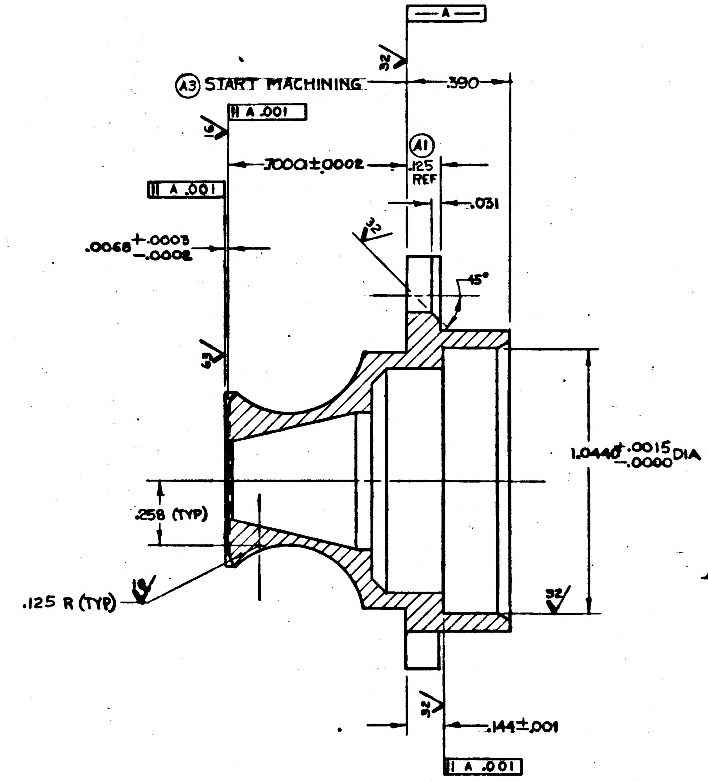
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A 8		REVISED PER TDRR NO. 0336y	9/25/63	9/20
B 3		REVISED PER TDRR NO. 07141	3/31/64	WK
C		REVISED PER TDRR NO. 07859	28 APR 64	WK


.645 +.000 −.005
.322
.031 (TYP)
.031 (TYP)
.384 REF
1.168 DIA (REF)

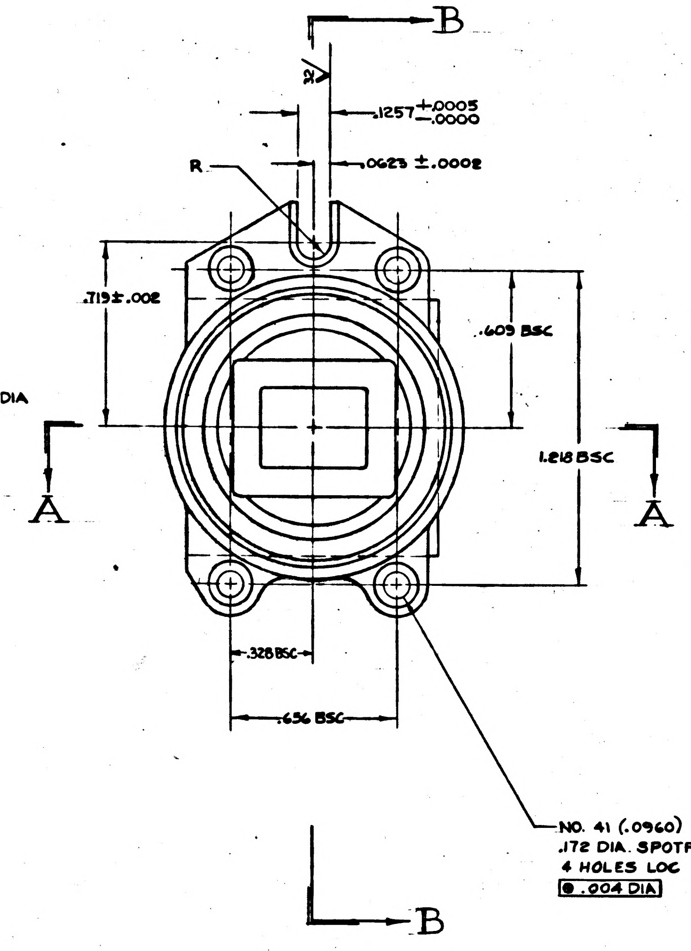
SECTION A-A


NO. 56 (.0465) DR X .218 DP
TAP NO. 0-80 NF 2B X .140 DP (A2)
4 HOLES LOC AS SHOWN
⊕ C D .004 DIA.
.015 TYP
15° TYP
32
.9998 +.0000 −.0005
(A7)
-D-
.4999 +.0000 −.0005
.156
32
⊥ A .001
⊥ B .001
START MACHINING
.0304 +.0005 −.0000 DIA
X .109 DP
2 HOLES LOC AS SHOWN
.343 BSC
.171 BSC
.015 X 45° CHAMFER TYP
(A8)
(A5)
.367 ±.002 TO PIN HOLE
.735 BSC BETWEEN TAPPED HOLES
.7343 ±.0003 BETWEEN PIN HOLES
-C- (A6)
±.0002
.5000
TO ℄ OF SLOT
(A4)
.998
START MACHINING
32
⊥ A .001
-B-

VIEW C-C

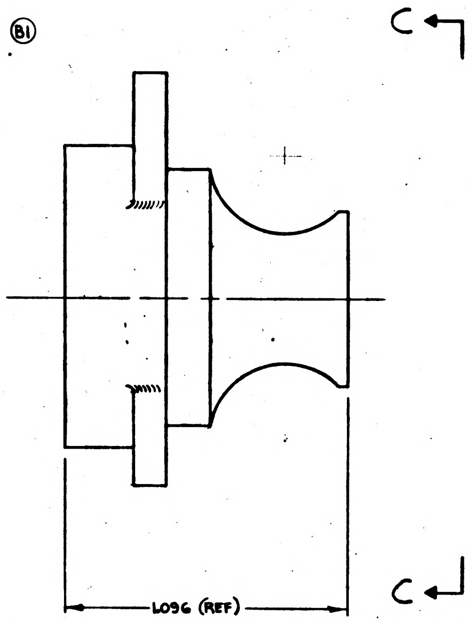

-A-
32
(A3) START MACHINING
.390
∥ A .001
16
.7000 ±.0002
(A1)
.125 REF
.031
∥ A .001
.0068 +.0003 −.0002
32
45°
63
1.0440 +.0015 −.0000 DIA
.258 (TYP)
.125 R (TYP)
16
32
32
.144 ±.001
∥ A .001

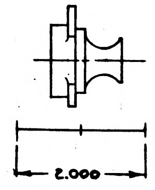
SECTION B-B


B
32
.1257 +.0005 −.0000
R
.0623 ±.0002
.719 ±.002
.609 BSC
1.218 BSC
A
A
.328 BSC
.656 BSC
B

NO. 41 (.0960) DR THRU
.172 DIA. SPOTFACE
4 HOLES LOC AS SHOWN
⊕ .004 DIA

(B1)





ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011444	1011559

APPLICATION

(B2)

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING
MATERIAL 1011418
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 50387000020
DRAWN B. CARROLL DATE 6-13-63
CHECKED W. Witzky 6-17-63
APPROVAL M. Alperner 6-22-63
APPROVAL E. Thomas 6-22-63
NASA APPROVAL W. J. Rhine 6-26-63
MIT APPROVAL W. Fiske 21 June 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BLOCK, APERTURE
(MACHINING)

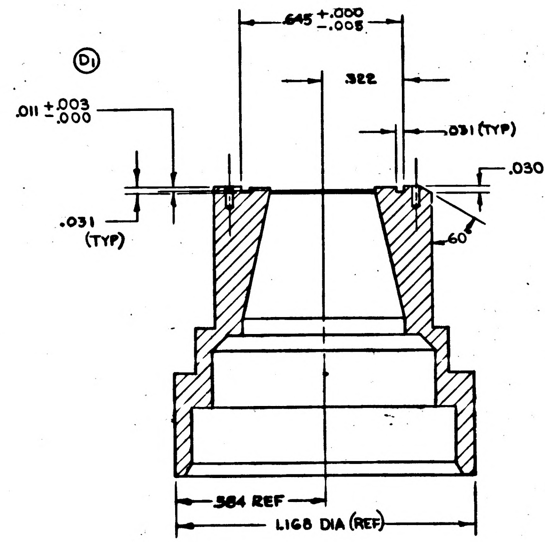
CODE IDENT NO.
SIZE E
NASA NUMBER 1011419
SCALE 4:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 125√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
(C1) 5. FINISH: ANODIZE (CHROMIC) PER MIL-A-8625, TYPE I, DYED BLACK.
(B2)

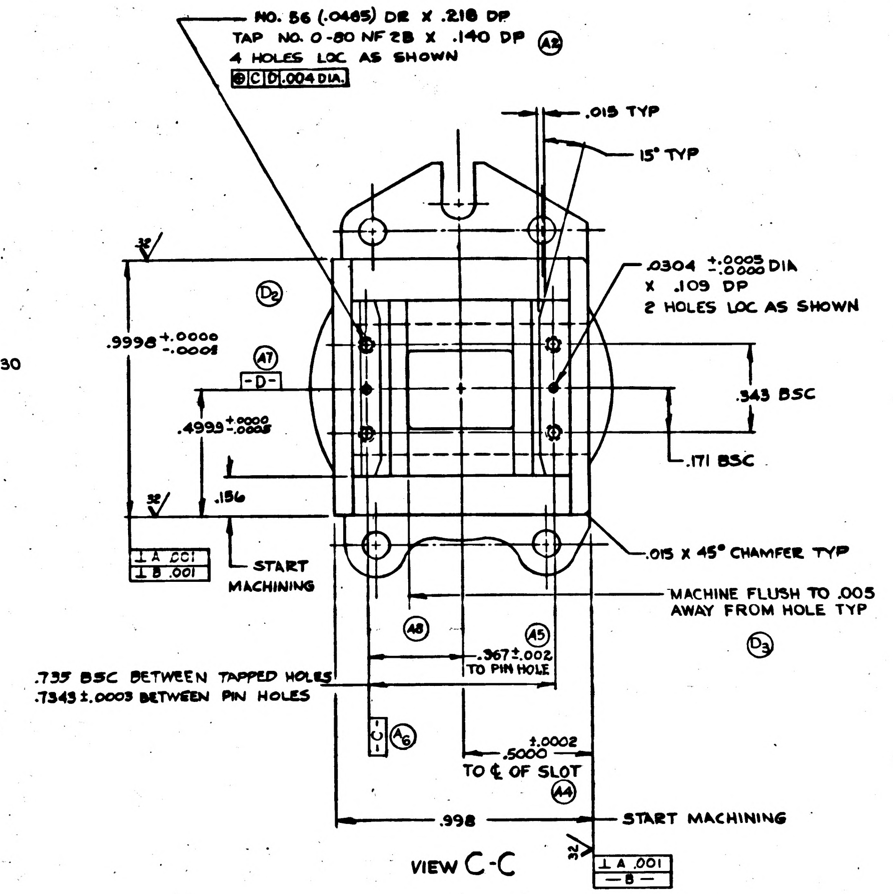
D 1011419

REVISIONS 01739

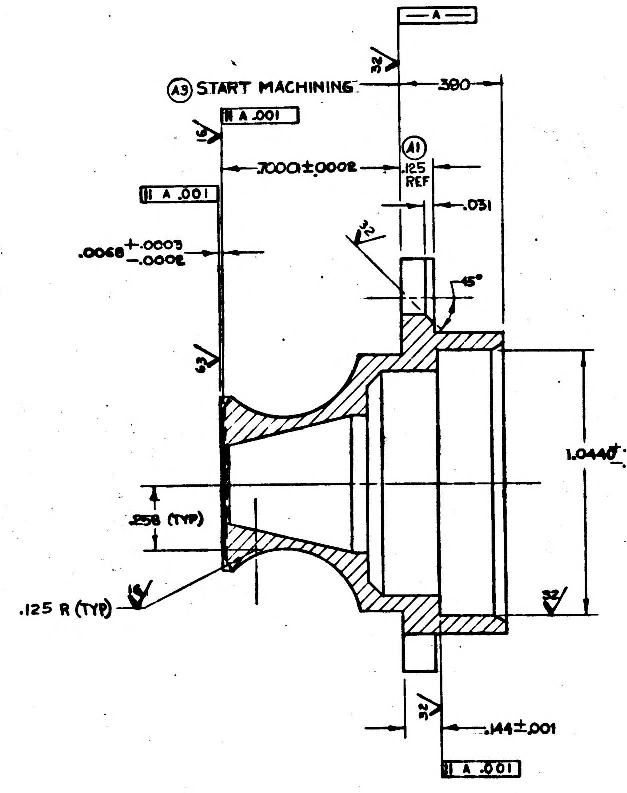
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A8		REVISED PER TDRR NO. 03364	9/25/63	
B3		REVISED PER TDRR NO. 07141	3/31/64	
C		REVISED PER TDRR NO. 07859	28 APR 64	
D3		REVISED PER TDRR NO. 11219	4 AUG 64	


(D1)
.645 +.000 −.005
.322
.011 +.003 −.000
.031 (TYP)
.030
.031 (TYP)
60°
.384 REF
1.168 DIA (REF)

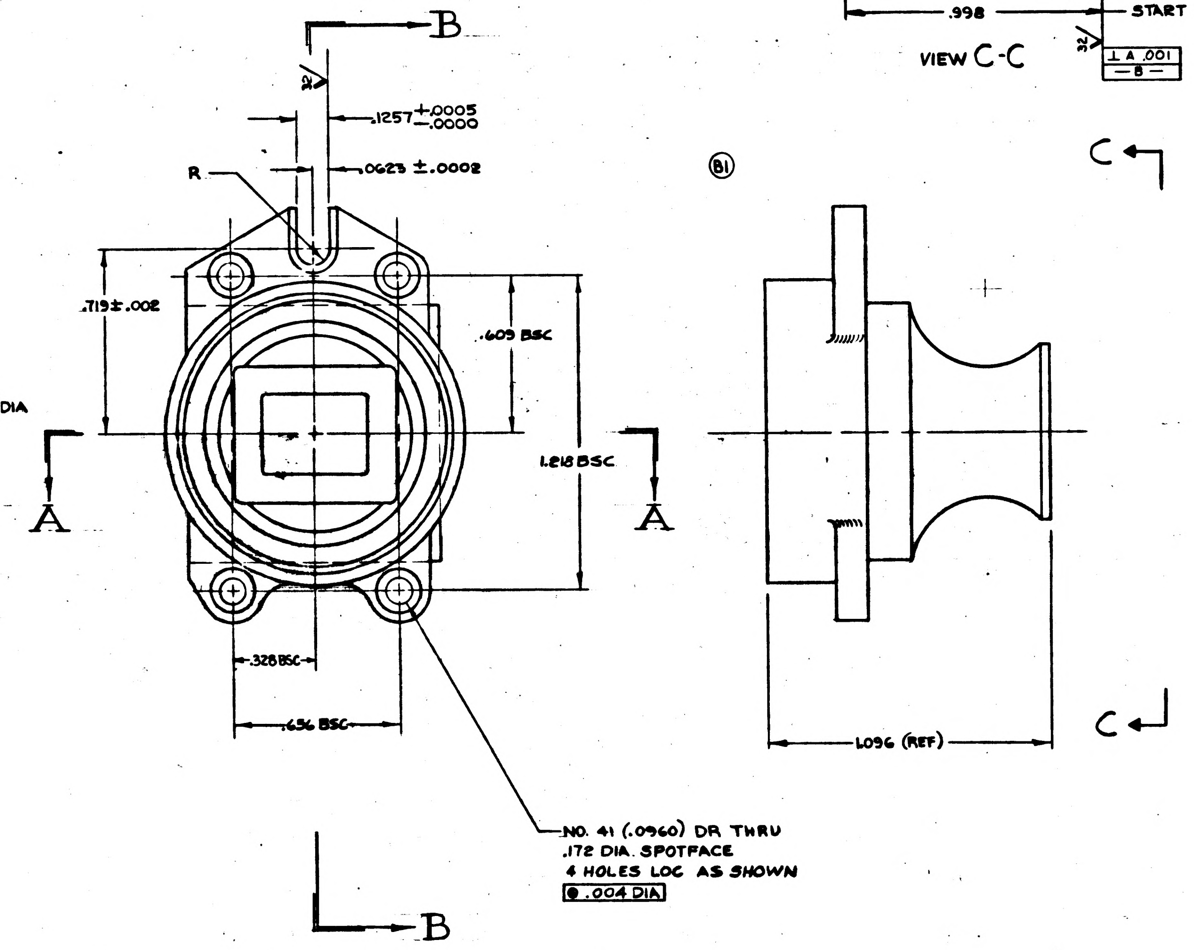
SECTION A-A

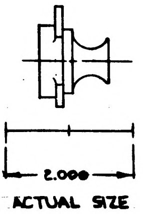

NO. 56 (.0465) DR X .218 DP
TAP NO. 0-80 NF 2B X .140 DP (A2)
4 HOLES LOC AS SHOWN
⊕ C D .004 DIA.
.015 TYP
15° TYP
.0304 +.0005 −.0000 DIA
X .109 DP
2 HOLES LOC AS SHOWN
(D2)
.9998 +.0000 −.0005
(A7)
-D-
.4999 +.0000 −.0005
.343 BSC
.171 BSC
.156
⊥ A .001
⊥ B .001
START MACHINING
.015 X 45° CHAMFER TYP
MACHINE FLUSH TO .005 AWAY FROM HOLE TYP
(D3)
(A8)
(A5)
.367 ±.002 TO PIN HOLE
.735 BSC BETWEEN TAPPED HOLES
.7343 ±.0003 BETWEEN PIN HOLES
-C- (A6)
.5000 ±.0002 TO ℄ OF SLOT
(A4)
.998
START MACHINING
⊥ A .001
-B-

VIEW C-C


-A-
(A3) START MACHINING
.380
∥ A .001
.7000 ±.0002
(A1)
.125 REF
.031
∥ A .001
.0068 +.0005 −.0002
45°
1.0440 +.0015 −.0000 DIA
.258 (TYP)
.125 R (TYP)
.144 ±.001
∥ A .001

SECTION B-B


B
.1257 +.0005 −.0000
R
.0625 ±.0002
.719 ±.002
.609 BSC
1.218 BSC
A
A
.328 BSC
.656 BSC
NO. 41 (.0960) DR THRU
.172 DIA. SPOTFACE
4 HOLES LOC AS SHOWN
⊕ .004 DIA
B
(B1)
C
C
1.096 (REF)



ACTUAL SIZE

MASTER

(B2)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011444	1011399

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64 DECIMALS ± .005 ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL 1011418
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 50387000020
DRAWN B. CARROLL DATE 6/63
CHECKED W. Witaky 6-17-63
APPROVAL M. Wernon 6-22-63
APPROVAL E. Thomas 6-22-63
NASA APPROVAL W.J. Rhine 6-26-63
MIT APPROVAL W. Coffey 26 Jun 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BLOCK, APERTURE
(MACHINING)

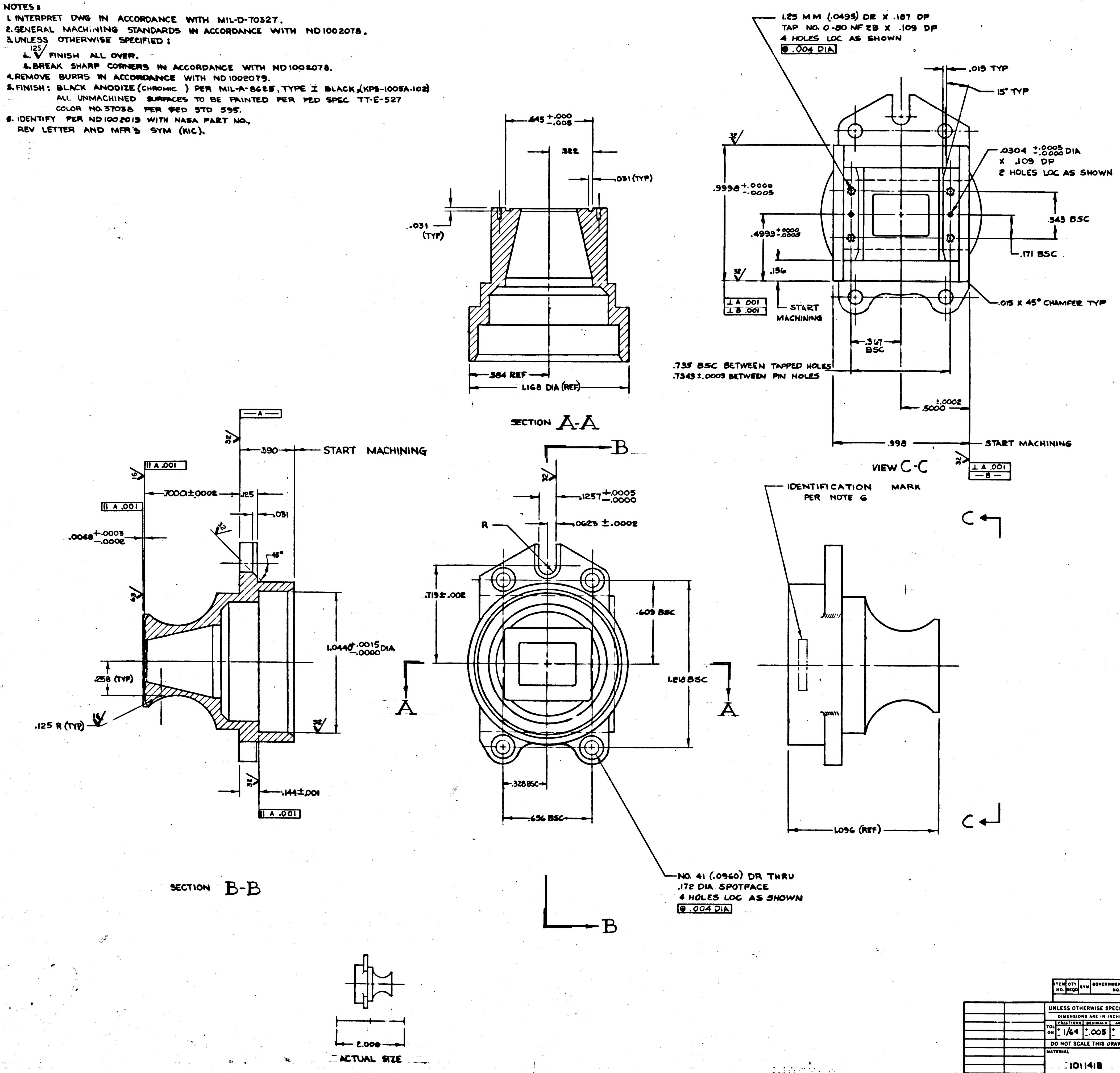
CODE IDENT NO.
SIZE E
NASA NUMBER 1011419
SCALE 4:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

	1011419

REVISIONS 01739				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   - a. $\sqrt{}^{125}$ FINISH ALL OVER.
   - b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: BLACK ANODIZE (CHROMIC) PER MIL-A-8625, TYPE I BLACK, (KPS-1005A.102) ALL UNMACHINED SURFACES TO BE PAINTED PER FED SPEC TT-E-527 COLOR NO. 37038 PER FED STD 595.
6. IDENTIFY PER ND1002019 WITH NASA PART NO., REV LETTER AND MFR'S SYM (KIC).



1.25 MM (.0495) DR X .187 DP
TAP NO. 0-80 NF 2B X .109 DP
4 HOLES LOC AS SHOWN
⊕ .004 DIA
.015 TYP
15° TYP
.0304 +.0005 -.0000 DIA
X .109 DP
2 HOLES LOC AS SHOWN
.9998 +.0000 -.0005
.4999 +.0000 -.0005
.156
.543 BSC
.171 BSC
.015 X 45° CHAMFER TYP
⊥ A .001
⊥ B .001
START MACHINING
.367 BSC
.735 BSC BETWEEN TAPPED HOLES
.7345 ±.0003 BETWEEN PIN HOLES
.5000 +.0002
.998
START MACHINING
VIEW C-C
⊥ A .001
B
.645 +.000 -.005
.322
.031 (TYP)
.031 (TYP)
.584 REF
1.168 DIA (REF)
SECTION A-A
A
32
.390
START MACHINING
∥ A .001
.7000 ±.0002
.125
.031
∥ A .001
.0068 +.0003 -.0002
45°
1.0440 +.0015 -.0000 DIA
.258 (TYP)
.125 R (TYP)
.144 ±.001
∥ A .001
SECTION B-B
B
.1257 +.0005 -.0000
.0625 ±.0002
R
.719 ±.002
.609 BSC
1.218 BSC
A
A
.328 BSC
.656 BSC
NO. 41 (.0960) DR THRU
.172 DIA. SPOTFACE
4 HOLES LOC AS SHOWN
⊕ .004 DIA
B
IDENTIFICATION MARK PER NOTE 6
C
C
1.096 (REF)
2.000
ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011420	1011359

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL 1011418

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 50387000020

DRAWN	B. CARROLL	DATE [illegible]
CHECKED	W. Witzky	6-17-63
APPROVAL	M. [illegible]	6-22-63
APPROVAL	E. Thomas	6-22-63
NASA APPROVAL	W. J. [illegible]	6-26-63
MIT APPROVAL	[illegible]	26 Jun 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BLOCK, APERTURE
(MACHINING)

CODE IDENT NO.	SIZE	NASA NUMBER
	E	1011419

SCALE 4:1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

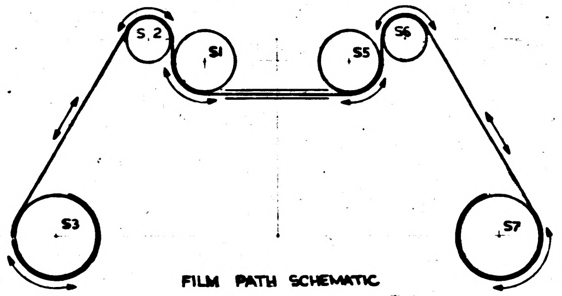
MASTER

1011420 A

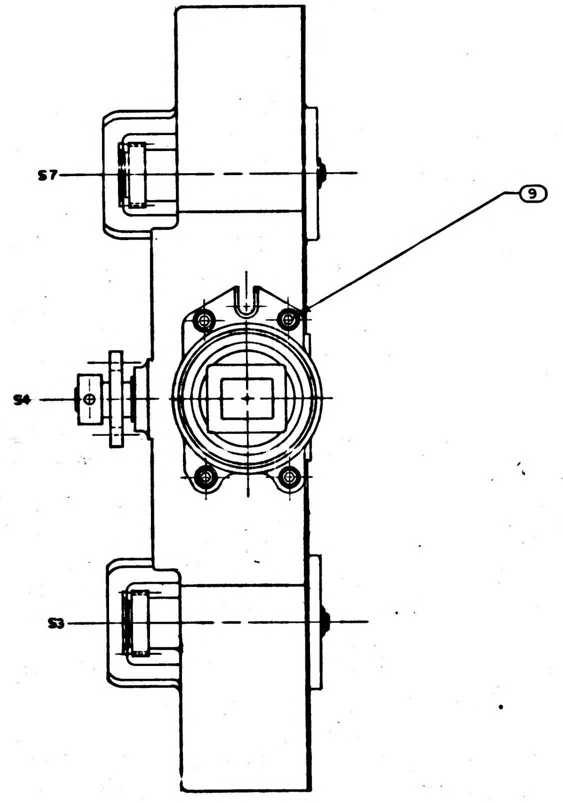
SYM	ZONE	REVI DESCRIPTION	DATE	APPROVAL
A		REVISED PE TDRR NO. Q7872	4/7/6	WK

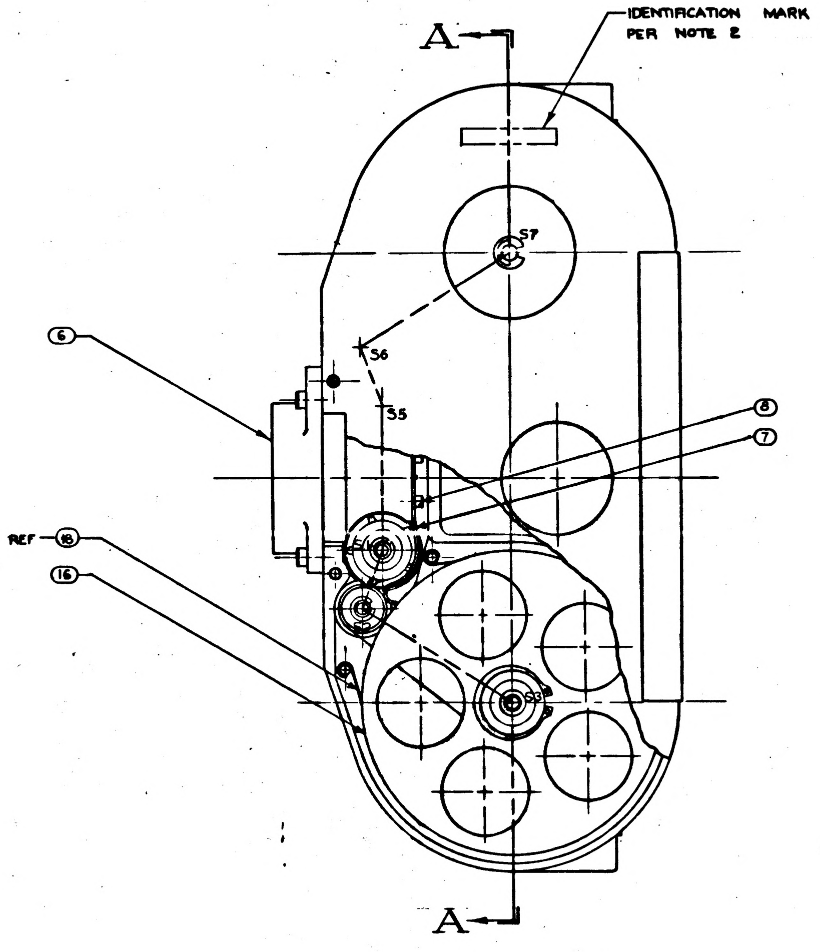
NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY PER ND1002019 WITH NASA PART NO., REV LETTER AND MFRS SYM (KIC).
3. ASSEMBLE AND TEST IN ACCORDANCE WITH ATP 1011420.
4. FINAL ACCEPTANCE TEST IN ACCORDANCE WITH FTM 1011420.

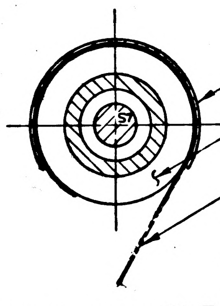


FILM PATH SCHEMATIC

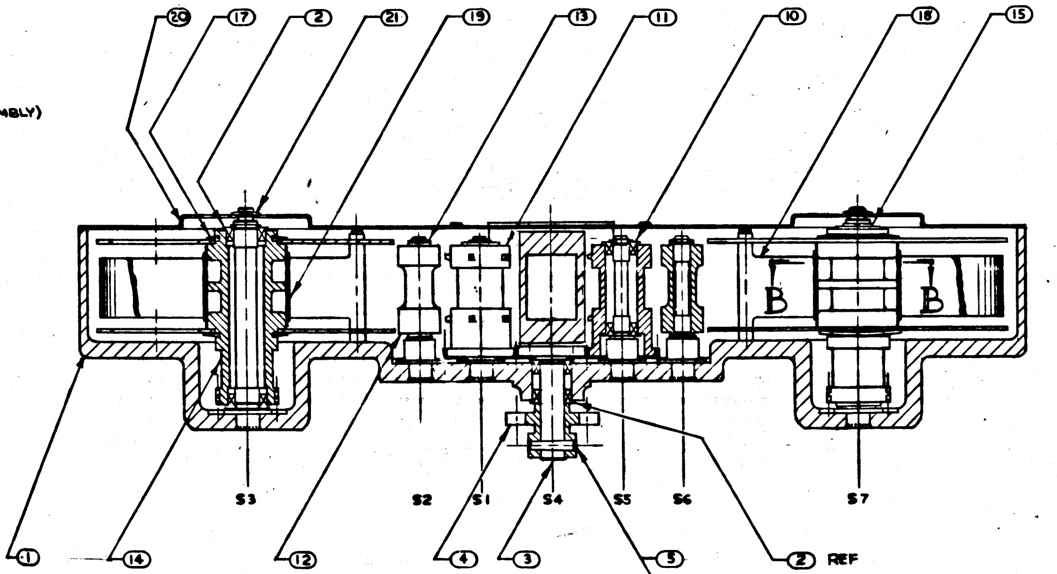




REFERENCE DWG:-
GEAR SCHEMATIC 1011527

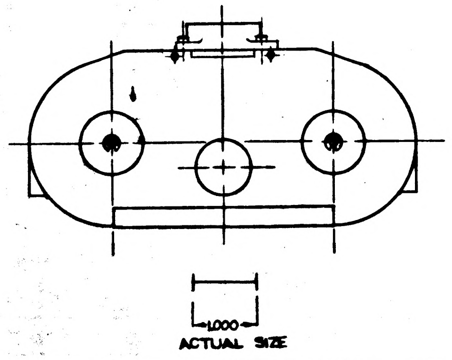


PARTIAL SECTION B-B
SCALE - 4:1



NO. 55 (.052) DR THRU
REAM FOR NO. 7/0 x 3/8 PIN
RECESS LARGE END 1/32 ± 0/1/64 BELOW
SURFACE AND STAKE 3 PLACES.

PARTIAL SECTION A-A



MASTER

	ITEM NO	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT
	21	2		MS16634-4012	74453078002		RING, RETAINING, EXTERNAL BOWED "E"			
A4	20	1		1011400	56387000030		COVER, MAGAZINE			
	19	2		1011404	59387000020		CLIP, FILM			
	18	2		1011441	58387000050		RETAINER, FILM			
A1	17	4		MS16628-4050	74453035014		RING, RETAINING, EXTERNAL BOWED			
	16	4		1011402	58387000040		FLANGE, SPOOL			
	15	2		1011770-2	74453044002		RING, RETAINING			
	14	2		1011398	33387000020		HUB, SPOOL			(S3)
	13	4		1011770-1	74453044001		RING, RETAINING			
	12	2		1011395	46387000030		ROLLER, FILM GUIDE			(S5)
	11	2		1011397	33387000010		SPROCKET			(S1)
A2	10	4		1011608-1	30025770080		BEARING, BALL			
	9	4		NAS1352C02LL4	74455157006		SCREW, CAP, HEX SOC HD SELF-LOCKING			
	8	4		NAS1351C00LL2	74455156001		SCREW CAP, HEX SOC HD SELF-LOCKING			
	7	1		1011455	59387000030		PLATE, APERTURE			
	6	1		1011444	85387000070		APERTURE BLOCK ASSY OF			
	5	1		MS24692-3	73 00230 5020		PIN, TAPERED PLAIN			
	4	1		1011401	33387000030		GEAR, SPUR - SPECIAL 57/10P			(S4)
	3	1		1011396	35387000010		GEARSHAFT 36T/64P			(S4)
	2	6		1011406	30021790120		BEARING, BALL			
A3	1	1		1011456	85387000130		HOUSING, MAGAZINE ASSY OF			

LIST OF PARTS AND MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOL ON: FRACTIONS ± — DECIMALS ± — ANGLES ± — DO NOT SCALE THIS DRAWING	KOLLSMAN INSTRUMENT CORPORATION ELMHURST NEW YORK KIC PN 87387000020	MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
MATERIAL —	DRAWN R CARROLL DATE 7/29/63 CHECKED MMW 9-11-63 APPROVAL M. Werner 9-11-63 APPROVAL E. Dhaye 9-11-63	TITLE MAGAZINE ASSY OF	
NEXT ASSY 1011559 / USED ON 1011559 APPLICATION	NASA APPROVAL Jack Barnard	CODE IDENT NO.	SIZE E / NASA NUMBER 1011420
CONTRACT	MIT APPROVAL 9/17/63	SCALE 2:1	WEIGHT CALC ACTUAL / SHEET OF

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

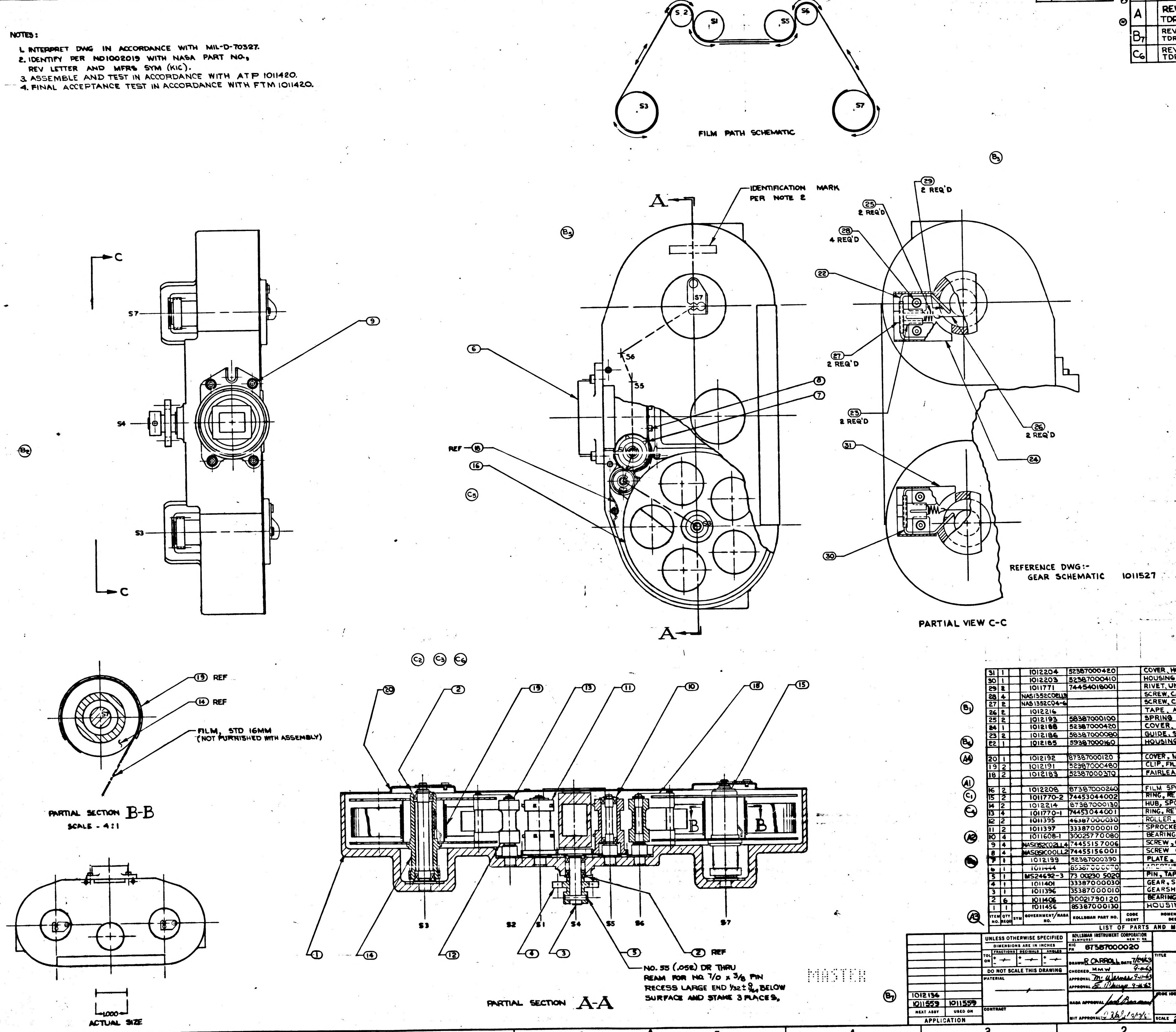
1011420 C

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY PER ND1002019 WITH NASA PART NO., REV LETTER AND MFRS SYM (KIC).
3. ASSEMBLE AND TEST IN ACCORDANCE WITH ATP 1011420.
4. FINAL ACCEPTANCE TEST IN ACCORDANCE WITH FTM 1011420.

REVISIONS 03146

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR NO. 07372	4/17/64	WK
B7		REVISED PER TDRR NO. 10684	7 JULY 64	WK
C6		REVISED PER TDRR NO. 10796	4 AUG 64	WK



REFERENCE DWG:- GEAR SCHEMATIC 1011527

NO. 55 (.052) DR THRU
REAM FOR NO. 7/0 x 3/8 PIN
RECESS LARGE END 1/32 ± 0/64 BELOW SURFACE AND STAKE 3 PLACES.

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
31	1		1012204	52387000420		COVER, HOUSING (RIGHT)			
30	1		1012203	52387000410		HOUSING, BRAKE (RIGHT)			
29	2		1011771	74454018001		RIVET, UNIVERSAL HD. MINIATURE			
28	4		NAS1352C02LL3			SCREW, CAP SOCKET HEAD			
27	2		NAS1352C04-6			SCREW, CAP SOCKET HEAD			
26	2		1012216			TAPE, ASSEMBLY			
25	2		1012193	58387000100		SPRING			
24	1		1012188	52387000420		COVER, HOUSING (LEFT)			
23	2		1012186	58387000080		GUIDE, SPRING			
22	1		1012185	59387000160		HOUSING, BRAKE (LEFT)			
20	1		1012192	87387000120		COVER, MAGAZINE			
19	2		1012191	52387000480		CLIP, FILM			
18	2		1012183	52387000370		FAIRLEAD			
16	2		1012208	87387000260		FILM SPOOL ASSY			
15	2		1011770-2	74453044002		RING, RETAINING			
14	2		1012214	87387000130		HUB, SPOOL		(S3)	
13	4		1011770-1	74453044001		RING, RETAINING			
12	2		1011395	46387000030		ROLLER, FILM GUIDE		(S2)	
11	2		1011397	33387000010		SPROCKET		(S1)	
10	4		1011608-1	30025770080		BEARING, BALL			
9	4		NAS1352C02LL4	74455157006		SCREW, CAP, HEX SOC HD SELF-LOCKING			
8	4		NAS1351C00LL2	74455156001		SCREW, CAP, HEX SOC HD SELF-LOCKING			
7	1		1012199	52387000390		PLATE, FILM RETAINER			
6	1		1011444	85367000070		APERTURE BLOCK ASSY OF			
5	1		MS24692-3	73 00230 5020		PIN, TAPERED PLAIN			
4	1		1011401	33387000030		GEAR, SPUR - SPECIAL 57/10P		(S4)	
3	1		1011396	35387000010		GEARSHAFT 36T/64P		(S4)	
2	6		1011406	30021790120		BEARING, BALL			
1	1		1011456	85387000130		HOUSING, MAGAZINE ASSY OF			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1012136	
1011559	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 87387000020

DRAWN R CARROLL DATE 7/24/63
CHECKED MMW 9-11-63
APPROVAL M. Werner 9-11-63
APPROVAL 9-16-63
NASA APPROVAL Jack Bos
MIT APPROVAL 9/17/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
MAGAZINE
ASSY OF

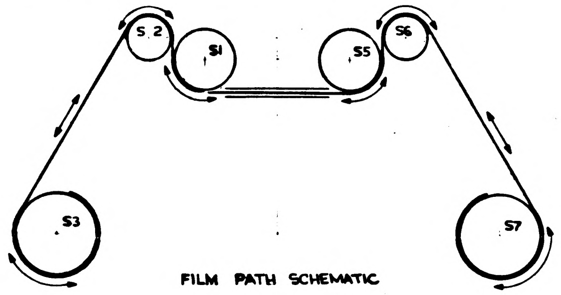
CODE IDENT NO.
SIZE E
NASA NUMBER 1011420
SCALE 2:1
WEIGHT CALC ACTUAL
SHEET OF

1011420

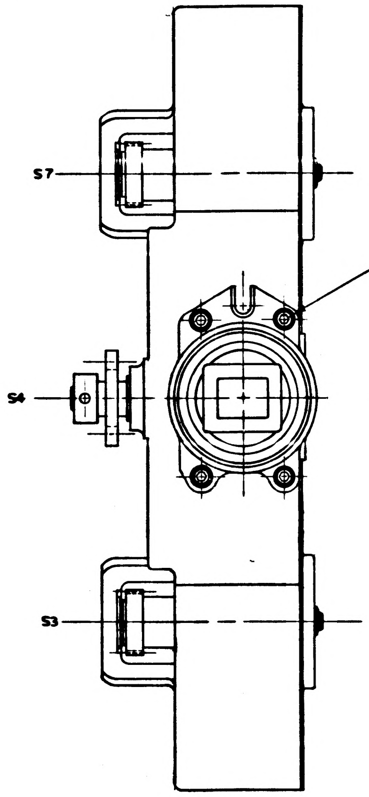
NOTES:

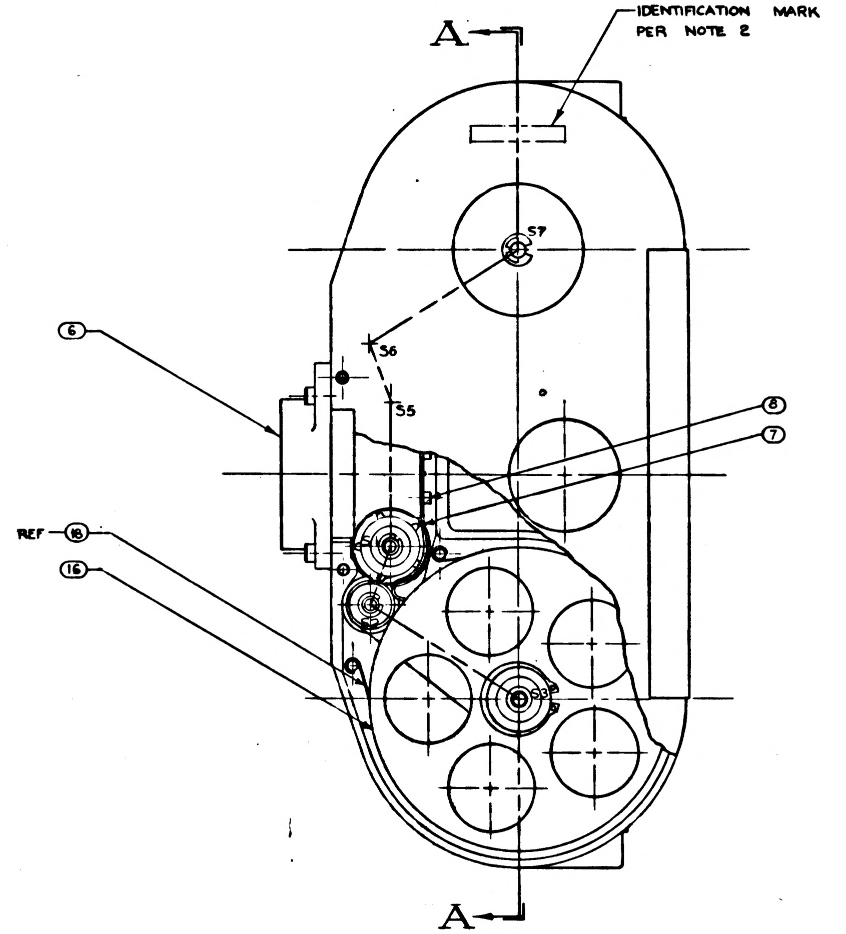
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY PER ND1002019 WITH NASA PART NO., REV LETTER AND MFRS SYM (KIC).
3. ASSEMBLE AND TEST IN ACCORDANCE WITH ATP 1011420.
4. FINAL ACCEPTANCE TEST IN ACCORDANCE WITH FTM 1011420.

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

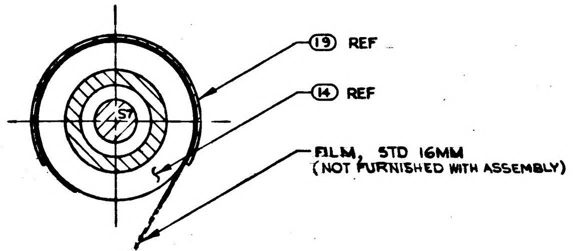


FILM PATH SCHEMATIC

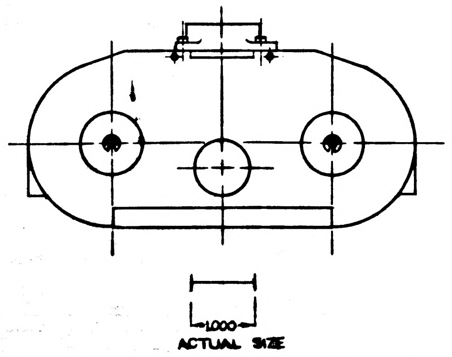


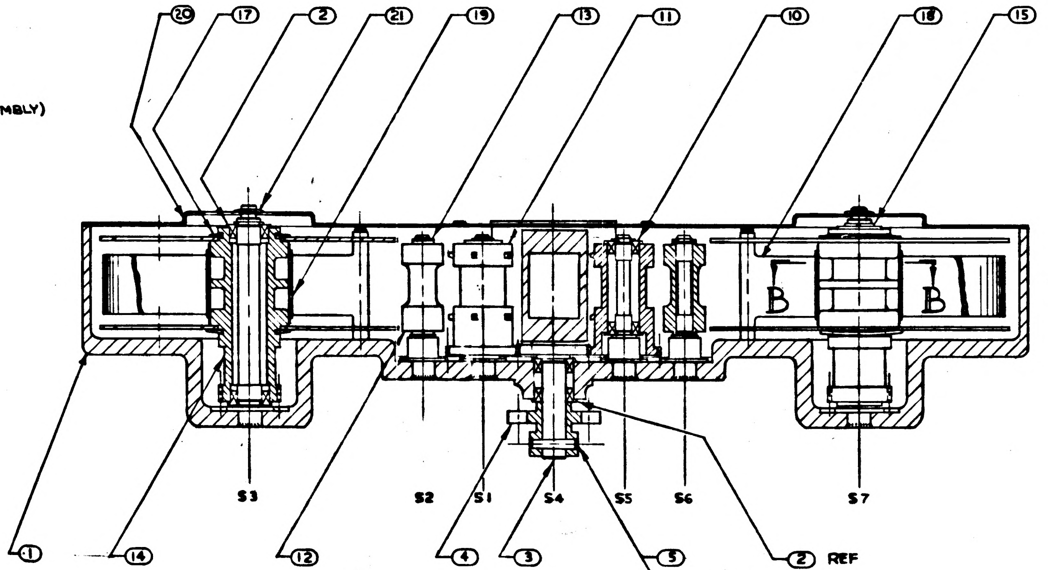


REFERENCE DWG:- GEAR SCHEMATIC 1011527



PARTIAL SECTION B-B
SCALE - 4:1





NO. 55 (.052) DR THRU
REAM FOR NO. 7/0 x 3/8 PIN
RECESS LARGE END 1/32 $^{+0}_{-1/64}$ BELOW
SURFACE AND STAKE 3 PLACES.

PARTIAL SECTION A-A

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
21	2		MS16634-4012	74453078002		RING, RETAINING, EXTERNAL BOWED "E"			
20	1		1011400	56387000030		COVER, CARTRIDGE			
19	2		1011404	59387000020		CLIP, FILM			
18	2		1011441	58387000050		RETAINER, FILM			
17	4		MS16628-4043	74453035014		RING, RETAINING, EXTERNAL BOWED			
16	4		1011402	58387000040		FLANGE, SPOOL			
15	2		1011770-2	74453044002		RING, RETAINING			
14	2		1011398	33387000020		HUB, SPOOL (S3)			
13	4		1011770-1	74453044001		RING, RETAINING			
12	2		1011395	46387000030		ROLLER, FILM GUIDE (S6)			
11	2		1011397	33387000010		SPROCKET (S1)			
10	8		1011608-1	30025770080		BEARING, BALL			
9	4		NAS1352C02LL4	74455157006		SCREW, CAP, HEX SOC HD SELF-LOCKING			
8	4		NAS1351C00LL2	74455156001		SCREW CAP, HEX SOC HD SELF-LOCKING			
7	1		1011455	59387000030		PLATE, APERTURE			
6	1		1011444	85387000070		APERTURE BLOCK ASSY OF			
5	1		MS24692-3	73 00230 5020		PIN, TAPERED PLAIN			
4	1		1011401	33387000030		GEAR, SPUR - SPECIAL 5T/10P (S4)			
3	1		1011396	35387000010		GEARSHAFT 36T/64P (S4)			
2	6		1011406	30021790120		BEARING, BALL			
1	1		1011456	85387000130		HOUSING, CARTRIDGE ASSEM. OF			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011559	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 87387000020
DRAWN R CARROLL DATE 7/29/63
CHECKED MMW 9-11-63
APPROVAL M. Werner 9-11-63
APPROVAL E. Thorup 9-16-63
NASA APPROVAL Jack Bassard
MIT APPROVAL 9/17/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
CARTRIDGE
ASSY OF

CODE IDENT NO.
SIZE E
NASA NUMBER 1011420
SCALE 2:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
0 2
PHOTOGRAPHIC SCALE ONLY

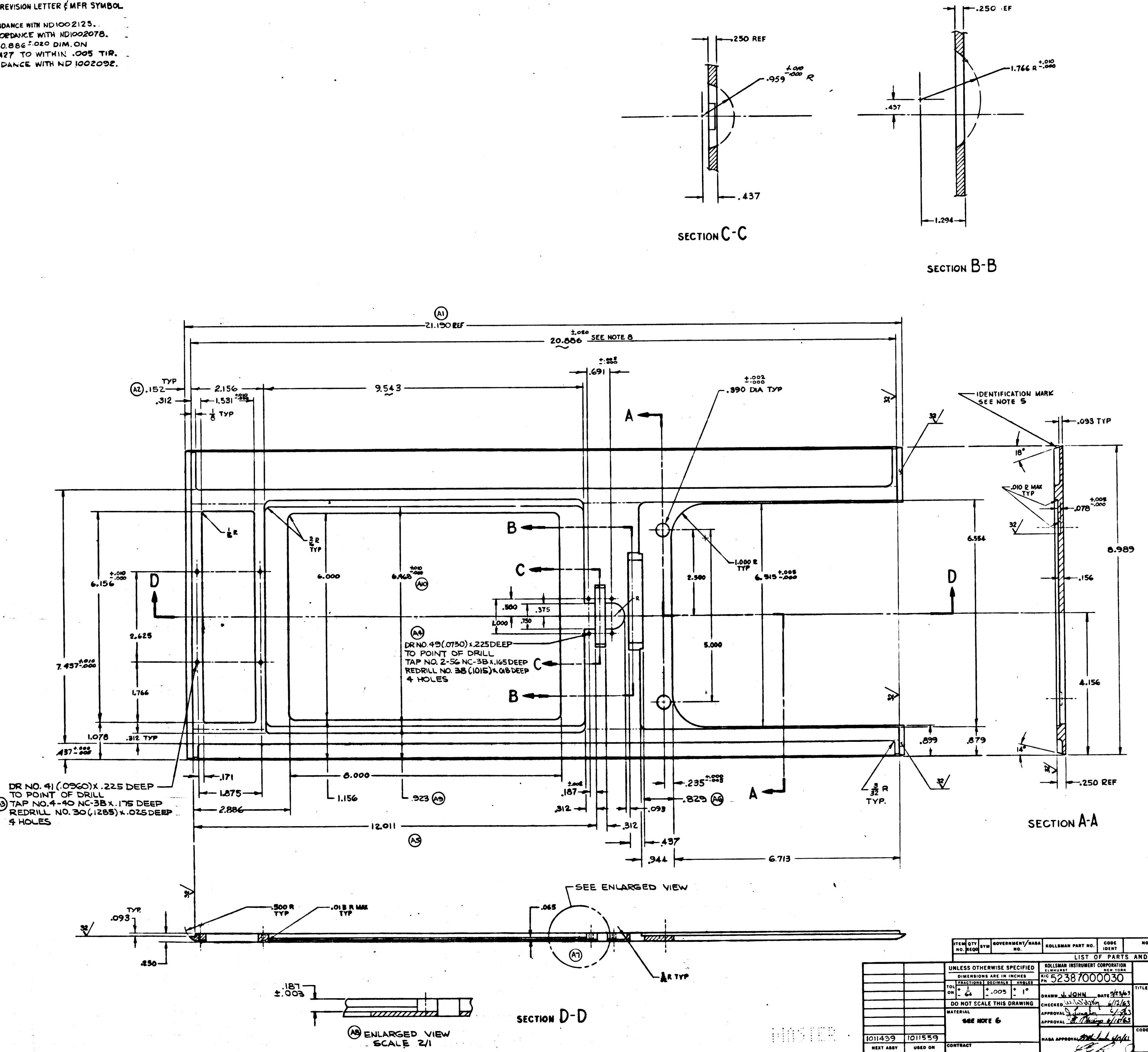
A 1011421

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		GENERAL CHANGES SEE TDRR NO. 02269	7/2-63	4/4/63

REVISIONS TDRR 01639

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED $\overset{125}{\checkmark}$ FINISH ALL OVER.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. IDENTIFY USING NASA DWG NO., REVISION LETTER & MFR SYMBOL PER ND 1002019.
6. MATERIAL: BERYLLIUM IN ACCORDANCE WITH ND1002125.
7. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
8. THIS DIMENSION TO MATCH 20.886 $^{\pm.020}$ DIM. ON PARTS NO. 1011426 AND 1011427 TO WITHIN .005 TIR.
9. STRESS RELIEVE IN ACCORDANCE WITH ND 1002092.


.250 REF
.959 R
.437
SECTION C-C
.250 REF
1.766 R
.437
1.294
SECTION B-B
A1
21.190 REF
20.886 ±.020 SEE NOTE 8
.691
.390 DIA TYP
IDENTIFICATION MARK SEE NOTE 5
.093 TYP
A2 .152 TYP
.312
2.156
1.531
1/8 TYP
9.543
A
B
C
D
1/8 R
3/8 R TYP
6.000
6.968 A10
6.156
7.437
2.625
1.766
1.078
.312 TYP
.437
.500
.375
1.000
.750
A4
DR NO. 49 (.0730) x .225 DEEP TO POINT OF DRILL
TAP NO. 2-56 NC-3B x .165 DEEP
REDRILL NO. 38 (.1015) x .018 DEEP
4 HOLES
1.000 R TYP
2.500
6.515
5.000
6.554
8.989
.899
.879
18°
.010 R MAX TYP
.078
.156
4.156
14°
.250 REF
3/32 R TYP.
SECTION A-A
DR NO. 41 (.0960) x .225 DEEP TO POINT OF DRILL
A3 TAP NO. 4-40 NC-3B x .175 DEEP
REDRILL NO. 30 (.1285) x .025 DEEP
4 HOLES
.171
1.875
2.886
8.000
1.156
.923 A9
.187
.312
12.011
A5
.235
.825 A6
.093
.312
.437
.944
6.713
SEE ENLARGED VIEW
.093 TYP
.500 R TYP
.018 R MAX TYP
.065
A7
.850
1/8 R TYP
SECTION D-D
.187 ±.003
A8 ENLARGED VIEW SCALE 2/1
32

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011439	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52387000030

DRAWN J. JOHN DATE 5/23/63
CHECKED W. Witzky 6/12/63
APPROVAL 6/13/63
APPROVAL 6/18/63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PANEL, FRONT

CODE IDENT NO.
SIZE E
NASA NUMBER 1011421
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

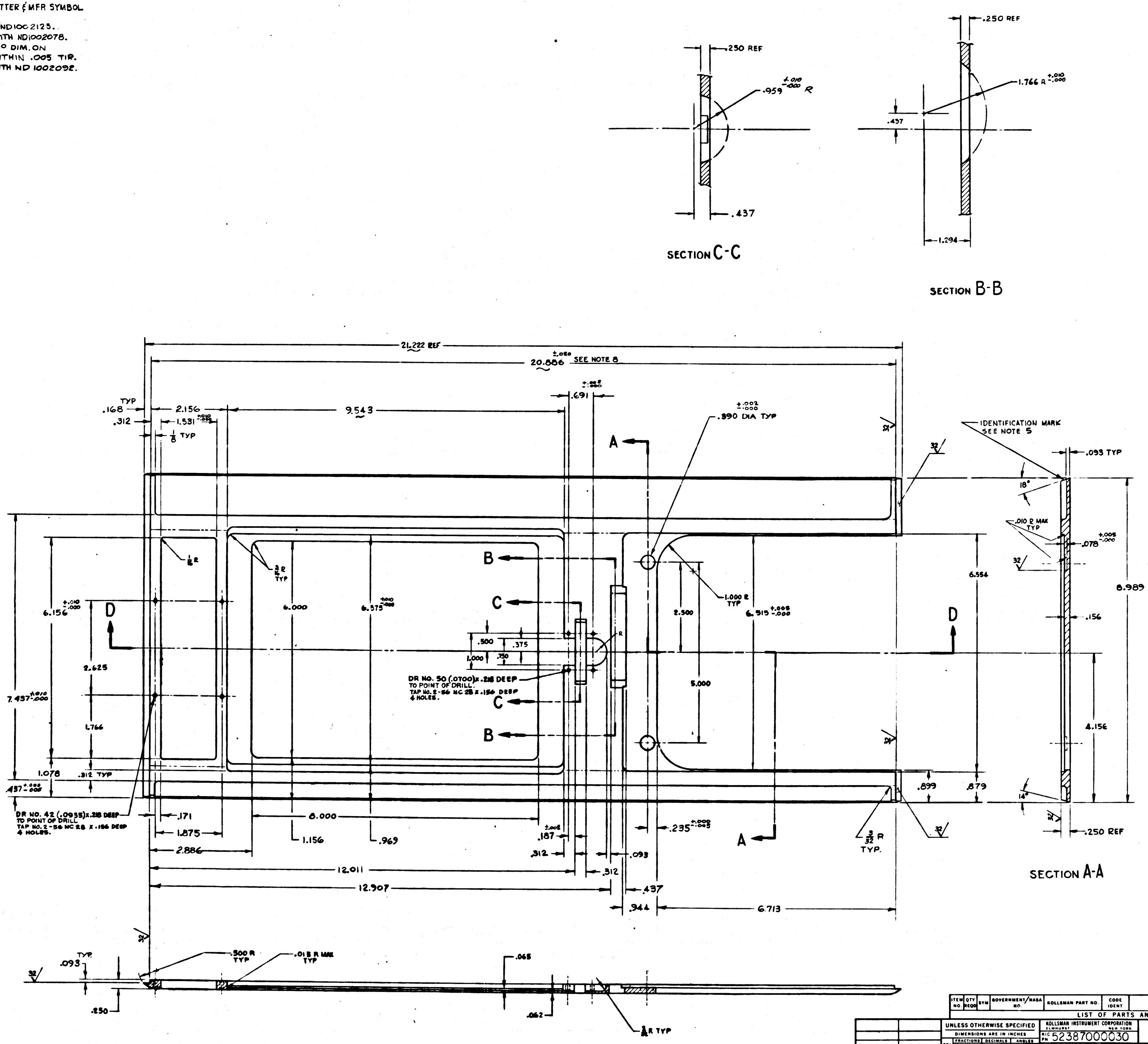
MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED 125/ FINISH ALL OVER.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. IDENTIFY USING NASA DWG NO., REVISION LETTER & MFR SYMBOL PER ND1002019.
6. MATERIAL: BERYLLIUM IN ACCORDANCE WITH ND1002125.
7. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
8. THIS DIMENSION TO MATCH 20.886 ±.020 DIM. ON PARTS NO. 1011426 AND 1011427 TO WITHIN .005 TIR.
9. STRESS RELIEVE IN ACCORDANCE WITH ND 1002092.

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL



.250 REF
.959 +.010 -.000 R
.437
1.766 R +.010 -.000
.437
1.294
21.222 REF
20.886 ±.020 SEE NOTE 8
.691
9.543
2.156
1.531
.168 TYP
.312
1/8 TYP
.390 DIA TYP
IDENTIFICATION MARK SEE NOTE 5
.093 TYP
18°
.010 R MAX TYP
.078 +.005 -.000
1/4 R
3/8 R TYP
6.000
6.375
6.156 +.010 -.000
2.625
1.766
7.437 +.010 -.000
1.078
.437 +.002 -.005
.312 TYP
.500
.375
1.000
.750
DR NO. 50 (.0700) x .218 DEEP TO POINT OF DRILL. TAP NO. 2-56 NC 2B x .156 DEEP 4 HOLES.
DR NO. 42 (.0935) x .218 DEEP TO POINT OF DRILL. TAP NO. 2-56 NC 2B x .186 DEEP 4 HOLES.
1.000 R TYP
2.500
6.915 +.005 -.000
5.000
6.554
8.989
.156
4.156
.899
.879
14°
.250 REF
3/32 R TYP.
.171
1.875
2.886
8.000
1.156
.969
.187
.312
.093
.312
.235 +.000 -.005
12.011
12.907
.437
.944
6.713
A
B
C
D
32
.093 TYP.
.250
.500 R TYP
.015 R MAX TYP
.065
.062
1/4 R TYP

SECTION C-C

SECTION B-B

SECTION A-A

SECTION D-D

1011421

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011439	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ± .005; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 6
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52387000030
DRAWN J. JOHN DATE 5/23/63
CHECKED W. Wiltsky 6/12/63
APPROVAL 6/1/63
APPROVAL B. Thaing 6/18/63
NASA APPROVAL 6/11/63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PANEL, FRONT

CODE IDENT NO.
SIZE E
NASA NUMBER 1011421
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
PHOTOGRAPHIC SCALE ONLY

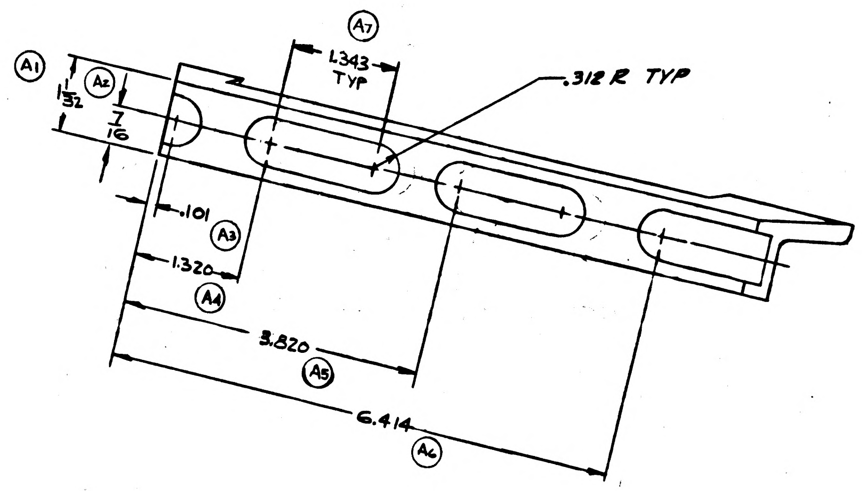
1011422 A

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A8	5-4 E-4	GENERAL CHANGES TORR 02267	7/27/63	8/6/63

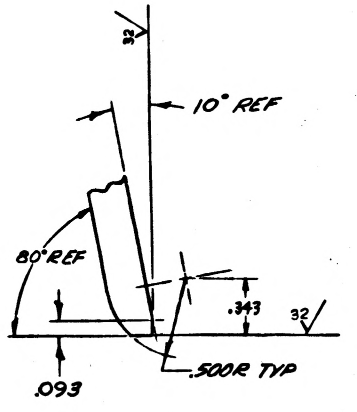
REVISIONS TDRR 02239

NOTES:

1. INTERPRET DWG. IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 125√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. MATERIAL: BERYLLIUM IN ACCORDANCE WITH ND1002125.
6. IDENTIFY USING NASA DWG. NO, REV. LETTER AND MFR'S. SYM. PER ND1002019
7. STRESS RELIEVE IN ACCORDANCE WITH ND 1002092.

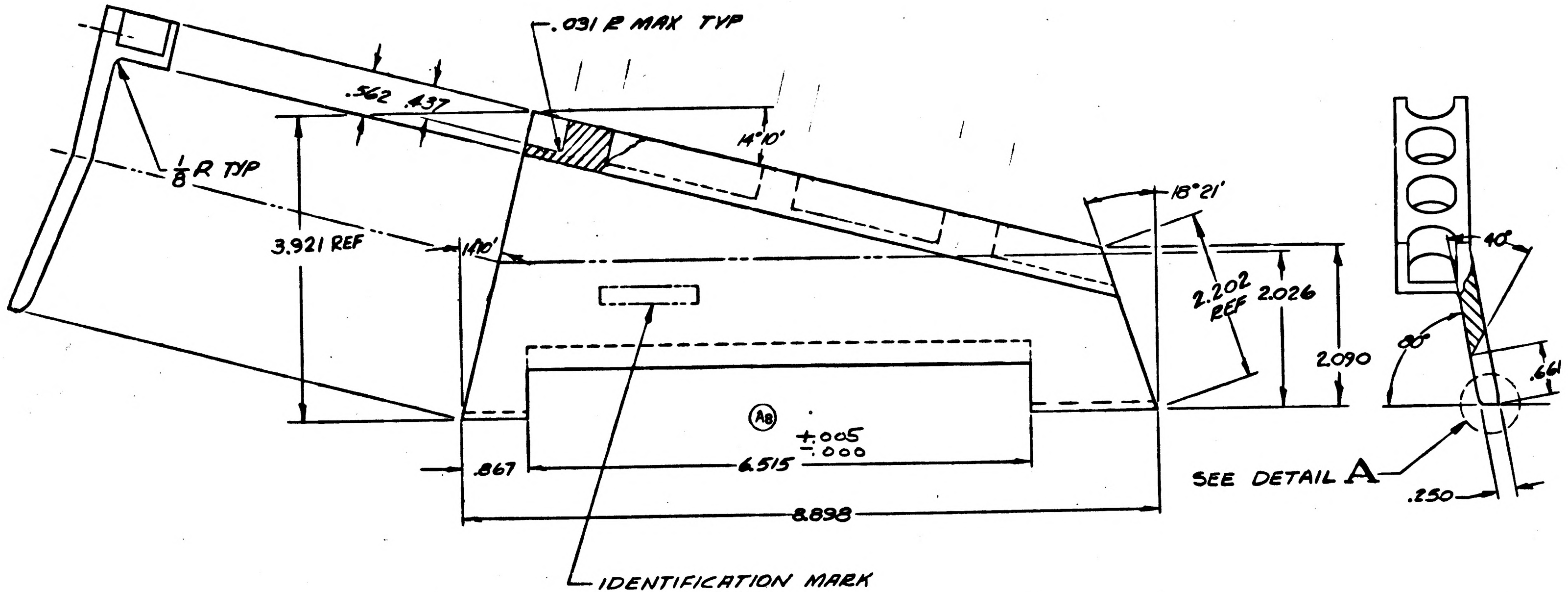


A1
1/32
A2
7/16
A7
1.343 TYP
.312 R TYP
.101
A3
1.320
A4
3.820
A5
6.414
A6



32
10° REF
80° REF
.343
32
.500R TYP
.093

DETAIL A
SCALE 2:1



.031 R MAX TYP
.562
.437
14°10'
1/8 R TYP
3.921 REF
1°10'
18°21'
2.202 REF
2.026
2.090
A8
+.005
-.000
.867
6.515
8.898
IDENTIFICATION MARK
SEE NOTE 6
40°
80°
.661
SEE DETAIL A
.250

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011439	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 0° 30'

DO NOT SCALE THIS DRAWING

MATERIAL: SEE NOTE 5

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52387000040

DRAWN R. TYLS DATE 27 MAY 63
CHECKED 6/13/63
APPROVAL 6/13/63
APPROVAL E. Ulbrang 6/18/63
NASA APPROVAL 6/19/63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
FLANGE, MOUNTING (LEFT SIDE)

CODE IDENT NO.	SIZE	NASA NUMBER
	D	1011422

SCALE 1:1 | WEIGHT | CALC ACTUAL | SHEET 1 OF 1

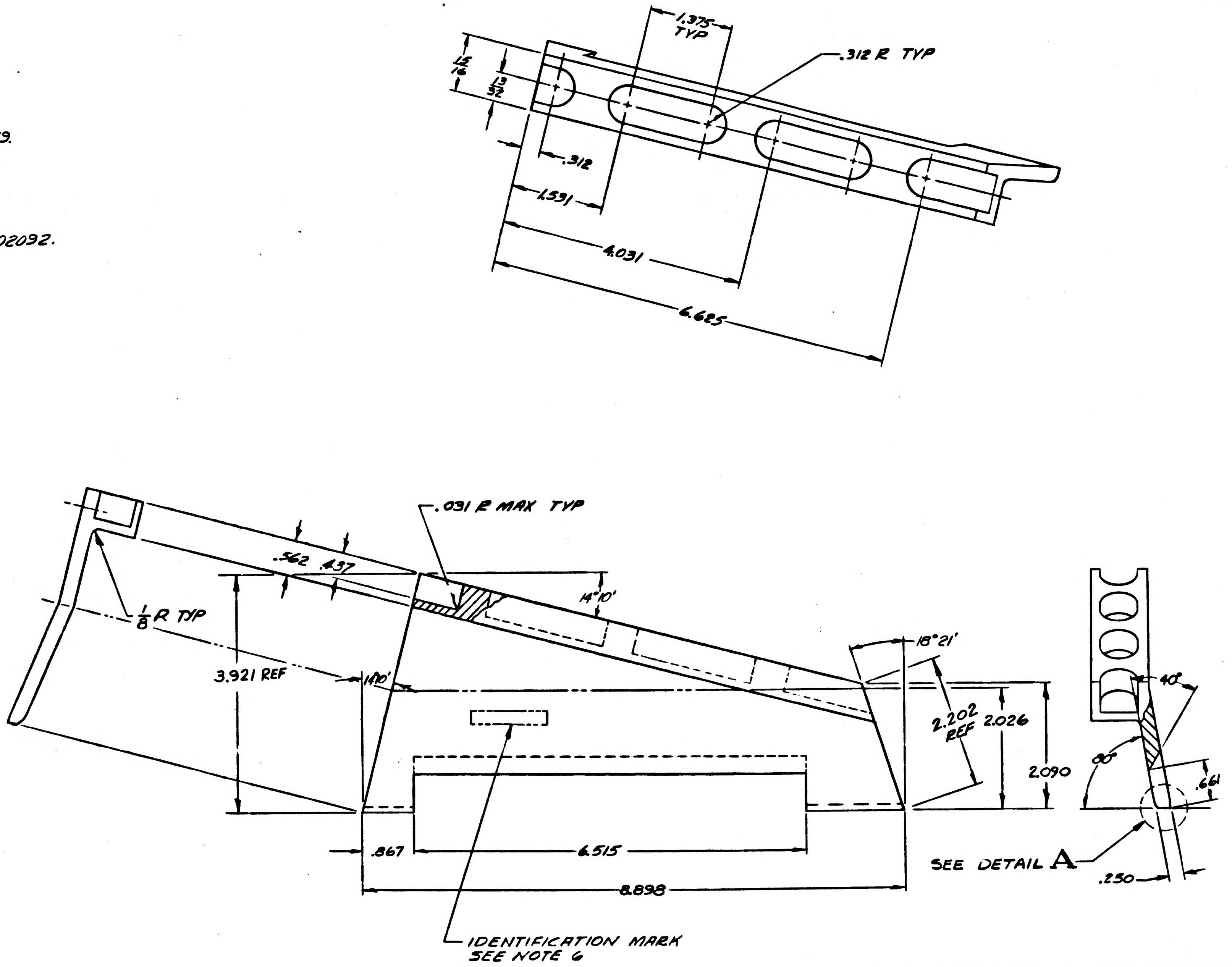
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011422

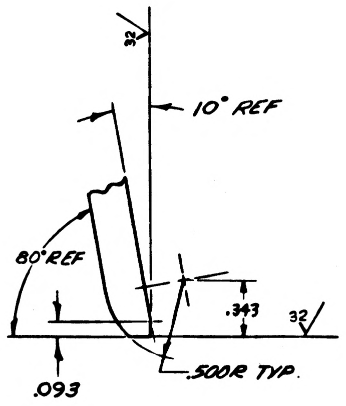
SYM	ZONE	REVISIONS DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG. IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   - a. 125√ FINISH ALL OVER.
   - b. BREAK SHARP CORNERS IN ACCORDANCE ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. MATERIAL: BERYLLIUM IN ACCORDANCE WITH ND1002125.
6. IDENTIFY USING NASA DWG. NO, REV. LETTER AND MFR'S. SYM. PER ND1002019
7. STRESS RELIEVE IN ACCORDANCE WITH ND 1002092.



1.375 TYP
.312 R TYP
15/16
13/32
.312
1.531
4.031
6.625
.031 R MAX TYP
.562
.437
14°10'
1/8 R TYP
3.921 REF
14°0'
18°21'
2.202 REF
2.026
2.090
40°
80°
.661
SEE DETAIL A
.250
.867
6.515
8.898
IDENTIFICATION MARK SEE NOTE 6



32
10° REF
80° REF
.343
32
.093
.500R TYP

DETAIL A
SCALE 2:1

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011439	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 0° 30'

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 5

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52387000040

DRAWN R. TYLS DATE 27 MAY 63
CHECKED J. [illegible] 6/13/63
APPROVAL [illegible] 6/ /63
APPROVAL E. [illegible] 6/18/63
NASA APPROVAL [illegible] 6/10/63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
FLANGE, MOUNTING (LEFT SIDE)

CODE IDENT NO. | SIZE D | NASA NUMBER 1011422
SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

1011422

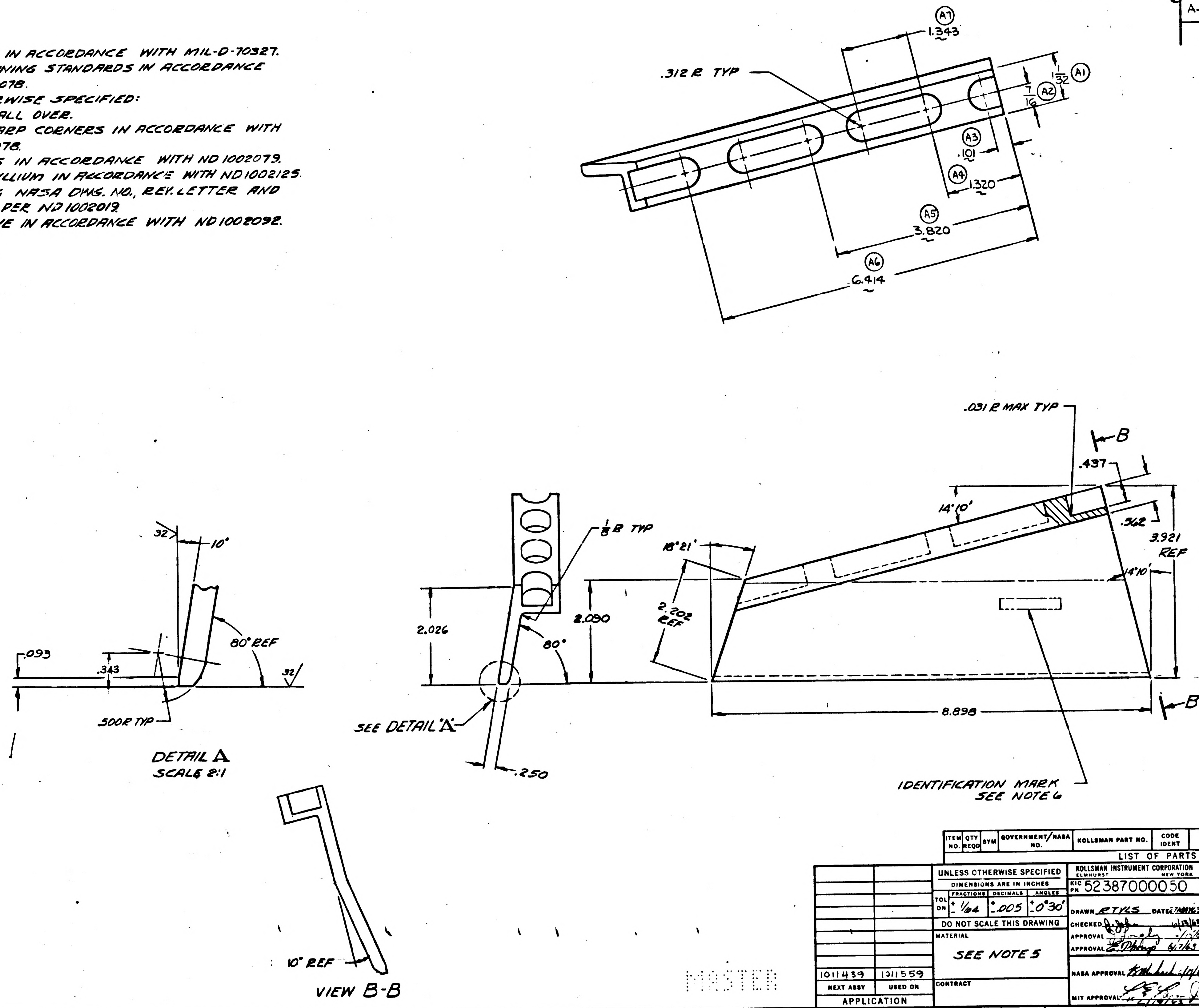
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

A	1011423

REVISIONS TDRR 1639				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A7		DIMENSIONAL CHANGES SEE TDRR NO. 02268	7-26-63	8/6/63

NOTES:

1. INTERPRET DWG. IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 125√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. MATERIAL: BERYLLIUM IN ACCORDANCE WITH ND1002125.
6. IDENTIFY USING NASA DWG. NO., REV. LETTER AND MFR'S SYM. PER ND1002019.
7. STRESS RELIEVE IN ACCORDANCE WITH ND1002092.



.312 R TYP
(A7) 1.343
1 1/32 (A1)
7/16 (A2)
(A3) .101
(A4) 1.320
(A5) 3.820
(A6) 6.414
.031 R MAX TYP
B
.437
14°10'
.562
3.921 REF
14°10'
18°21'
2.202 REF
1/8 R TYP
2.026
2.090
80°
8.898
B
SEE DETAIL A
.250
32
10°
80° REF
.093
.343
32
.500 R TYP
DETAIL A
SCALE 2:1
10° REF
VIEW B-B
IDENTIFICATION MARK SEE NOTE 6

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

APPLICATION	
NEXT ASSY	USED ON
1011439	1011559

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	±.005	±0°30'

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 5

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52387000050

DRAWN R TYLS DATE 7 MAY 63
CHECKED 10/13/63
APPROVAL 1/15/63
APPROVAL 6/7/63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
FLANGE MOUNTING (RIGHT SIDE)

CODE IDENT NO.	SIZE	NASA NUMBER
	D	1011423

SCALE 1:1 WEIGHT CALC ACTUAL SHEET 1 OF 1

MASTER

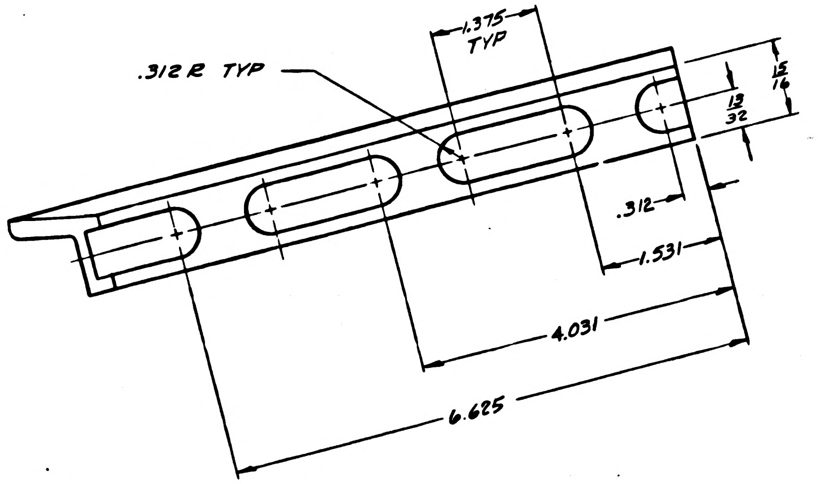
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

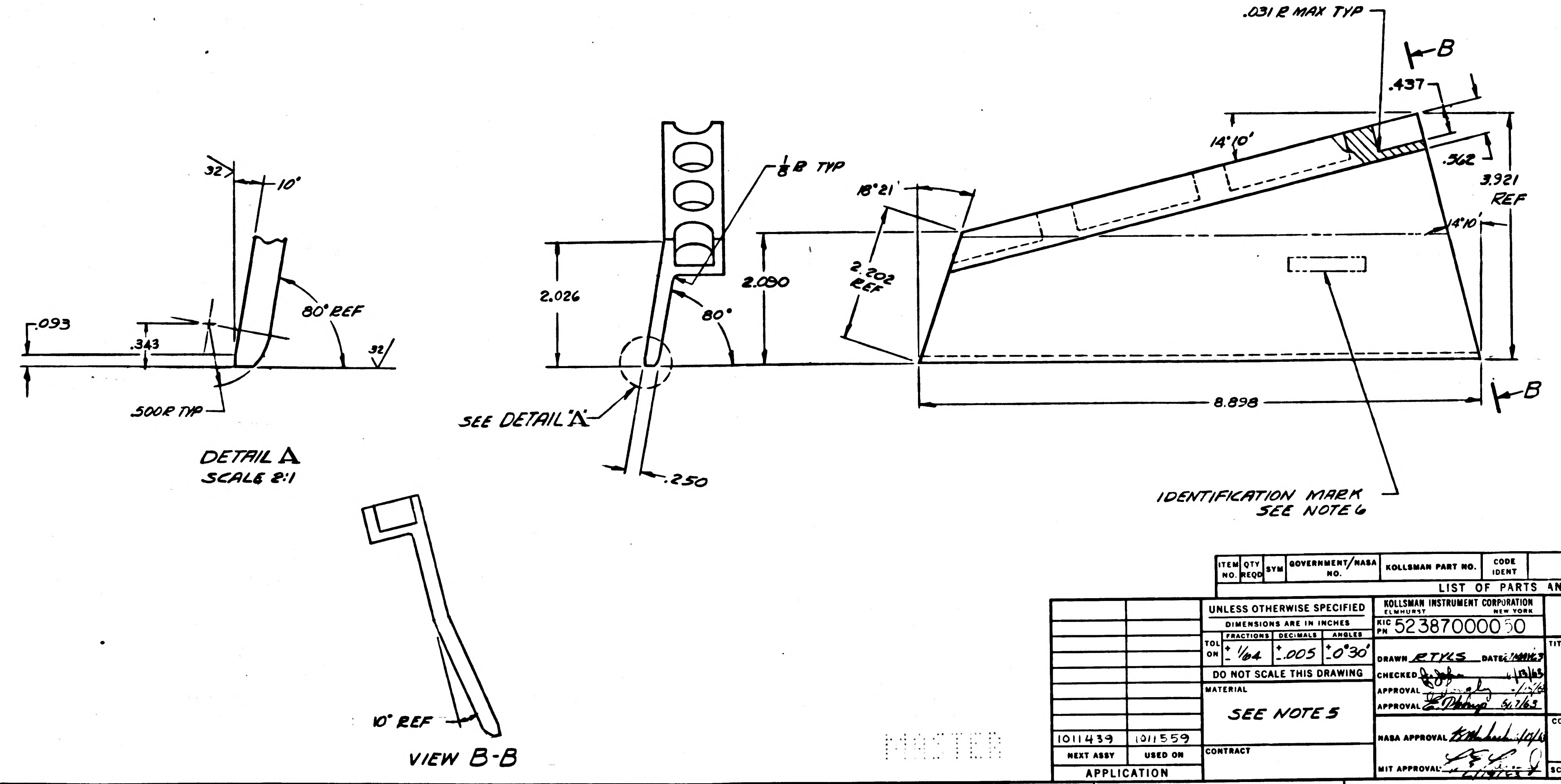
1011423

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG. IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
    a. 125√ FINISH ALL OVER.
    b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. MATERIAL: BERYLLIUM IN ACCORDANCE WITH ND1002125.
6. IDENTIFY USING NASA DWG. NO., REV. LETTER AND MFR'S SYM. PER ND1002019.
7. STRESS RELIEVE IN ACCORDANCE WITH ND1002092.


.312 R TYP
1.375 TYP
15/16
13/32
.312
1.531
4.031
6.625


.031 R MAX TYP
B
.437
14°10'
.362
3.921 REF
14°10'
18°21'
2.202 REF
1/8 R TYP
2.026
2.090
80°
8.898
B
SEE DETAIL A
.250
IDENTIFICATION MARK SEE NOTE 6
32
10°
.093
.343
80° REF
32
.500R TYP
DETAIL A
SCALE 2:1
10° REF
VIEW B-B

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011439	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 0°30'

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 5

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52387000050

DRAWN RTYLS DATE 1 MAY 63
CHECKED 6/13/63
APPROVAL 6/15/63
APPROVAL 6/17/63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
FLANGE MOUNTING (RIGHT SIDE)

CODE IDENT NO.
SIZE D
NASA NUMBER 1011423
SCALE 1:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

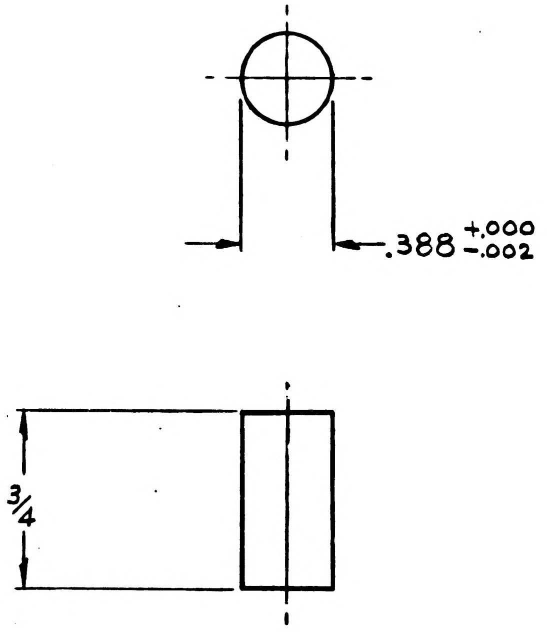
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

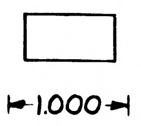
1011425

REVISIONS ØVFR 1639				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG. IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED.
   - a. 125/ FINISH ALL OVER
   - b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. MATERIAL: BERYLLIUM IN ACCORDANCE WITH ND 1002125.
6. IDENTIFY USING NASA PART NO., REVISION LETTER & MANUFACTUREERS SYMBOL PER ND 1002019.
7. STRESS RELIEVE IN ACCORDANCE WITH ND 1002092.





ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011439	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± ~

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 5

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57387000080

DRAWN R. TYLS DATE 6 JUNE '63
CHECKED J. Jelen 6/13/63
APPROVAL J. Longley 6/15/63
APPROVAL E. Thomas 6/17/63
NASA APPROVAL B. Weinbach 6/17/63
MIT APPROVAL 6/19/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PAD, MOUNTING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011425
SCALE 2:1
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

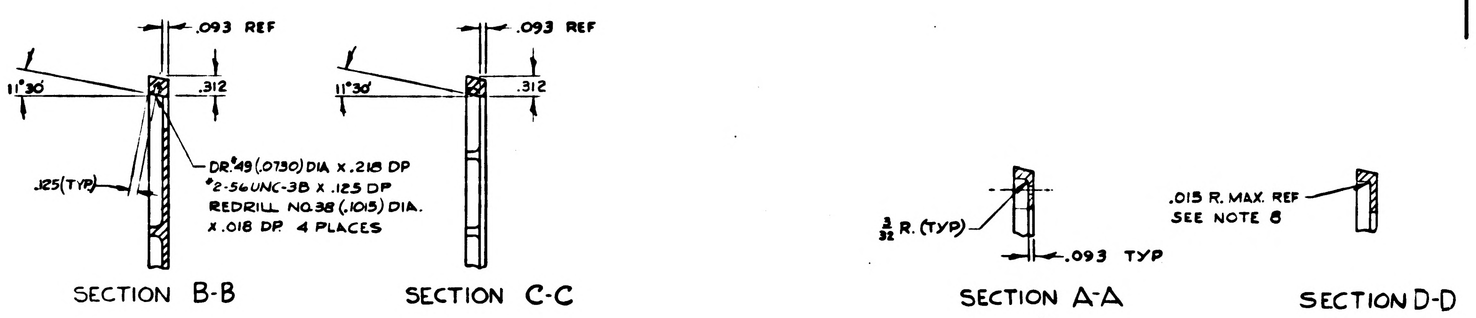
E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

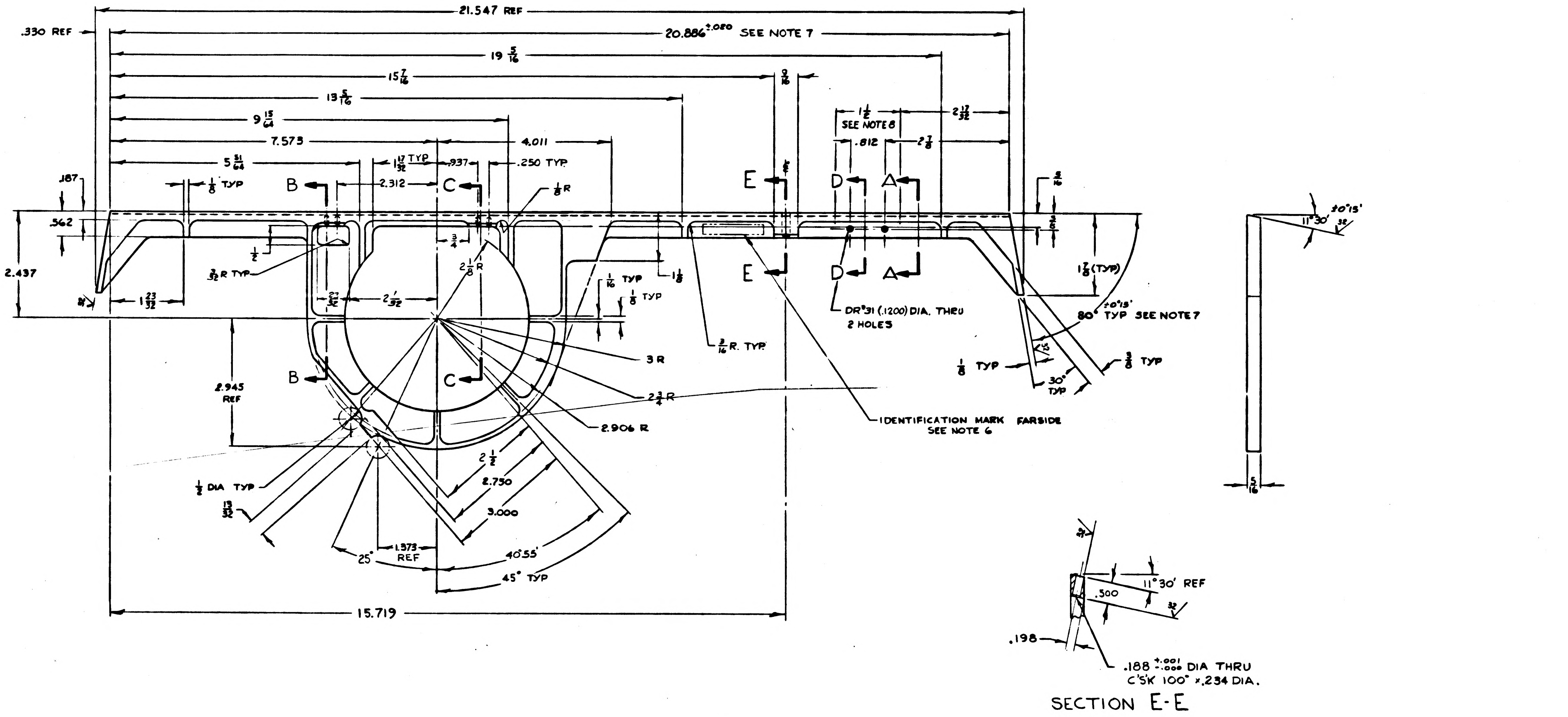
1011425

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a) 125√ FINISH ALL OVER.
   b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. MATERIAL: BERYLLIUM IN ACCORDANCE WITH ND1002125.
6. IDENTIFY USING NASA PART NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND1002012
7. THESE DIMENSIONS TO MATCH CORRESPONDING DIMENSIONS ON PART 1011427 WITHIN .005 LINEAR AND 0° 15' ANGULAR.
8. AREA CONTAINED WITHIN 1½ DIM. TO HAVE .015 R MAX.
9. STRESS RELIEVE IN ACCORDANCE WITH ND1002092.



.093 REF
11°30'
.312
.125(TYP)
DR #49 (.0730) DIA x .218 DP
#2-56UNC-3B x .125 DP
REDRILL NO.38 (.1015) DIA.
x .018 DP 4 PLACES
SECTION B-B
.093 REF
11°30'
.312
SECTION C-C
3/32 R. (TYP)
.093 TYP
SECTION A-A
.015 R. MAX. REF
SEE NOTE 8
SECTION D-D



21.547 REF
.330 REF
20.886 ±.020 SEE NOTE 7
19 5/16
15 7/16
13 5/16
9 15/64
7.573
4.011
5 31/64
1 17/32 TYP
.937
.250 TYP
.187
1/8 TYP
2.312
1/8 R
.562
1/2
3/32 R TYP
3/4
2 1/8 R
2.437
8°
1 23/32
23/32
2 1/32
1/16 TYP
1 1/8
1/8 TYP
9/16
1 1/2
SEE NOTE 8
2 17/32
.812
2 7/8
5/16
3/8
1 7/8 (TYP)
11°30'
±0°15'
80° ±0°15' TYP SEE NOTE 7
3 R
2 3/4 R
2.906 R
2.945 REF
3/16 R. TYP
DR #31 (.1200) DIA. THRU 2 HOLES
IDENTIFICATION MARK FARSIDE SEE NOTE 6
1/8 TYP
3/8 TYP
15°
30° TYP
1/2 DIA TYP
13/32
2 1/2
2.750
3.000
25°
1.573 REF
40°55'
45° TYP
15.719
5/16
B
C
E
D
A
SECTION E-E
.500
11°30' REF
.198
.188 +.001 -.000 DIA THRU
C'SK 100° x .234 DIA.

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011439	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ± .005; ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE 5
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52387000080
DRAWN Wysocki DATE 5/23/63
CHECKED 6/7/63
APPROVAL 6/ /63
APPROVAL E. Mayo 6/18/63
NASA APPROVAL 6/19/63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

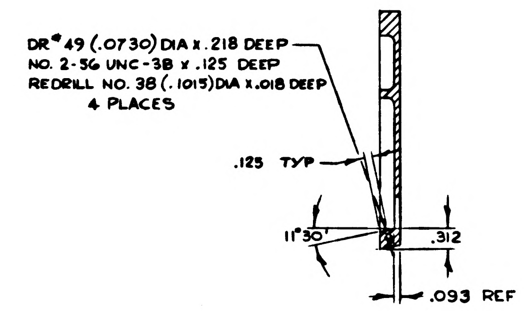
TITLE
PANEL, UPPER

CODE IDENT NO.
SIZE E
NASA NUMBER 1011426
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

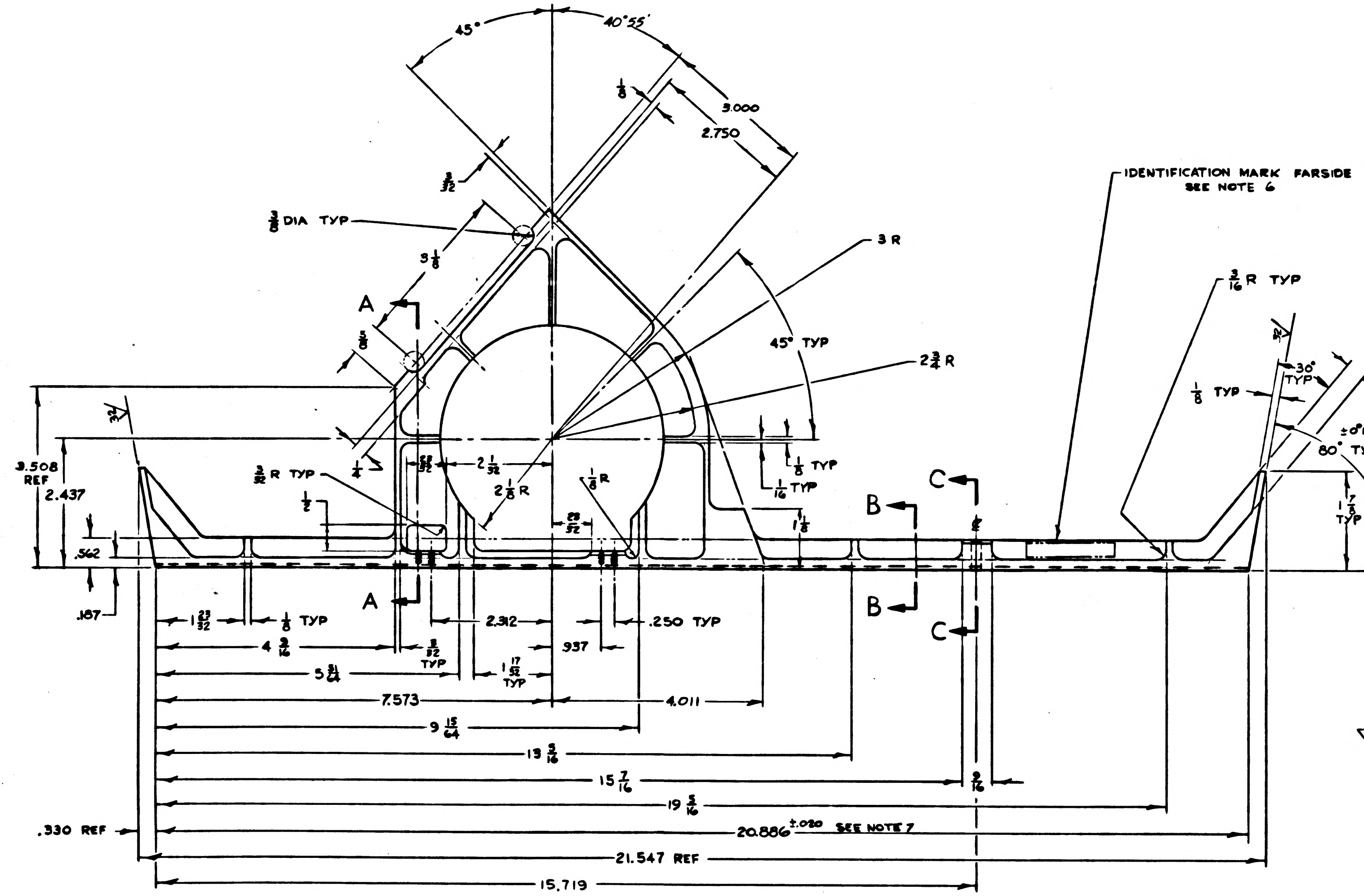
1011427

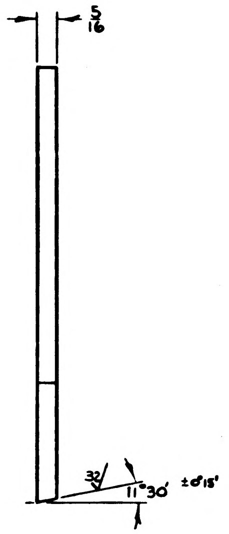
REVISIONS TDRR 01637				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

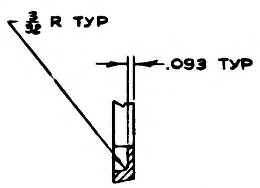
NCTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 125/ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. MATERIAL: BERYLLIUM IN ACCORDANCE WITH ND1002125.
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019.
7. THESE DIMENSIONS TO MATCH CORRESPONDING DIMENSIONS ON PART NO. 1011426 WITHIN .005 LINEAR AND 0°15' ANGULAR.
8. STRESS RELIEVE IN ACCORDANCE WITH ND1002092.


DR #49 (.0730) DIA x .218 DEEP
NO. 2-56 UNC-3B x .125 DEEP
REDRILL NO. 38 (.1015) DIA x .018 DEEP
4 PLACES
.125 TYP
11°30'
.312
.093 REF

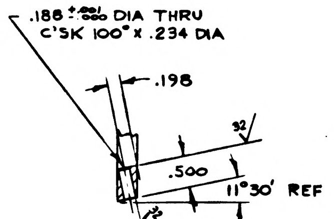
SECTION A-A


45°
40°55'
1/8
3.000
2.750
3/32
3/8 DIA TYP
3 1/8
A
5/8
3 R
45° TYP
2 3/4 R
IDENTIFICATION MARK FARSIDE
SEE NOTE 6
3/16 R TYP
32
30° TYP
1/8 TYP
3/8 TYP
±0°15'
80° TYP SEE NOTE 7
1 7/8 TYP
3.508 REF
2.437
.562
.187
1/4
3/32 R TYP
1/2
23/32
2 1/32
2 1/8 R
1/8 R
23/32
1/8 TYP
1/16 TYP
1 1/8
B
C
1 23/32
1/8 TYP
2.312
.250 TYP
4 9/16
3/32 TYP
.937
5 31/64
1 17/32 TYP
7.573
4.011
9 15/64
13 5/16
15 7/16
9/16
19 5/16
.330 REF
20.886 ±.020 SEE NOTE 7
21.547 REF
15.719


5/16
32
11°30' ±0°15'


3/32 R TYP
.093 TYP

SECTION B-B


.188 +.001 -.000 DIA THRU
C'SK 100° x .234 DIA
.198
32
.500
11°30' REF

SECTION C-C

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011439	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ± .005; ANGLES ± 0°30'
DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE 5
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52387000090
DRAWN Wysocki DATE 5/27/63
CHECKED 6/12/63
APPROVAL 6/13/63
APPROVAL 6/14/63
NASA APPROVAL 6/11/63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PANEL LOWER

CODE IDENT NO.
SIZE E
NASA NUMBER 1011427
SCALE 1:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

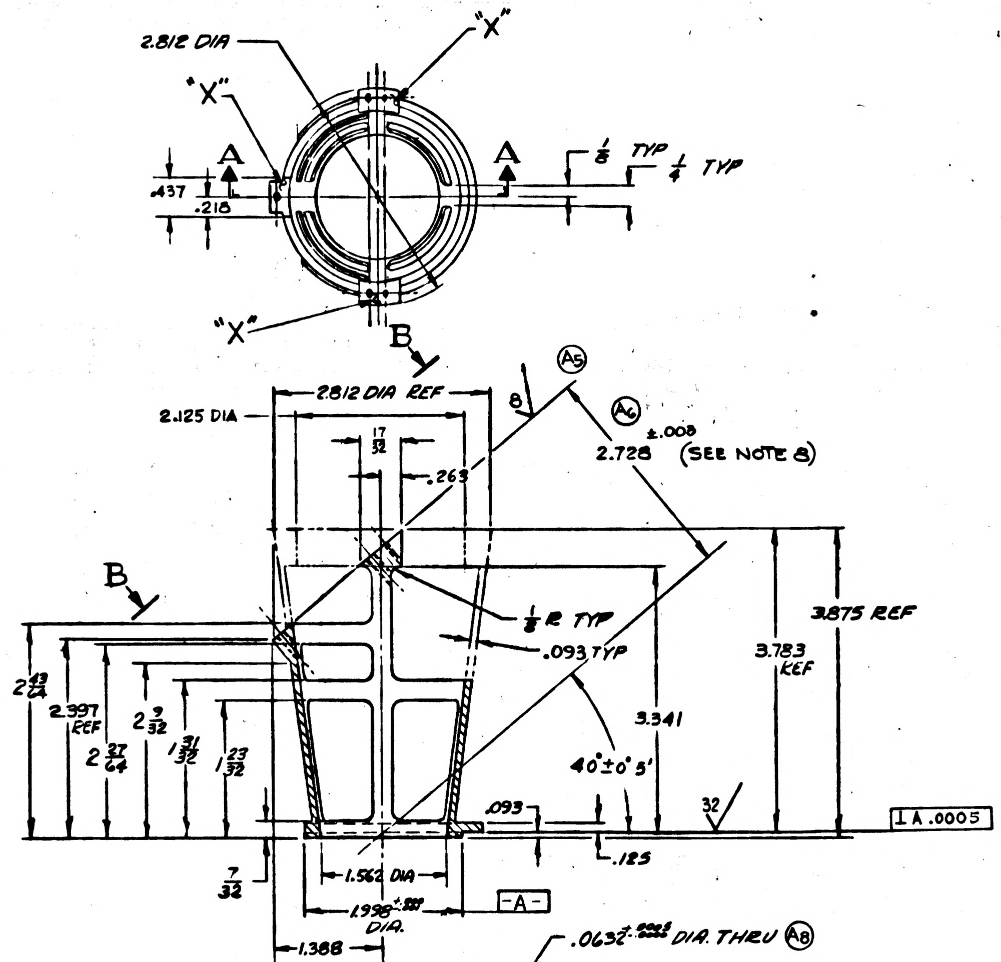
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

A	1011428

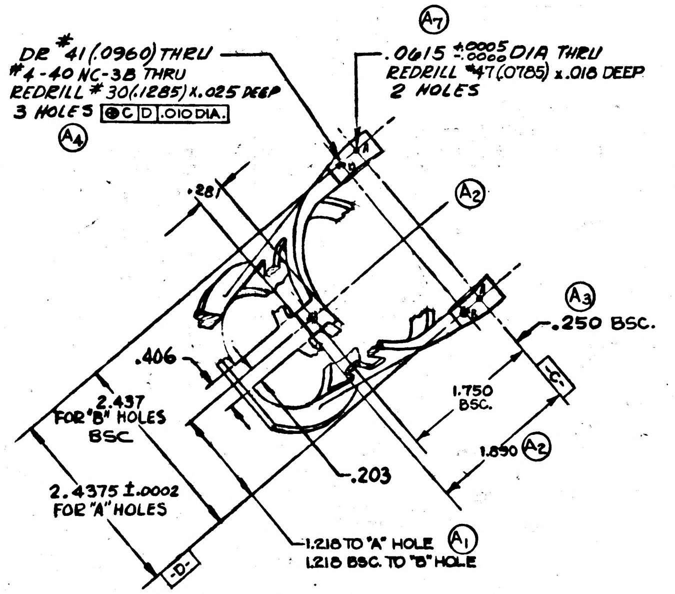
REVISIONS TDRR 01905				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A9		REVISED PER TDRR NO. 04633		

NOTES:

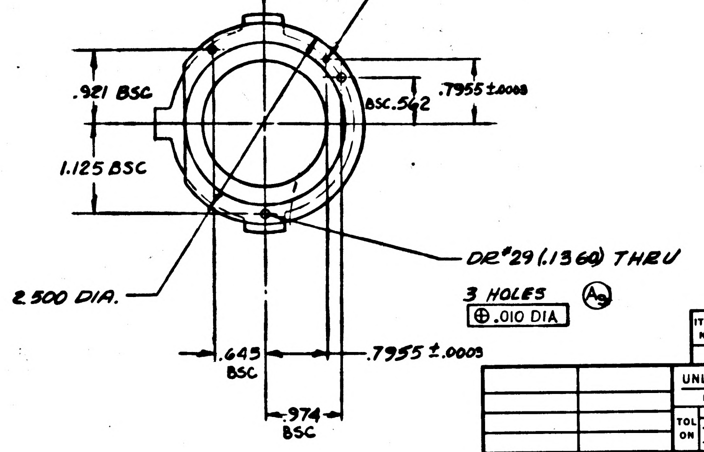
1. INTERPRET DWG. IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 125 FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. MATERIAL: BERYLLIUM IN ACCORDANCE WITH ND1002125.
6. IDENTIFY USING NASA DWG NO., REV LETTER AND MFR'S SYM PER ND1002019.
7. HEAT TREAT (STABILIZE AND STRESS RELIEVE) PER ND1002092.
8. SURFACES MARKED "X" TO BE IN LINE WITHIN .0005 -


2.812 DIA
"X"
"X"
"X"
A
A
.437
.218
1/8 TYP
1/4 TYP
B
B
2.812 DIA REF
2.125 DIA
17/32
.263
A6
A5
±.008
2.728 (SEE NOTE 8)
8
1/8 R TYP
.093 TYP
3.875 REF
3.783 REF
3.341
40°±0°5'
2 43/64
2.997 REF
2 9/32
2 37/64
1 31/32
1 23/32
.093
.125
32
⊥ A .0005
7/32
1.562 DIA
1.998 DIA.
-A-
1.388
.0632 DIA. THRU A8

SECTION A-A


DR #41 (.0960) THRU
#4-40 NC-3B THRU
REDRILL #30 (.1285) x .025 DEEP
3 HOLES ⊕ C D .010 DIA.
A4
A7
.0615 +.0005 -.0000 DIA THRU
REDRILL #47 (.0785) x .018 DEEP
2 HOLES
.281
A2
A3
.250 BSC.
C
.406
2.437 FOR "B" HOLES BSC
1.750 BSC.
1.890 A2
.203
2.4375 ±.0002 FOR "A" HOLES
1.218 TO "A" HOLE
1.218 BSC. TO "B" HOLE
A1
D

PARTIAL VIEW B-B


.921 BSC
1.125 BSC
BSC .542
.7955 ±.0003
2.500 DIA.
.645 BSC
.7955 ±.0003
.974 BSC
DR #29 (.1360) THRU
3 HOLES A9
⊕ .010 DIA

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011470	1011559
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL: SEE NOTE 5

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52387000100

DRAWN E TYLS DATE 29 MAY 63
CHECKED J. John 6/21/63
APPROVAL M. Yunnes 6-22-63
APPROVAL E. Dhang 7-2-63
NASA APPROVAL W. J. 7/3/63
MIT APPROVAL W. Hofer 3 July 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SUPPORT, MIRROR SMALL

CODE IDENT NO.	SIZE	NASA NUMBER
	D	1011428

SCALE 1:1 WEIGHT CALC ACTUAL SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

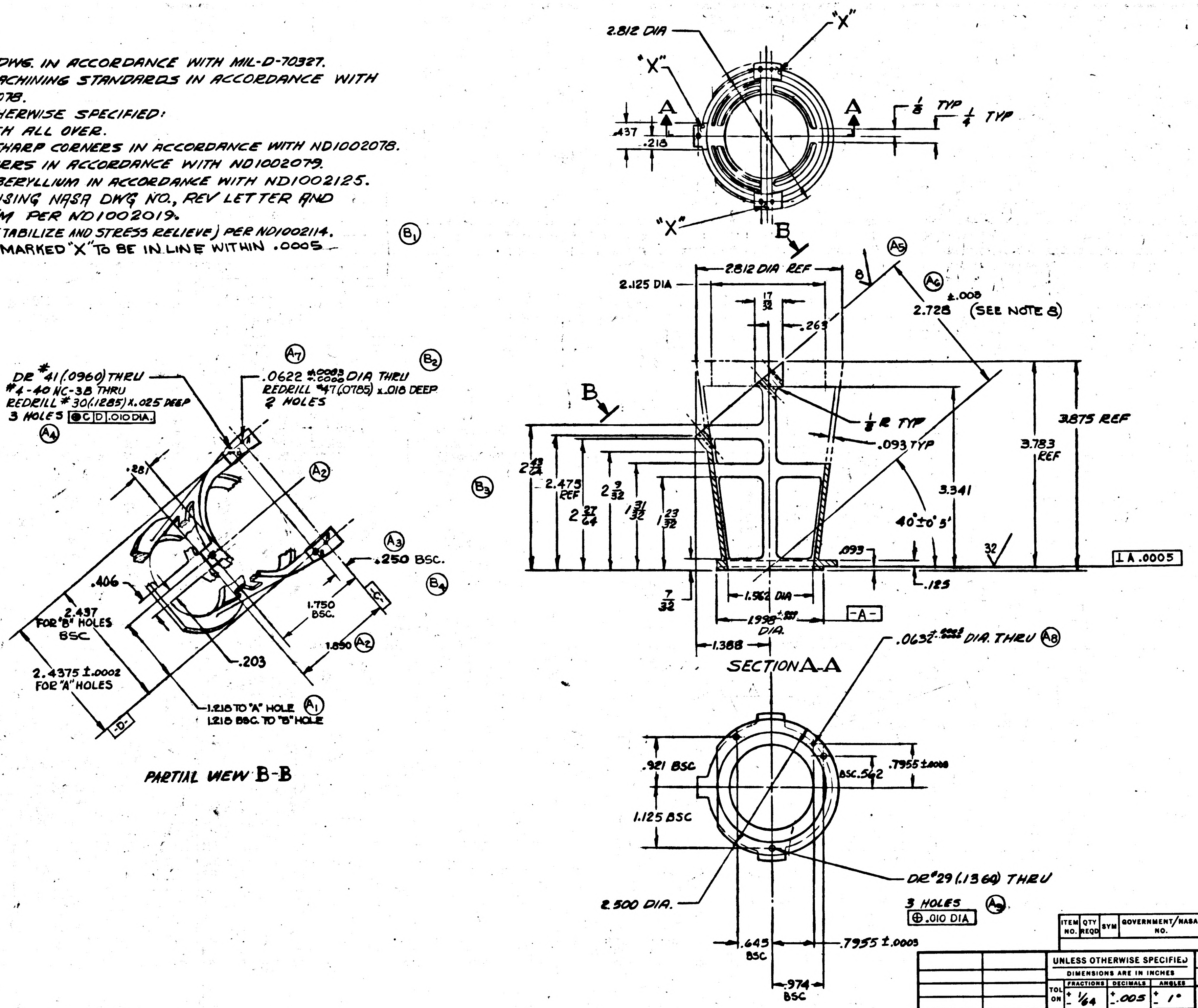
B	1011428

REVISIONS TDRR 01905

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A9		REVISED PER TDRR NO. 04633		
B4		REVISED PER TDRR NO. 07561	14 APR 64	WK

NOTES:

1. INTERPRET DWG. IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 125√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. MATERIAL: BERYLLIUM IN ACCORDANCE WITH ND1002125.
6. IDENTIFY USING NASA DWG NO., REV LETTER AND MFR'S SYM PER ND1002019.
7. HEAT TREAT (STABILIZE AND STRESS RELIEVE) PER ND1002114. (B1)
8. SURFACES MARKED "X" TO BE IN LINE WITHIN .0005



2.812 DIA
"X"
"X"
"X"
A
A
.437
.218
1/8 TYP
1/4 TYP
B
B
2.812 DIA REF
2.125 DIA
17/32
.263
8
(A5)
(A6)
±.008
2.728 (SEE NOTE 8)
1/8 R TYP
.093 TYP
3.875 REF
3.783 REF
3.341
40°±0°5'
2 43/64
2.475 REF
2 9/32
2 37/64
1 31/32
1 23/32
.093
.125
32
⊥ A .0005
7/32
1.562 DIA
1.998 DIA
-A-
1.388
SECTION A-A
.0632 DIA. THRU (A8)
(B3)
DR #41 (.0960) THRU
#4-40 NC-3B THRU
REDRILL #30 (.1285) x .025 DEEP
3 HOLES ⊕ C D .010 DIA.
(A4)
(A7)
.0622 ±.0003 DIA THRU
REDRILL #47 (.0785) x .018 DEEP
2 HOLES
(B2)
.281
(A2)
(A3)
.250 BSC.
(B4)
-C-
.406
2.437 FOR "B" HOLES BSC
1.750 BSC.
1.890 (A2)
.203
2.4375 ±.0002 FOR "A" HOLES
-D-
1.218 TO "A" HOLE
1.218 BSC. TO "B" HOLE
(A1)
PARTIAL VIEW B-B
.921 BSC
1.125 BSC
BSC .562
.7955 ±.0003
2.500 DIA.
DR #29 (.1360) THRU
3 HOLES ⊕ .010 DIA (A9)
.645 BSC
.7955 ±.0003
.974 BSC

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011470	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL: SEE NOTE 5

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52387000100

DRAWN ETYLS DATE 29 MAY 63
CHECKED 6/21/63
APPROVAL 6-22-63
APPROVAL 7-2-63
NASA APPROVAL 7/3/63
MIT APPROVAL 3 July 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SUPPORT, MIRROR SMALL

CODE IDENT NO.
SIZE D
NASA NUMBER 1011428
SCALE 1:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

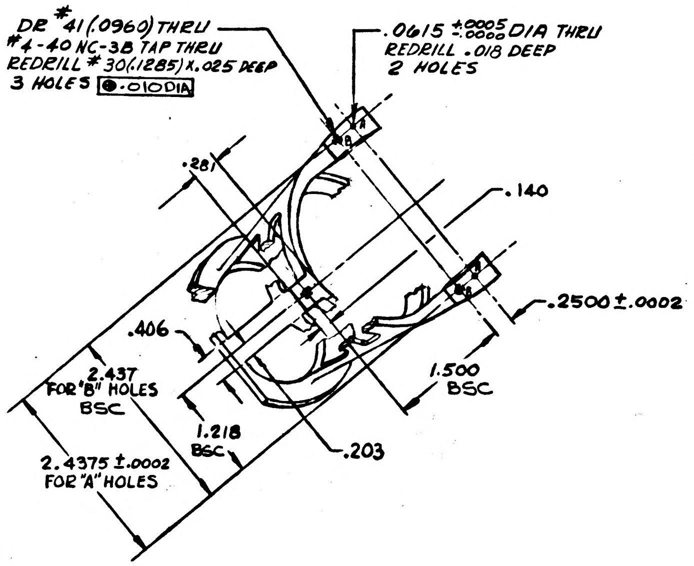
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011428

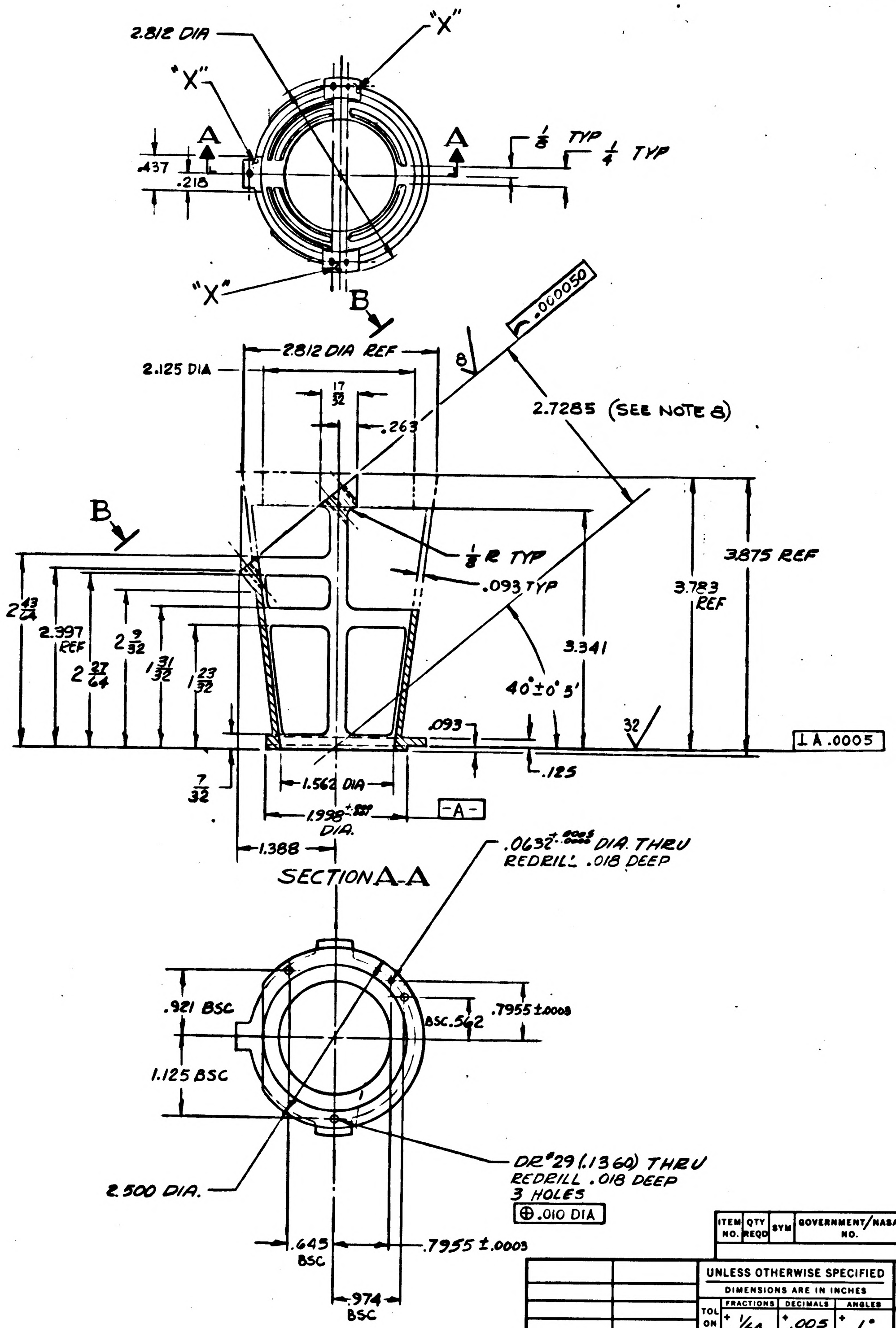
REVISIONS TDRR 01905

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG. IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 125√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. MATERIAL: BERYLLIUM IN ACCORDANCE WITH ND1002125.
6. IDENTIFY USING NASA DWG NO., REV LETTER AND MFR'S SYM PER ND1002019.
7. HEAT TREAT (STABILIZE AND STRESS RELIEVE) PER ND1002092.
8. SURFACES MARKED "X" TO BE IN LINE WITHIN .0005


DR #41 (.0960) THRU
#4-40 NC-3B TAP THRU
REDRILL #30 (.1285) X .025 DEEP
3 HOLES ⊕ .010 DIA
.0615 +.0005 -.0000 DIA THRU
REDRILL .018 DEEP
2 HOLES
.281
.140
.2500 ± .0002
.406
2.437 FOR "B" HOLES BSC
1.218 BSC
.203
1.500 BSC
2.4375 ± .0002 FOR "A" HOLES
A
B

PARTIAL VIEW B-B


2.812 DIA
"X"
"X"
"X"
A
A
.437
.218
1/8 TYP
1/4 TYP
B
B
2.812 DIA REF
2.125 DIA
17/32
.263
8
.000050
2.7285 (SEE NOTE 8)
1/8 R TYP
.093 TYP
3.875 REF
3.783 REF
3.341
40° ± 0° 5'
32
⊥ A .0005
2 43/64
2.397 REF
2 27/64
2 9/32
1 31/32
1 23/32
.093
.125
7/32
1.562 DIA
1.998 DIA
-A-
1.388
.0632 +.0005 -.0000 DIA. THRU
REDRILL .018 DEEP
.921 BSC
1.125 BSC
BSC .562
.7955 ± .0003
2.500 DIA.
DR #29 (.1360) THRU
REDRILL .018 DEEP
3 HOLES
⊕ .010 DIA
.645 BSC
.7955 ± .0003
.974 BSC

SECTION A-A

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011470	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 5

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52387000100

DRAWN R. TYLS DATE 29 MAY 63
CHECKED 6/21/63
APPROVAL M. Urner 6-22-63
APPROVAL 7-2-63
NASA APPROVAL 7/3/63
MIT APPROVAL 3 July 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SUPPORT, MIRROR SMALL

CODE IDENT NO.
SIZE D
NASA NUMBER 1011428
SCALE 1:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011428

INCHES
PHOTOGRAPHIC SCALE ONLY

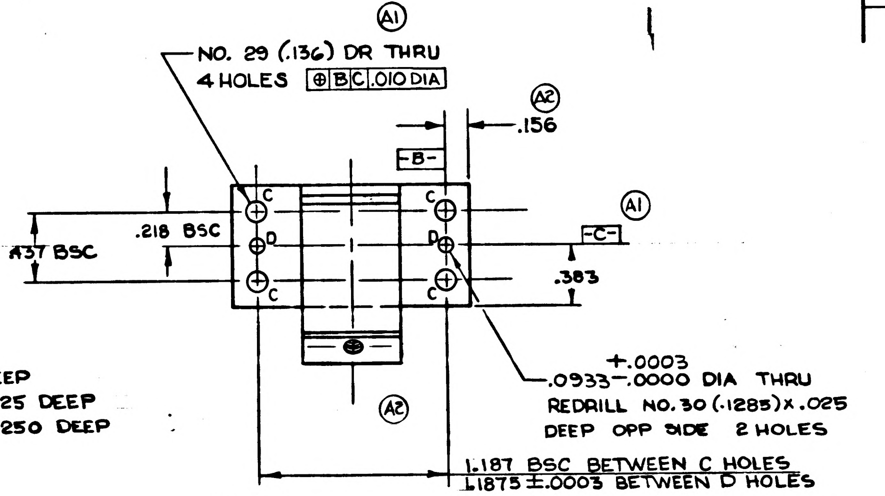
A 1011429

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO. 03986		

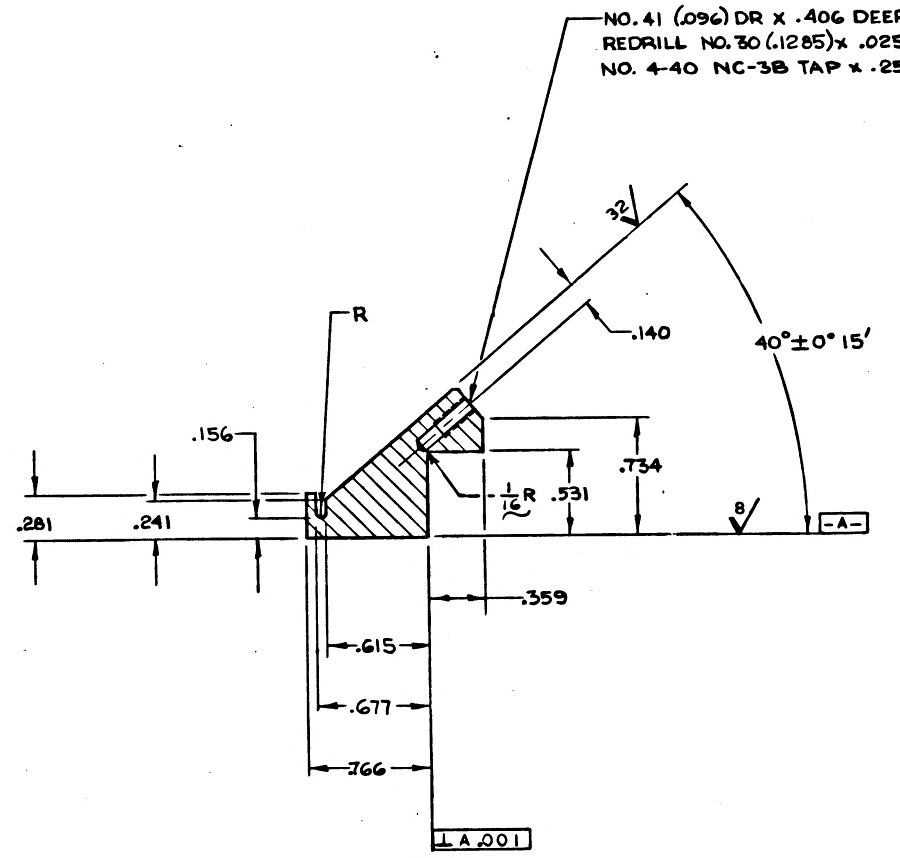
REVISIONS TDRR 02322

NOTES:

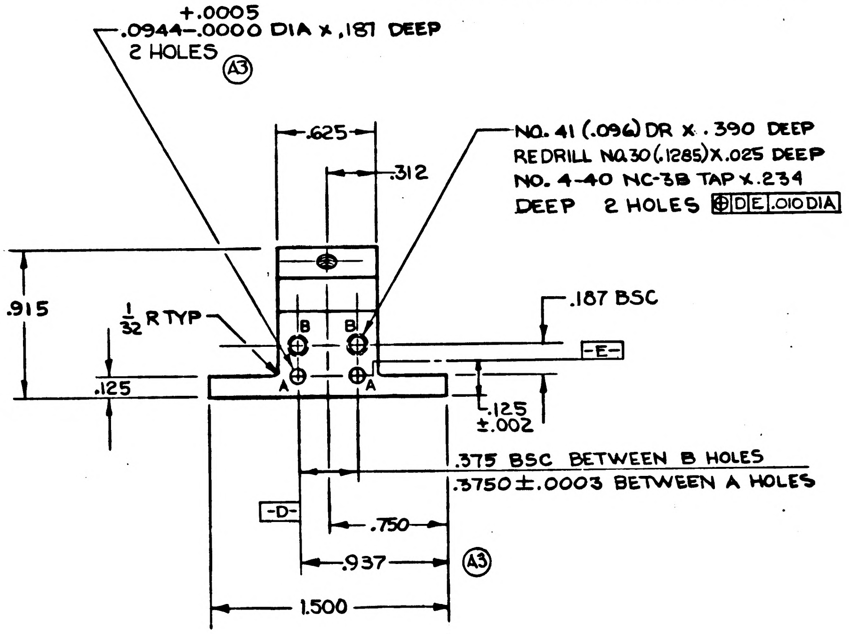
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. $\overset{125}{\surd}$ FINISH ALL OVER.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. MATERIAL: BERYLLIUM IN ACCORDANCE WITH ND1002125.
6. HEAT TREAT: STRESS RELIEVE AND STABILIZE IN ACCORDANCE WITH ND1002092.
7. FINISH: BLACKEN PER ND1002127



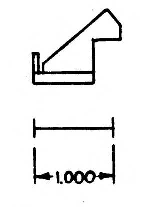
A1
NO. 29 (.136) DR THRU
4 HOLES ⊕ B C .010 DIA
A2
.156
-B-
A1
-C-
.218 BSC
.437 BSC
.383
C
D
C
D
C
C
A2
+.0003
.0933 −.0000 DIA THRU
REDRILL NO. 30 (.1285) X .025
DEEP OPP SIDE 2 HOLES
1.187 BSC BETWEEN C HOLES
1.1875 ±.0003 BETWEEN D HOLES



NO. 41 (.096) DR X .406 DEEP
REDRILL NO. 30 (.1285) X .025 DEEP
NO. 4-40 NC-3B TAP X .250 DEEP
32
.140
40° ± 0° 15′
R
.156
.734
1/16 R
.531
8
-A-
.281
.241
.359
.615
.677
.766
⊥ A .001



+.0005
.0944 −.0000 DIA X .187 DEEP
2 HOLES
A3
.625
.312
NO. 41 (.096) DR X .390 DEEP
REDRILL NO. 30 (.1285) X .025 DEEP
NO. 4-40 NC-3B TAP X .234
DEEP 2 HOLES ⊕ D E .010 DIA
.915
1/32 R TYP
B
B
A
A
.187 BSC
-E-
.125
.125
±.002
.375 BSC BETWEEN B HOLES
.3750 ±.0003 BETWEEN A HOLES
-D-
.750
.937
A3
1.500



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011515	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 5

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52387000110

DRAWN R. CARROLL DATE 7/16/63
CHECKED N. Farrell 7/17/63
APPROVAL M. Verner 7/3/63
APPROVAL E. Tharp 7/31/63
NASA APPROVAL W J Klune 7-31-67
MIT APPROVAL L Hafel 7/31/67

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SUPPORT, MIRROR

CODE IDENT NO. | SIZE D | NASA NUMBER 1011429
SCALE 2:1 | WEIGHT | CALC ACTUAL | SHEET 1 OF 1

MASTER

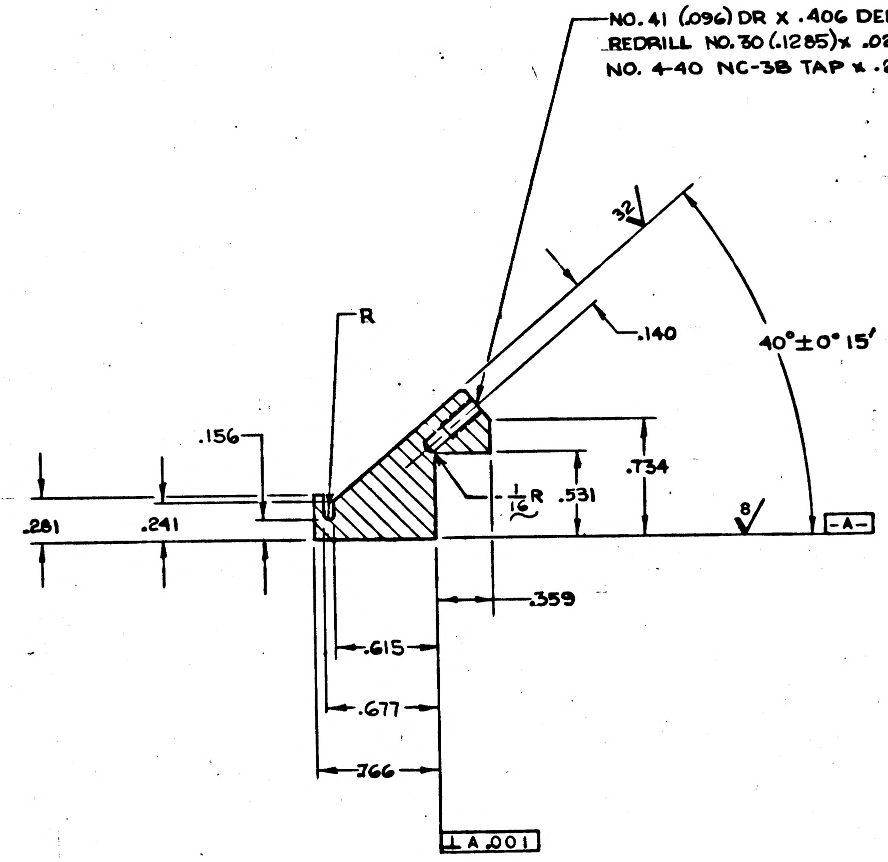
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

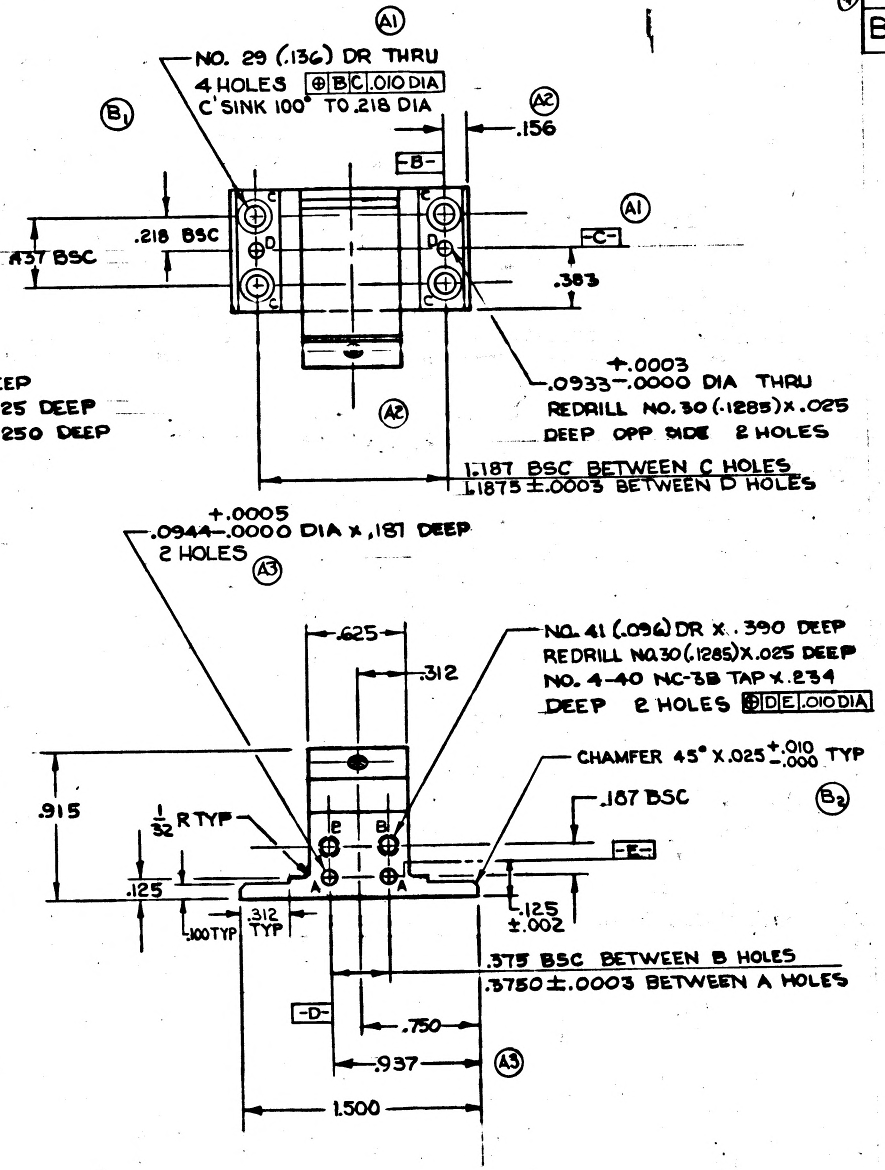
1011429 B

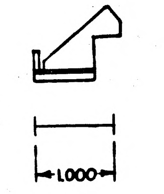
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS TDRR 02322				
A3		REVISED PER TDRR NO. 03986		WK
B2		REVISED PER TDRR NO. 08589	26 MAY 64	WK

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 125√ FINISH ALL OVER.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. MATERIAL: BERYLLIUM IN ACCORDANCE WITH ND1002125.
6. HEAT TREAT: STRESS RELIEVE AND STABILIZE IN ACCORDANCE WITH ND1002092.
7. FINISH: BLACKEN PER ND1002127


NO. 41 (.096) DR X .406 DEEP
REDRILL NO. 30 (.1285) X .025 DEEP
NO. 4-40 NC-3B TAP X .250 DEEP
32
.140
40° ± 0° 15'
R
.156
.734
1/16 R
.531
.281
.241
8
-A-
.359
.615
.677
.766
⊥ A .001


A1
NO. 29 (.136) DR THRU
4 HOLES ⊕ B C .010 DIA
C'SINK 100° TO .218 DIA
B1
A2
.156
-B-
A1
.218 BSC
.437 BSC
-C-
C
D
.383
+.0003
.0933 -.0000 DIA THRU
REDRILL NO. 30 (.1285) X .025
DEEP OPP SIDE 2 HOLES
A2
1.187 BSC BETWEEN C HOLES
1.1875 ± .0003 BETWEEN D HOLES
+.0005
.0944 -.0000 DIA X .181 DEEP
2 HOLES
A3
.625
.312
NO. 41 (.096) DR X .390 DEEP
REDRILL NO. 30 (.1285) X .025 DEEP
NO. 4-40 NC-3B TAP X .234
DEEP 2 HOLES ⊕ D E .010 DIA
CHAMFER 45° X .025 +.010 -.000 TYP
.187 BSC
B2
.915
1/32 R TYP
E
B
A
-E-
.125
.125 ±.002
.100 TYP
.312 TYP
.375 BSC BETWEEN B HOLES
.3750 ± .0003 BETWEEN A HOLES
-D-
.750
.937
A3
1.500



ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011515	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 5

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52387000110

DRAWN R. CARROLL DATE 7/16/63
CHECKED N. Farrell 7/17/63
APPROVAL 7/3/63
APPROVAL E. Thomp 7/30/63
NASA APPROVAL W J Rhine 7-31-67
MIT APPROVAL 7/21/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SUPPORT, MIRROR

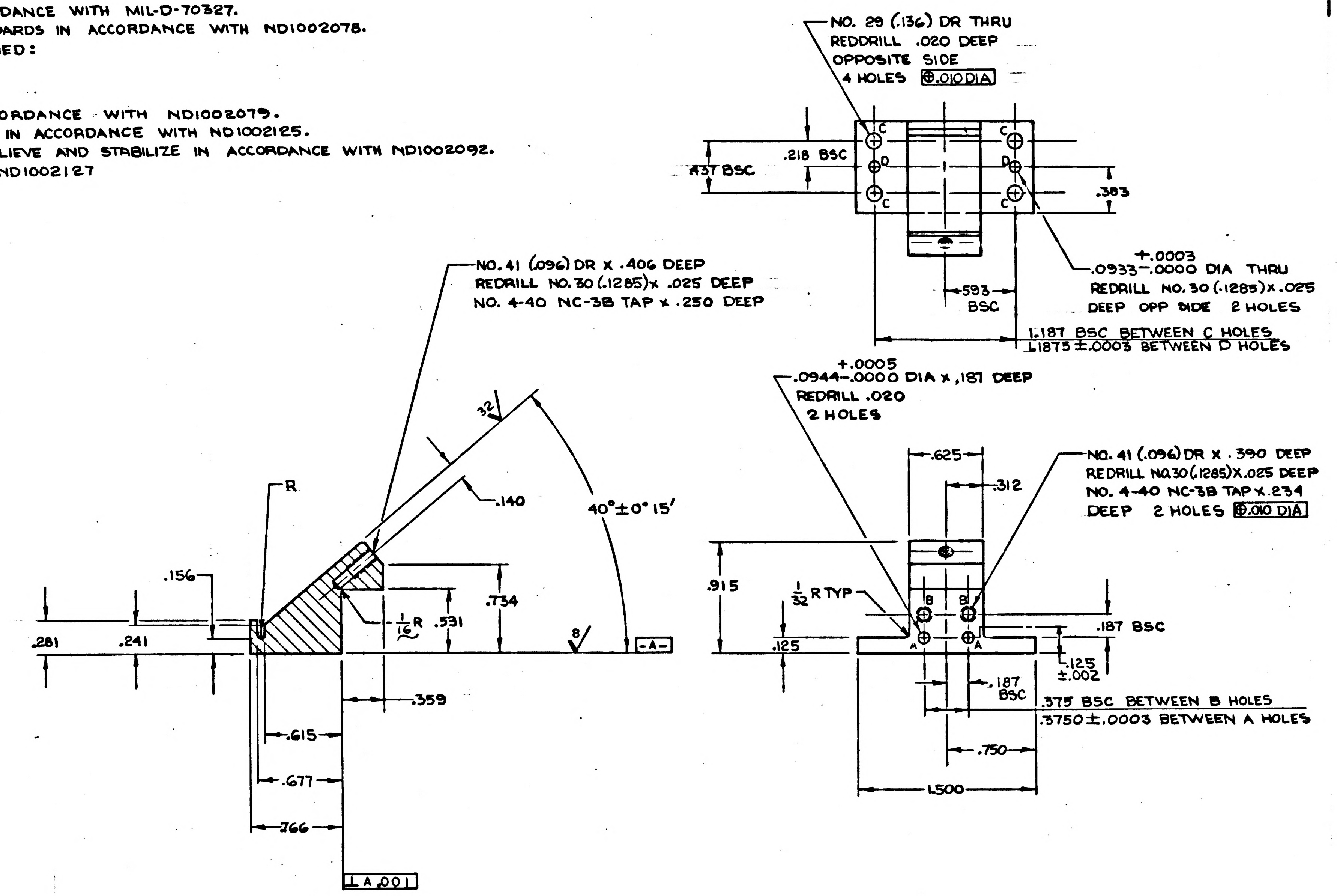
CODE IDENT NO.
SIZE D
NASA NUMBER 1011429
SCALE 2:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

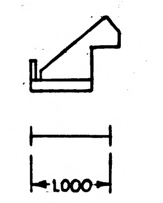
1011429

REVISIONS T. FR 02322				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 125√ FINISH ALL OVER.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. MATERIAL : BERYLLIUM IN ACCORDANCE WITH ND1002125.
6. HEAT TREAT : STRESS RELIEVE AND STABILIZE IN ACCORDANCE WITH ND1002092.
7. FINISH : BLACKEN PER ND1002127


NO. 29 (.136) DR THRU
REDDRILL .020 DEEP
OPPOSITE SIDE
4 HOLES ⊕.010 DIA
.218 BSC
.437 BSC
.383
C
D
+.0003
.0933 -.0000 DIA THRU
REDRILL NO. 30 (.1285) x .025
DEEP OPP SIDE 2 HOLES
.593 BSC
1.187 BSC BETWEEN C HOLES
1.1875 ±.0003 BETWEEN D HOLES
NO. 41 (.096) DR x .406 DEEP
REDRILL NO. 30 (.1285) x .025 DEEP
NO. 4-40 NC-3B TAP x .250 DEEP
+.0005
.0944 -.0000 DIA x .187 DEEP
REDRILL .020
2 HOLES
32
.140
40° ± 0° 15'
R
.156
.734
1/16 R
.531
.281
.241
8
-A-
.359
.615
.677
.766
⊥ A .001
.625
.312
NO. 41 (.096) DR x .390 DEEP
REDRILL NO. 30 (.1285) X .025 DEEP
NO. 4-40 NC-3B TAP x .234
DEEP 2 HOLES ⊕.010 DIA
.915
1/32 R TYP
B
A
.125
.187 BSC
.125 ±.002
.187 BSC
.375 BSC BETWEEN B HOLES
.3750 ±.0003 BETWEEN A HOLES
.750
1.500



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	
TOL ON	FRACTIONS ± 1/64 DECIMALS ± .005 ANGLES ± 1°
DO NOT SCALE THIS DRAWING	
MATERIAL	SEE NOTE 5
CONTRACT	
KOLLSMAN INSTRUMENT CORPORATION ELMHURST NEW YORK	
KIC PN	52387000110
DRAWN	R. CARROLL DATE 7/16/63
CHECKED	M. Farrell 7/17/63
APPROVAL	M. Werner 7/3/63
APPROVAL	E. Thorup 7/30/63
NASA APPROVAL	W J Rline 7-31-63
MIT APPROVAL	L Hazel 7/31/63
MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
TITLE	SUPPORT, MIRROR
CODE IDENT NO.	
SIZE	D
NASA NUMBER	1011429
SCALE	2:1
WEIGHT	CALC ACTUAL
SHEET	1 OF 1

NEXT ASSY	USED ON
1011515	1011559

APPLICATION

MASTER

INCHES
PHOTOGRAPHIC SCALE ONLY

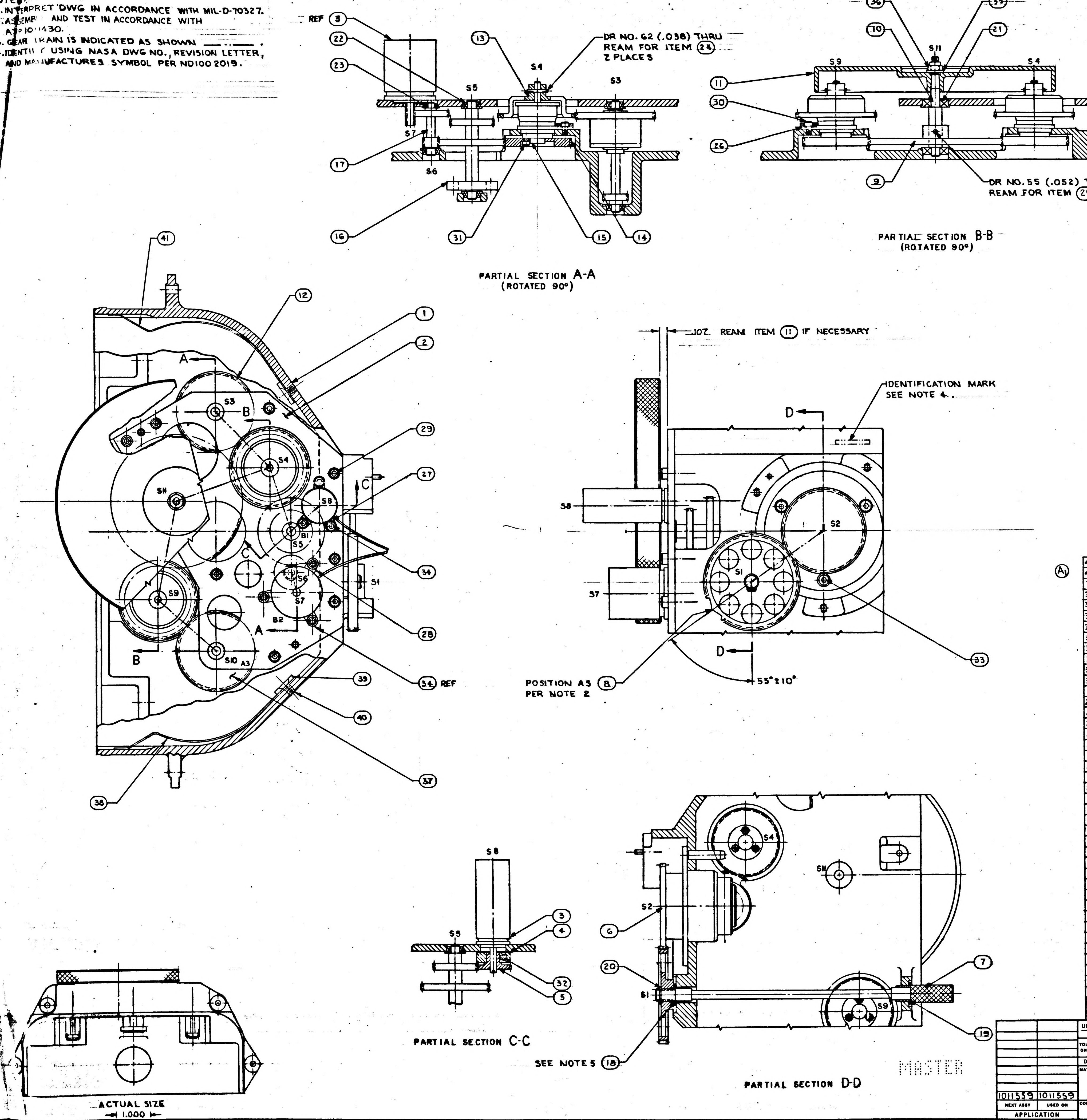
1011429

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLE AND TEST IN ACCORDANCE WITH ATP 1011430.
3. GEAR TRAIN IS INDICATED AS SHOWN ——·——.
4. IDENTIFY USING NASA DWG NO., REVISION LETTER, AND MANUFACTURES SYMBOL PER ND100 2019.

1011430 A

REVISIONS 03146

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A₂		REVISED PER TDRR NO. 08624	26 MAY 64	WK


REF ③
DR NO. 62 (.038) THRU REAM FOR ITEM ㉔ 2 PLACES
S5
S4
S3
S7
S6
PARTIAL SECTION A-A (ROTATED 90°)
DR NO. 55 (.052) THRU REAM FOR ITEM ㉕
S9
S11
S4
PARTIAL SECTION B-B (ROTATED 90°)
.107 REAM ITEM ⑪ IF NECESSARY
IDENTIFICATION MARK SEE NOTE 4.
D
S8
S2
S1
S7
POSITION AS PER NOTE 2
55°±10°
A
B
C
S3
S4
S11
S8
B1
S5
S6
S7
S9
S10
A3
B2
S1
REF
S8
S5
PARTIAL SECTION C-C
S4
S11
S2
S1
S9
SEE NOTE 5
PARTIAL SECTION D-D
ACTUAL SIZE
1.000
MASTER

REFERENCE DWGS:-
GEAR SCHEMATIC 1011527

Ⓐ₁

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
41	1		1012168			SPRING, UPPER			
40	4		NAS1189C02P3L			SCREW, SELF LOCKING FLT HD			
39	2		1012161			PLATE, RETAINING			
38	1		1011554			SPRING, LOWER			
37	1		1011443-2	85387000062		HOUSING & CLUTCH ASSY OF (CCW)(S10)			
36	1		1011750-6	74443128006		NUT, HEX, PLAIN, SELF-LOCKING			
35	1		MS15795-303			WASHER, PLAIN			
34	6		NAS1352C02LL3	74455157005		SCREW, CAP, HEX SOC HD, SELF-LOCKING			
33	3		NAS1352C04LL4	74455157013		SCREW, CAP, HEX SOC HD, SELF-LOCKING			
32	1		NAS1352C02LL6	74455157007		SCREW, CAP, HEX SOC HD, SELF-LOCKING			
31	6		NAS1351C00LL3	74455156002		SCREW, CAP, HEX SOC HD, SELF-LOCKING			
30	6		NAS1352C01LL2	74455157001		SCREW, CAP, HEX SOC HD, SELF-LOCKING			
29	8		NAS1352C03LL4	74455157009		SCREW, CAP, HEX SOC HD, SELF-LOCKING			
28	3		1011868-5	54386900334		CLAMP, RIM CLENCHING			
27	3		1011868-4	54386900333		CLAMP, RIM CLENCHING			
26	6		1011447	52387000140		CLAMP, MOUNTING			
25	1		1011524-1	39387000050		PIN, PLAIN, TAPERED			
24	2		1011524-2	39387000051		PIN, PLAIN, TAPERED			
23	1		1011474	30021790060		BEARING, BALL, ANNULAR			
22	7		1011608-1	30025770080		BEARING, BALL, ANNULAR			
21	2		1011608-3	30025770082		BEARING, BALL, ANNULAR			
20	1		MS16628-18	74453035001		RING, RETAINING · EXTERNAL BOWED			
19	2		1011408	74403018001		BEARING SLEEVE (FLANGED)			
18	1		1011488	74468068001		WASHER, FLAT LAMINATED			
17	1		1011435	35387000020		SHAFT, PINION (S6)			
16	1		1011438	35387000030		SHAFT, PINION (S5)			
15	2		1011369	75011000501		CLUTCH, SLIP (S4)(S9)			
14	2		1011451	33387000080		GEAR, SPUR 78T-80P (S4)(S9)			
13	2		1011449	33387000070		GEAR, SPUR 55T-48P (S4)(S9)			
12	1		1011443-1	85387000061		HOUSING & CLUTCH ASSY OF (CW)(S3)			
11	1		1011415	57387000060		WHEEL, MANUAL (S11)			
10	1		1011417	57387000070		SHAFT, GEAR MANUAL (S11)			
9	1		1011416	33387000040		GEAR, SPUR MANUAL (S11)			
8	1		1011457	33387000100		GEAR, SPUR (SPECIAL) (S1)			
7	1		1011458	57387000120		SHAFT, FOCUSING MANUAL (S1)			
6	1		1011374	74471380001		LENS, PROJECTION (S			
5	1		1011434	33387000050		GEAR, SPUR 60T-120P (S8			
4	1		1011355-2	57386901331		CLAMP, COLLAR			
3	1		1011471	85387000180		MOTOR, RESOLVER & CONNECTOR ASSY			
2	1		1011461	52387000150		PLATE, BEARING			
1	1		1011462	85387000110		HOUSING ASSY OF			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011559	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 87387000030
DRAWN S. Maano DATE 7-20-63
CHECKED MMW 9-13-63
APPROVAL M. Werner 9-13-63
APPROVAL E. Thorup 9-16-63
NASA APPROVAL Jack Barnard
MIT APPROVAL C. Ha 11/9/17/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

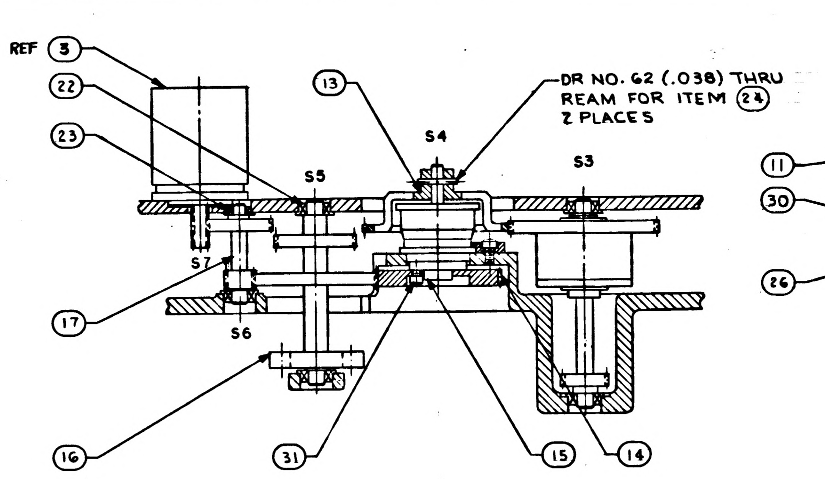
TITLE
GEARBOX ASSY

CODE IDENT NO.
SIZE E
NASA NUMBER 1011430
SCALE 2:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

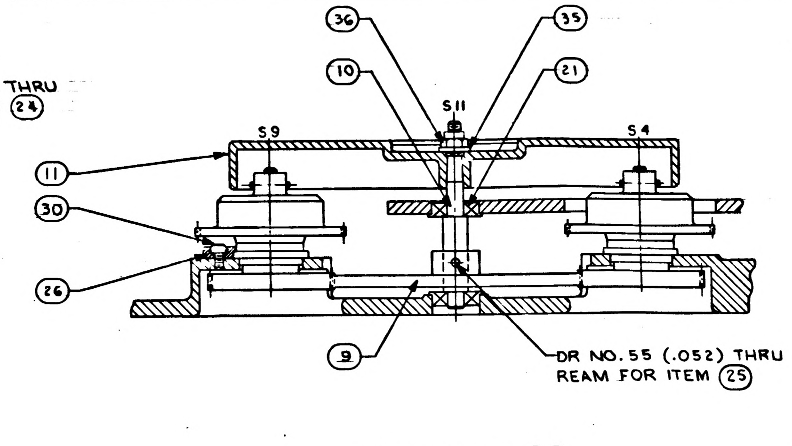
1011430

SYM	ZONE	REVISIONS DESCRIPTION	DATE	APPROVAL

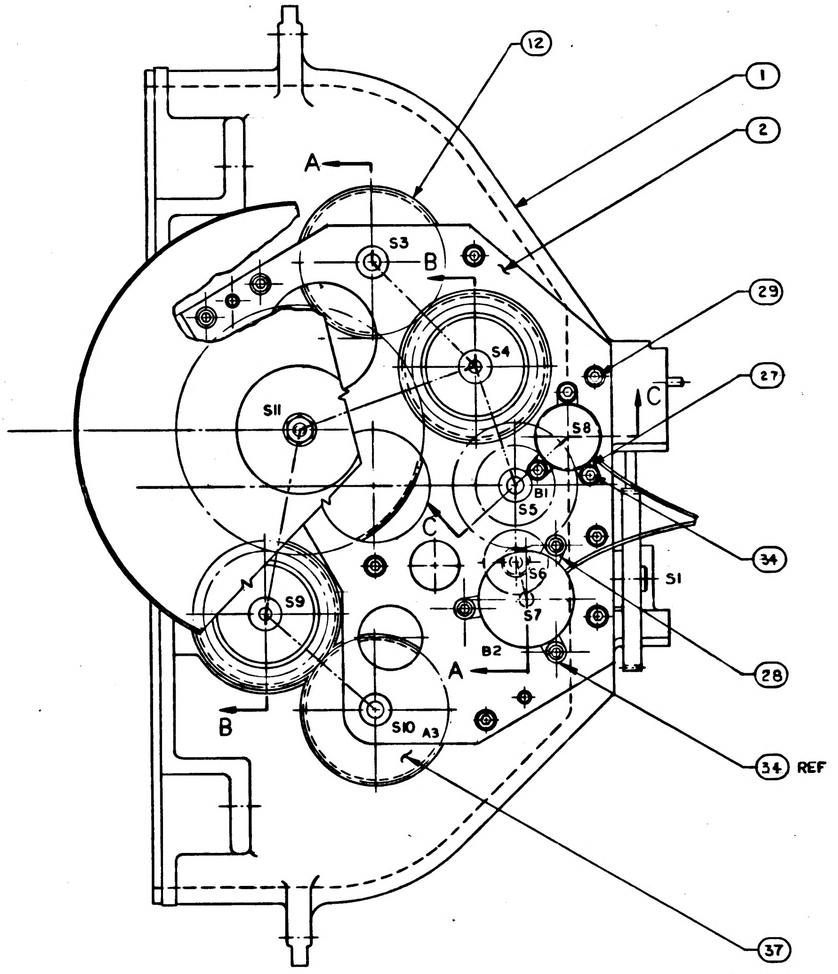
NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLE AND TEST IN ACCORDANCE WITH ATP 1011430.
3. GEAR TRAIN IS INDICATED AS SHOWN ——··—— .
4. IDENTIFY USING NASA DWG NO., REVISION LETTER, AND MANUFACTURES SYMBOL PER ND100 2019.

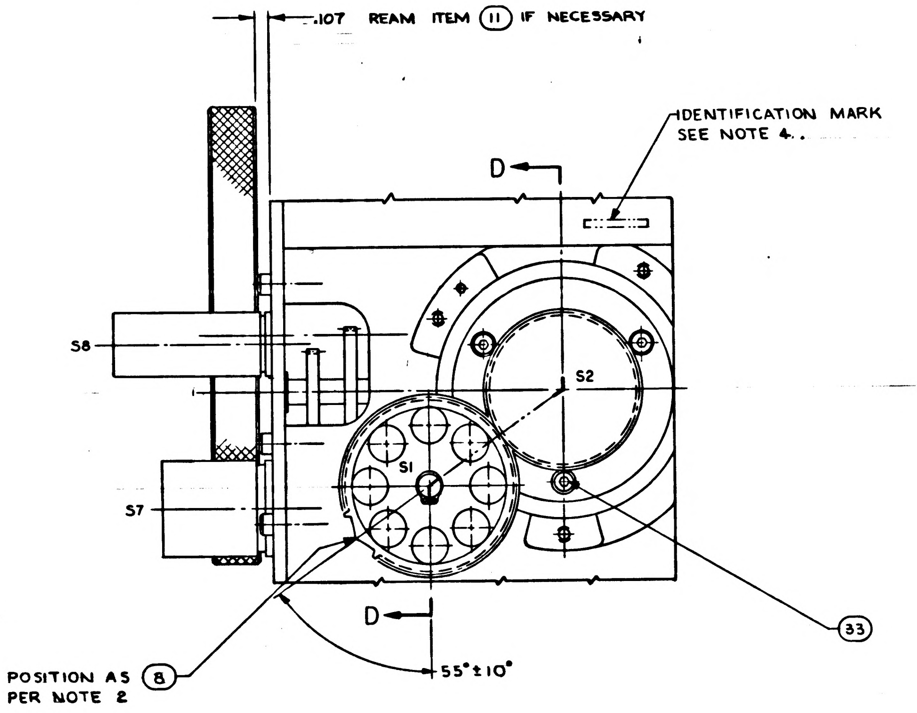


PARTIAL SECTION A-A (ROTATED 90°)



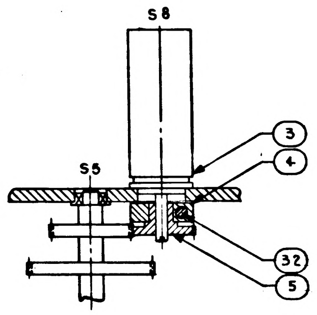
PARTIAL SECTION B-B (ROTATED 90°)



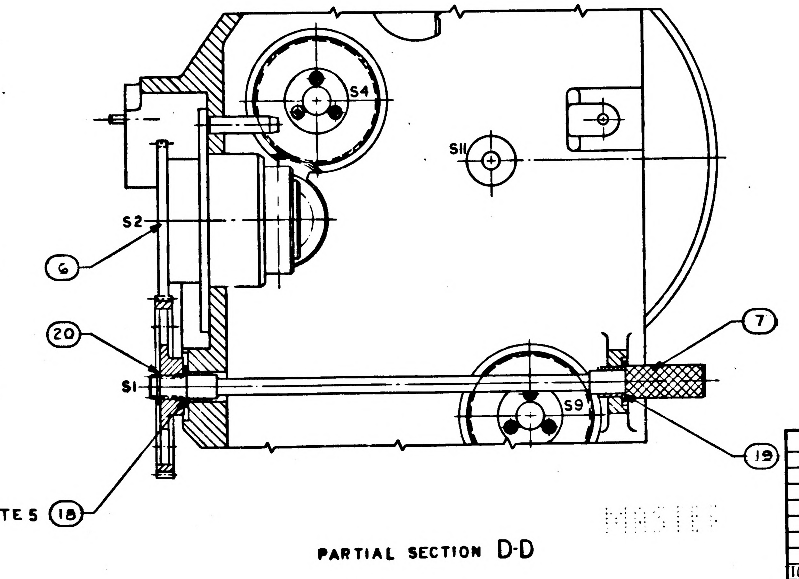


.107 REAM ITEM ⑪ IF NECESSARY
IDENTIFICATION MARK SEE NOTE 4.
D
S8
S2
S1
S7
D
POSITION AS PER NOTE 2 ⑧
55° ± 10°
㉝

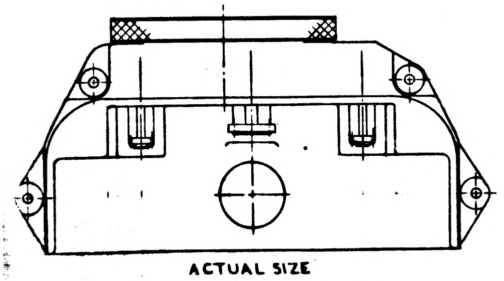
REFERENCE DWGS:-
GEAR SCHEMATIC 1011527



PARTIAL SECTION C-C



PARTIAL SECTION D-D



ACTUAL SIZE
1.000

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
37	1		1011443-2	85387000062		HOUSING & CLUTCH ASSY OF (CCW)(10)			
36	1		1011750-6	74443128006		NUT, HEX, PLAIN, SELF-LOCKING			
35	1		MS15795-303			WASHER, PLAIN			
34	6		NAS1352C02LL3	74455157005		SCREW, CAP, HEX SOC HD, SELF-LOCKING.			
33	3		NAS1352C04LL4	74455157013		SCREW. CAP, HEX SOC HD, SELF-LOCKING			
32	1		NAS1352C02LL6	74455157007		SCREW, CAP, HEX SOC HD, SELF-LOCKING			
31	6		NAS1351C00LL3	74455156002		SCREW, CAP, HEX SOC HD, SELF-LOCKING			
30	6		NAS1352C01LL2	74455157001		SCREW, CAP, HEX SOC HD, SELF-LOCKING			
29	8		NAS1352C03LL4	74455157009		SCREW, CAP, HEX SOC HD, SELF-LOCKING			
28	3		1011868-5	54386900334		CLAMP, RIM CLENCHING			
27	3		1011868-4	54386900333		CLAMP, RIM CLENCHING			
26	6		1011447	52387000140		CLAMP, MOUNTING			
25	1		1011524-1	39387000050		PIN, PLAIN, TAPERED			
24	2		1011524-2	39387000051		PIN, PLAIN, TAPERED			
23	1		1011474	30021790060		BEARING, BALL, ANNULAR			
22	7		1011608-1	30025770080		BEARING, BALL, ANNULAR			
21	2		1011608-3	30025770082		BEARING, BALL, ANNULAR			
20	1		MS16628-18	74453035001		RING, RETAINING · EXTERNAL BOWED			
19	2		1011408	74403018001		BEARING SLEEVE (FLANGED)			
18	1		1011488	74468068001		WASHER, FLAT LAMINATED			
17	1		1011435	35387000020		SHAFT, PINION (S6)			
16	1		1011438	35387000030		SHAFT, PINION (S5)			
15	2		1011369	75011000501		CLUTCH, SLIP (S4)(S9)			
14	2		1011451	33387000080		GEAR, SPUR 78T-80P (S4)(S9)			
13	2		1011449	33387000070		GEAR, SPUR 55T-48P (S4)(S9)			
12	1		1011443-1	85387000061		HOUSING & CLUTCH ASSY OF (CW)(S3)			
11	1		1011415	57387000060		WHEEL, MANUAL (S11)			
10	1		1011417	57387000070		SHAFT, GEAR MANUAL (S11)			
9	1		1011416	33387000040		GEAR, SPUR MANUAL (S11)			
8	1		1011457	33387000100		GEAR, SPUR (SPECIAL) (S1)			
7	1		1011458	57387000120		SHAFT, FOCUSING MANUAL (S1)			
6	1		1011374	74471380001		LENS, PROJECTION (S2)			
5	1		1011434	33387000050		GEAR, SPUR 60T-120P (S8)			
4	1		1011355-2	57386901331		CLAMP, COLLAR			
3	1		1011471	85387000180		MOTOR, RESOLVER & CONNECTOR ASSY OF			
2	1		1011461	52387000150		PLATE, BEARING			
1	1		1011462	85387000110		HOUSING ASSY OF			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011559	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 87387000030

DRAWN S. Mucco DATE 7-20-63
CHECKED MMW 9-13-63
APPROVAL M. Werner 9-13-63
APPROVAL E. Wang 9-16-63
NASA APPROVAL
MIT APPROVAL 12/9/1/6

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
GEARBOX ASSY

CODE IDENT NO.
SIZE E
NASA NUMBER 1011430
SCALE 2 : 1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

	1011433

REVISIONS TDRR 02279				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG. IN ACCORDANCE WITH MIL-D-70327.

2. SURFACE QUALITY 60-40 PER MIL-O-13830 (ORD)

3. MATERIAL: GLASS, OPTICAL PER JAN-G-174 GRADE C TYPE 517-645

4. SURFACE ① POLISHED FLAT WITHIN 10 FRINGES WHEN MEASURED WITH OPTICAL TEST FLAT OF 1/10 WAVE ACCURACY (MIN.) USING MONOCHROMATIC LIGHT AT 5461 A°. ALL OTHER SURFACES FINE GROUND.

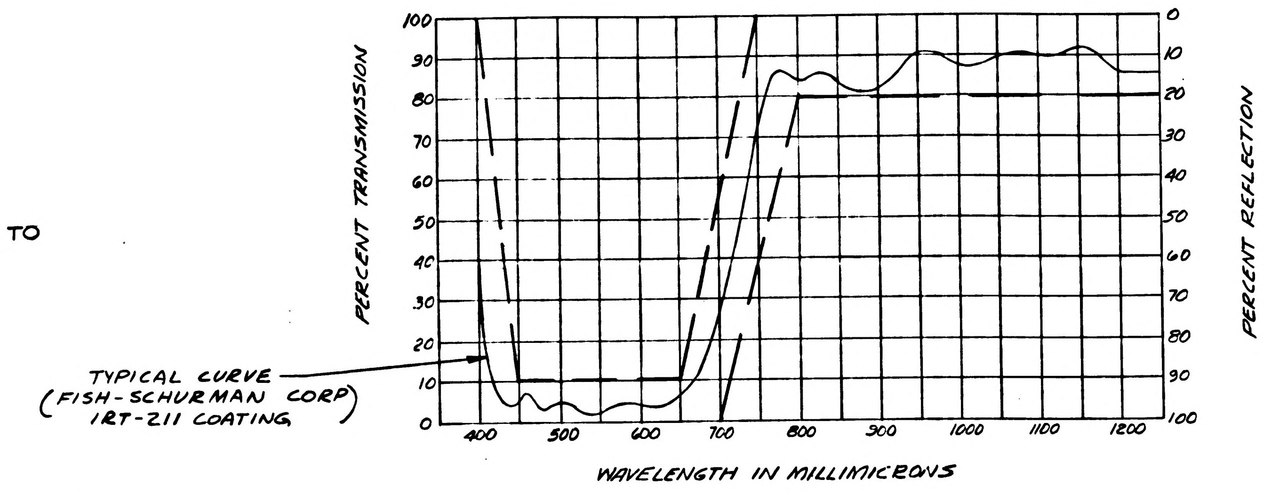
5. SURFACE ① & ② PARALLEL WITHIN 0°15'

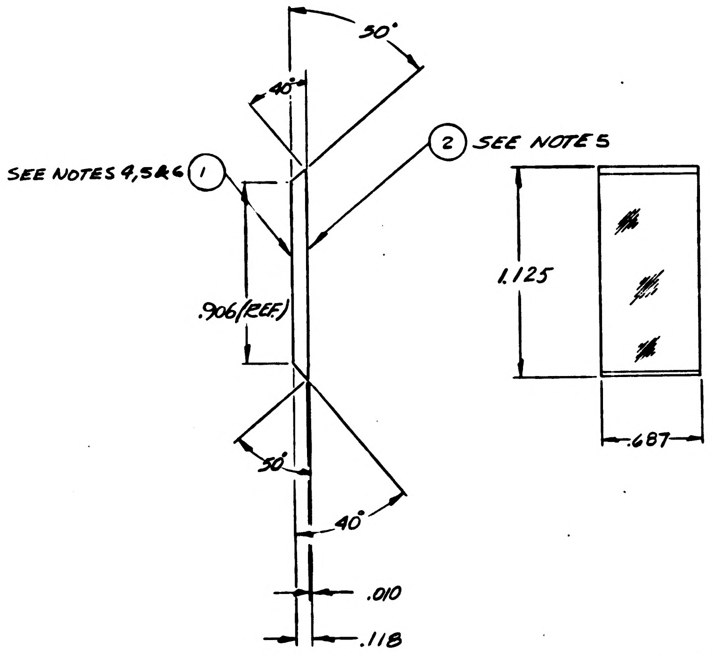
6. AFTER COATING SURFACE ①, TRANSMISSION/REFLECTION CURVE TO LIE WITHIN LIMITS INDICATED BY DASHED LINES IN FIG. 1. COATING TO BE DURABLE AT PRESSURES DOWN TO 10^{-4} MM Hg AND TEMPERATURES UP TO 150°F, AND DURING CLEANING AS SPECIFIED IN ND1002096.

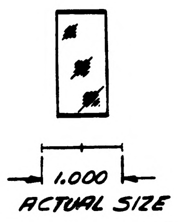
7. THE SUM OF THE REFLECTION PERCENTAGE AND THE TRANSMISSION PERCENTAGE OF THE FINISHED ITEM SHALL BE 95% MIN. AVERAGED OVER THE WAVELENGTH RANGE.

8. IDENTIFY USING NASA DRAWING NO, REVISION LETTER & MFR'S. SYMBOL PER ND1002019.

FIGURE 1 ANGLE OF INCIDENCE 45°







ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011559	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOL ON: FRACTIONS ± ~ DECIMALS ±.005 ANGLES ± 1° DO NOT SCALE THIS DRAWING	KOLLSMAN INSTRUMENT CORPORATION ELMHURST NEW YORK KIC PN 28387000010	MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
MATERIAL SEE NOTE 3	DRAWN E. TYLS DATE 31MAY63 CHECKED M Fazwell 6-28-63 APPROVAL M. Werner 6-28-63 Rem. APPROVAL	TITLE MIRROR	
CONTRACT	NASA APPROVAL 7/19/63 MIT APPROVAL W Kupfer 24 July 63	CODE IDENT NO. SCALE 2:1	SIZE D NASA NUMBER 1011433 WEIGHT CALC ACTUAL SHEET 1 OF 1

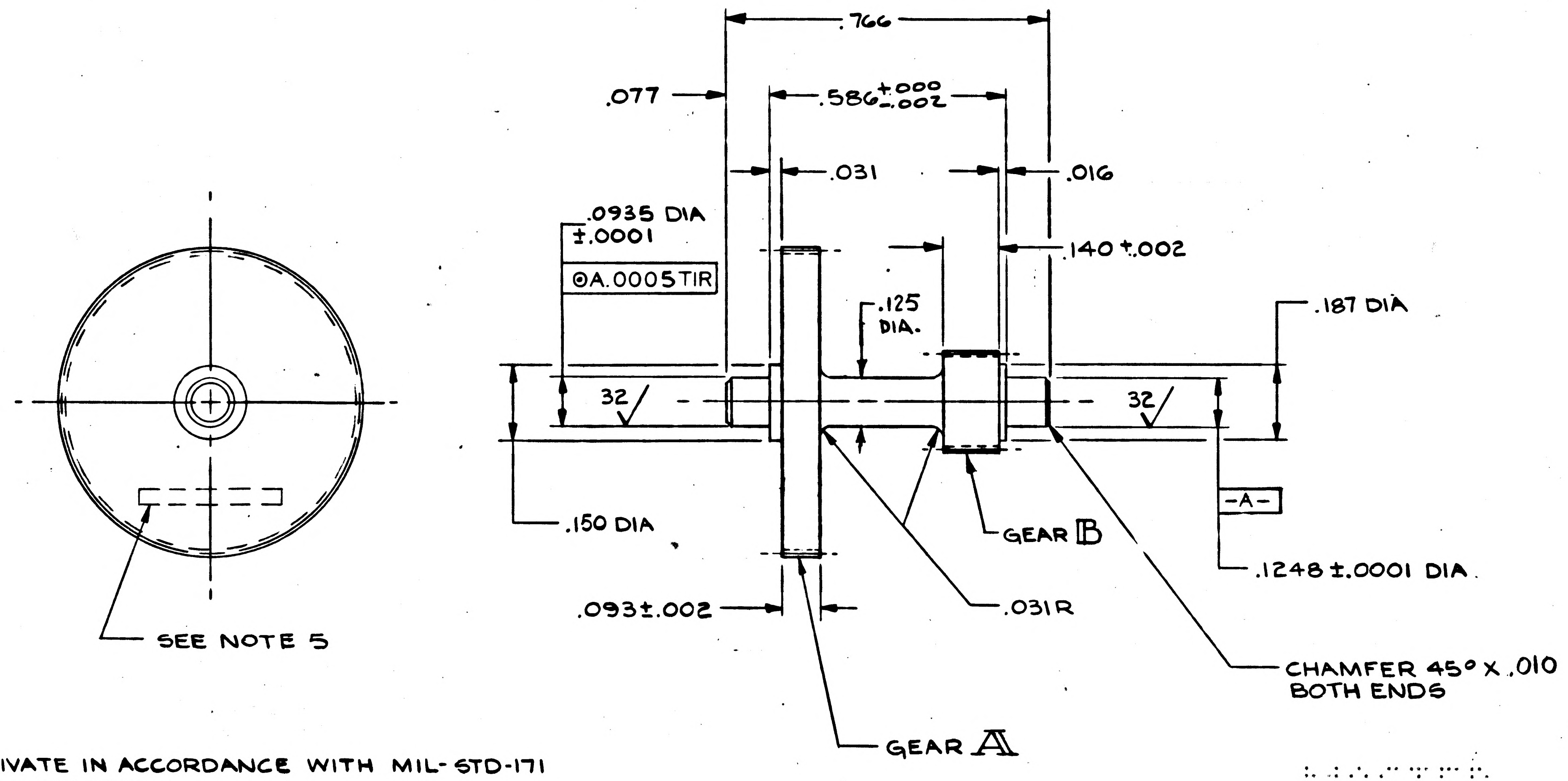
INCHES
PHOTOGRAPHIC SCALE ONLY

SPUR GEAR DATA

	GEAR A	GEAR B
NO OF TEETH	60	18
DIAMETRAL PITCH	120	80
PRESSURE ANGLE	20°	20°
PITCH DIAMETER	.5000	.22500
OUTSIDE DIAMETER	$.5167^{+.0000}_{-.0015}$	$.2500^{+.0000}_{-.0020}$
AGMA CLASS	PREC ID	PREC ID
GEAR TEETH FINISH	32√	32√

REVISIONS TDRR 01905

SYM	ZONE	DESCRIPTION	DATE	APPROVAL



MASTER

6. FINISH: PASSIVATE IN ACCORDANCE WITH MIL-STD-171 (KPS-1005I.200).
5. IDENTIFY PER ND1002019; WITH NASA PART NO. REV LETTER AND MFR'S SYM (KIC)
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
3. UNLESS OTHERWISE SPECIFIED:
   a 125√ FINISH ALL OVER
   b BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.

NOTES:

1011435

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011430	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	±	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
STAINLESS STEEL
A.I.S.I 303
FED.SPEC, QQ-S-763
CLASS 303, COND A

CONTRACT

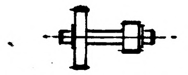
KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 35387000020

DRAWN V. Lozito DATE 5-31-63
CHECKED W. Witzky 6-17-63
APPROVAL M. Werner 7-1-63
APPROVAL E. Thomas 7-1-63
NASA APPROVAL 7/3/63
MIT APPROVAL W Kupfer 3/6/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SHAFT, PINION

CODE IDENT NO.
SIZE C
NASA NUMBER 1011435
SCALE 4:1
WEIGHT CALC ACTUAL
SHEET OF



ACTUAL SIZE

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

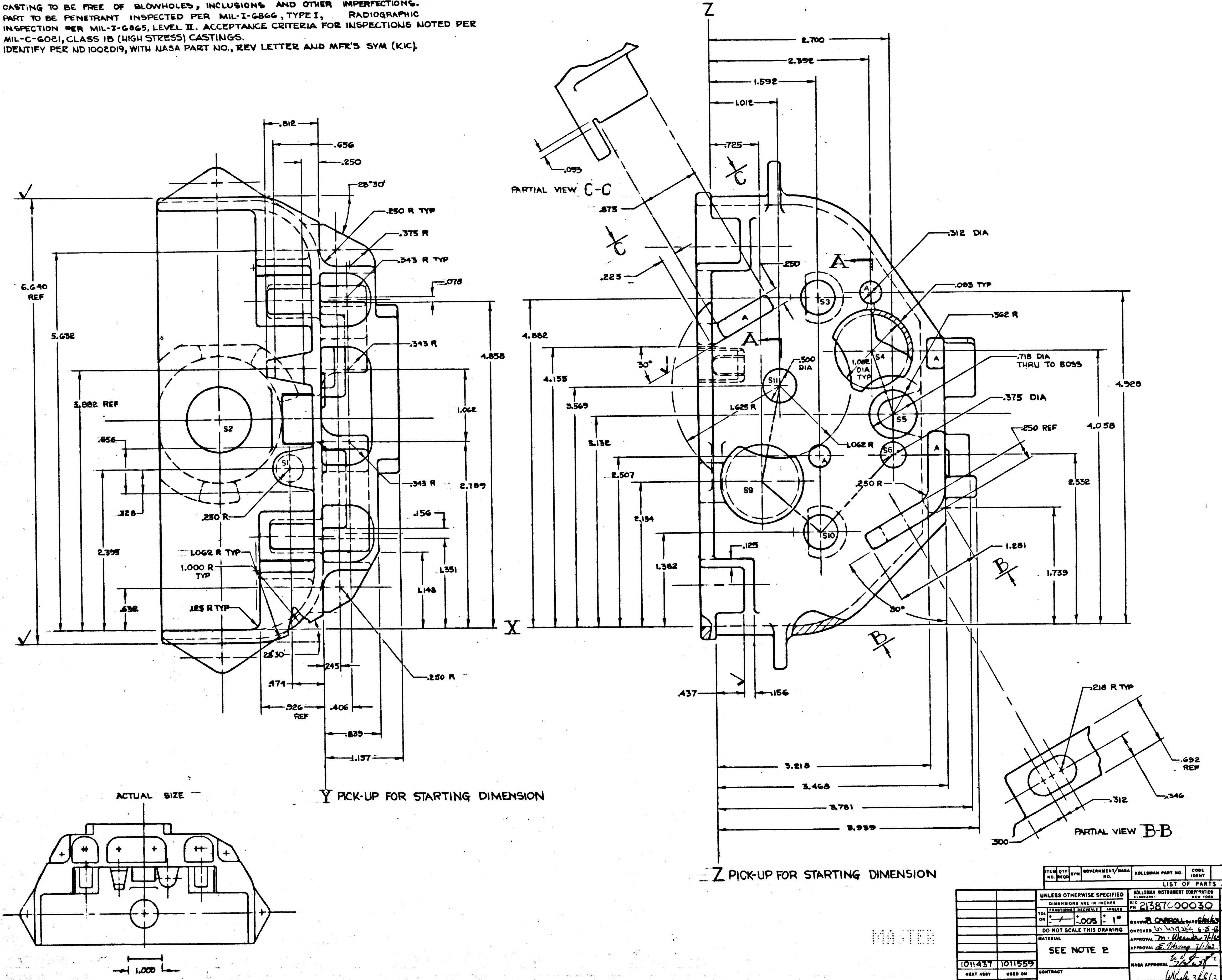
1011435

1011436 A

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS TDRR 61605				
A		REVISED PER TDRR NO. 03161	[illegible]	[illegible]

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. MATERIAL: INVESTMENT CASTING, ALUMINUM ALLOY 356-T6,
   FED SPEC QQ-A-601C, ALLOY 356 COND T6 OR EQUIVALENT.
3. ALL FILLETS AND RADII TO BE 1/16 MAX UNLESS OTHERWISE NOTED.
4. SURFACES MARKED √ WILL BE MACHINED, .031 MATERIAL HAS BEEN INCLUDED FOR MACHINING.
5. CASTING DIMENSIONS TO HAVE A TOLERANCE OF ±.005/INCH OR .005 WHICHEVER IS GREATER, UNLESS OTHERWISE SPECIFIED.
6. CASTING TO BE FREE OF BLOWHOLES, INCLUSIONS AND OTHER IMPERFECTIONS.
7. PART TO BE PENETRANT INSPECTED PER MIL-I-6866, TYPE I, RADIOGRAPHIC INSPECTION PER MIL-I-6865, LEVEL II. ACCEPTANCE CRITERIA FOR INSPECTIONS NOTED PER MIL-C-6021, CLASS IB (HIGH STRESS) CASTINGS.
8. IDENTIFY PER ND 1002019, WITH NASA PART NO., REV LETTER AND MFR'S SYM (KIC).


PARTIAL VIEW C-C
PARTIAL VIEW B-B
ACTUAL SIZE
Y PICK-UP FOR STARTING DIMENSION
Z PICK-UP FOR STARTING DIMENSION
X
Y
Z
A
B
C
S1
S2
S3
S4
S5
S6
S9
S10
S11
.812
.656
.250
28°30'
.250 R TYP
.375 R
.343 R TYP
.078
.343 R
.343 R
6.640 REF
5.632
4.858
3.882 REF
1.062
2.789
.656
.328
2.355
.632
.250 R
.156
1.062 R TYP
1.000 R TYP
.125 R TYP
1.351
1.148
28°30'
.245
.474
.926 REF
.406
.839
1.137
.250 R
1.000
2.700
2.392
1.592
1.012
.725
.093
.875
.225
.250
.312 DIA
.093 TYP
.562 R
.718 DIA THRU TO BOSS
.375 DIA
.250 REF
.500 DIA
1.062 DIA TYP
1.625 R
1.062 R
.250 R
30°
4.882
4.155
3.569
3.132
2.507
2.134
1.382
.125
4.928
4.058
2.532
1.739
1.281
30°
.437
.156
3.218
3.468
3.781
3.939
.218 R TYP
.692 REF
.346
.312
.300

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011437	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — ; DECIMALS ±.005 ; ANGLES ± 1°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 21387C00030

DRAWN R. CARROLL DATE 6/6/63
CHECKED W. Witzke 6-28-63
APPROVAL M. Wernder 7/1/63
APPROVAL E. Thomp 7/1/63
NASA APPROVAL 7/3/63
MIT APPROVAL 3/6/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

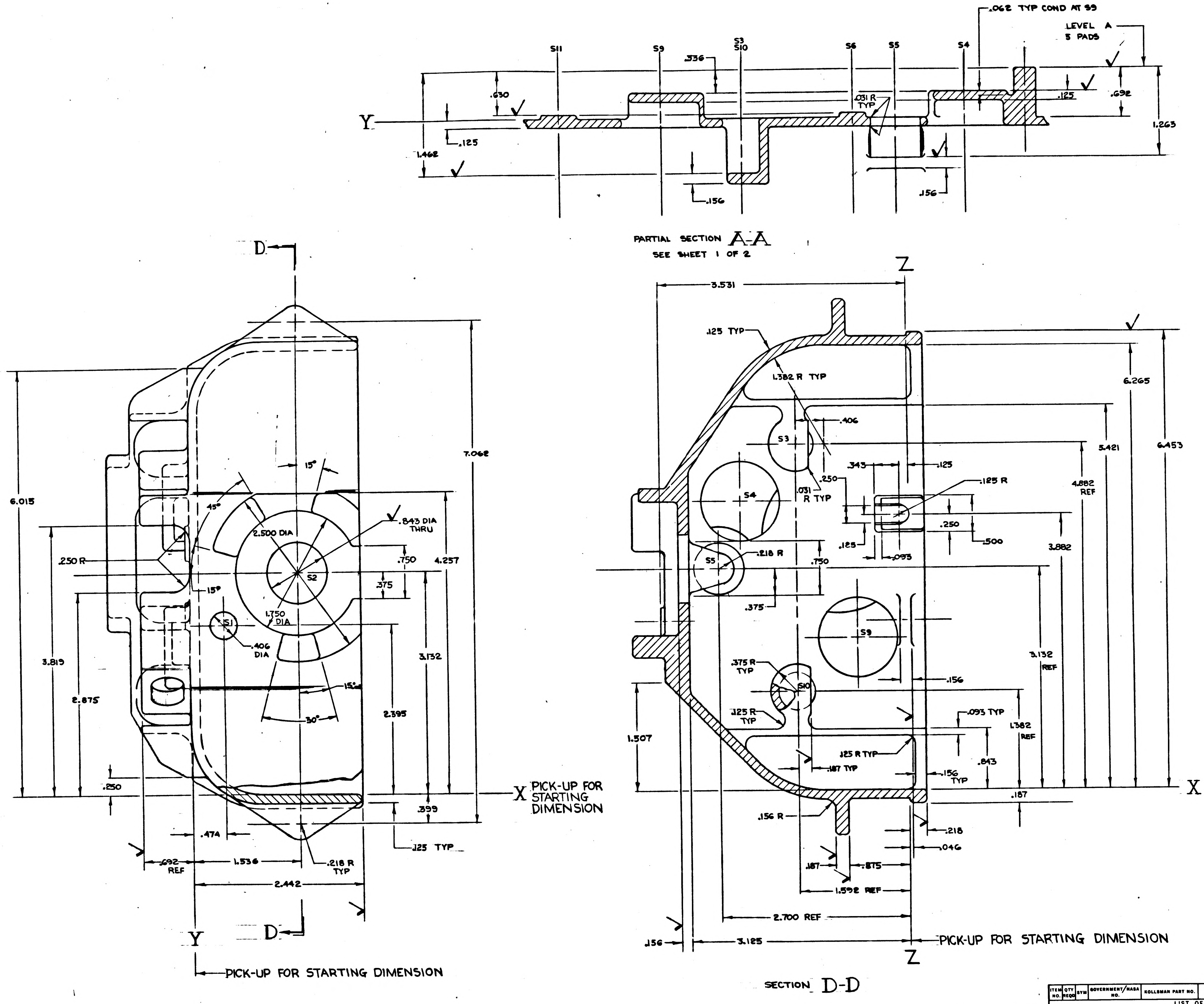
TITLE
HOUSING, GEARBOX
CASTING

CODE IDENT NO.
SIZE E
NASA NUMBER 1011436
SCALE 2:1
WEIGHT
CALC ACTUAL
SHEET 1 OF 2

INCHES
PHOTOGRAPHIC SCALE ONLY

1011436 A

REVISIONS TDRR01905				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		SEE SHT NO. 1 FOR CHANGES 03'61	9-16-63	9/17 DW



.062 TYP COND AT S9
LEVEL A
5 PADS
S11
S9
S3
S10
S6
S5
S4
.336
.630
.031 R TYP
.125
.692
1.263
Y
.125
1.462
.156
.156
PARTIAL SECTION A-A
SEE SHEET 1 OF 2
D
15°
45°
.843 DIA THRU
2.500 DIA
.750
4.257
7.062
6.015
.250 R
S2
.375
15°
S1
1.750 DIA
.406 DIA
3.819
3.132
2.875
15°
30°
2.395
.250
X PICK-UP FOR STARTING DIMENSION
.399
.474
.125 TYP
.692 REF
1.536
.218 R TYP
2.442
Y
D
PICK-UP FOR STARTING DIMENSION
Z
3.531
.125 TYP
1.382 R TYP
6.265
.406
S3
5.421
6.453
.343
.125
.125 R
.250
.031 R TYP
4.882 REF
S4
.250
.500
.125
.093
3.882
.218 R
S5
.750
.375
S9
3.132 REF
.375 R TYP
S10
.156
.125 R TYP
.093 TYP
1.382 REF
1.507
.125 R TYP
.187 TYP
.843
.156 TYP
X
.187
.156 R
.218
.046
.187
.875
1.592 REF
2.700 REF
.156
3.125
PICK-UP FOR STARTING DIMENSION
Z
SECTION D-D

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	±	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
SEE SHEET 1 OF 2

CONTRACT

1011437	1011559
NEXT ASSY	USED ON

APPLICATION

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 21387000030

DRAWN R CARROLL DATE 6/25/63
CHECKED W. Witzky 6-27-63
APPROVAL M. Wagner 7/1/63
APPROVAL E. Thomas 7/1/63
NASA APPROVAL 7/3/63
MIT APPROVAL 3 July 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, GEARBOX
CASTING

CODE IDENT NO. SIZE E NASA NUMBER 1011436

SCALE 2:1 WEIGHT CALC ACTUAL SHEET 2 OF 2

MASTER

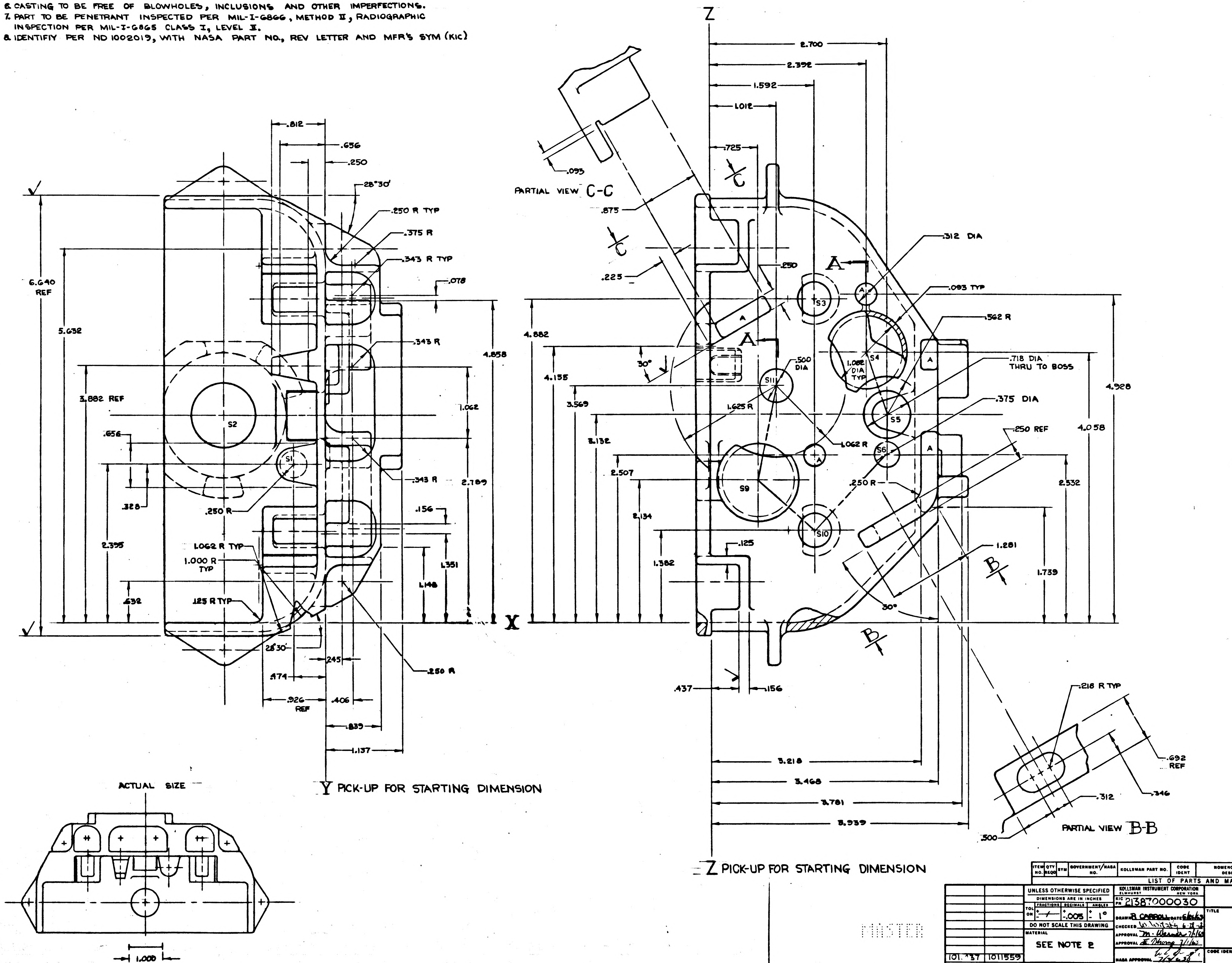
INCHES
PHOTOGRAPHIC SCALE ONLY

1011436

REVISIONS TDRR 61405				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. MATERIAL: INVESTMENT CASTING, ALUMINUM ALLOY 356-T6, FED SPEC QQ-A-601C, ALLOY 356 COND T6 OR EQUIVALENT.
3. ALL FILLETS AND RADII TO BE 1/16 MAX UNLESS OTHERWISE NOTED.
4. SURFACES MARKED √ WILL BE MACHINED, .031 MATERIAL HAS BEEN INCLUDED FOR MACHINING.
5. CASTING DIMENSIONS TO HAVE A TOLERANCE OF ±.005/INCH OR .005 WHICHEVER IS GREATER, UNLESS OTHERWISE SPECIFIED.
6. CASTING TO BE FREE OF BLOWHOLES, INCLUSIONS AND OTHER IMPERFECTIONS.
7. PART TO BE PENETRANT INSPECTED PER MIL-I-6866, METHOD II, RADIOGRAPHIC INSPECTION PER MIL-I-6865 CLASS I, LEVEL II.
8. IDENTIFIY PER ND 1002019, WITH NASA PART NO., REV LETTER AND MFR'S SYM (KIC)



.812
.656
.250
28°30'
.250 R TYP
.375 R
.343 R TYP
.078
6.640 REF
5.632
4.858
.343 R
3.882 REF
S2
1.062
.656
S1
.343 R
2.789
.328
.250 R
.156
2.355
1.062 R TYP
1.000 R TYP
1.351
1.148
.632
.125 R TYP
28°30'
.245
.474
.250 R
.926 REF
.406
.839
1.137
X
Y PICK-UP FOR STARTING DIMENSION
ACTUAL SIZE
1.000
Z
2.700
2.392
1.592
1.012
.725
C
.093
PARTIAL VIEW C-C
.875
C
.225
.250
A
S3
A
.312 DIA
.093 TYP
.562 R
4.882
A
30°
4.155
.500 DIA
S11
1.082 DIA TYP
S4
.718 DIA THRU TO BOSS
A
4.928
3.569
1.625 R
S5
.375 DIA
3.132
1.062 R
S6
.250 REF
4.058
A
2.507
S9
.250 R
2.532
2.134
S10
.125
1.281
1.382
B
1.739
30°
B
.437
.156
.218 R TYP
3.218
3.468
3.781
3.939
.692 REF
.346
.312
.500
PARTIAL VIEW B-B
Z PICK-UP FOR STARTING DIMENSION

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
101.737	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ±.005 ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE 2
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 21387000030
DRAWN B. CARROLL DATE 6/26/63
CHECKED W. Witzky 6-28-63
APPROVAL M. Wesner 7/1/63
APPROVAL E. Thomg 7/1/63
NASA APPROVAL 7/3/63
MIT APPROVAL 3/8/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, GEARBOX
CASTING

CODE IDENT NO.
SIZE E
NASA NUMBER 1011436
SCALE 2:1
WEIGHT CALC ACTUAL
SHEET 1 OF 2

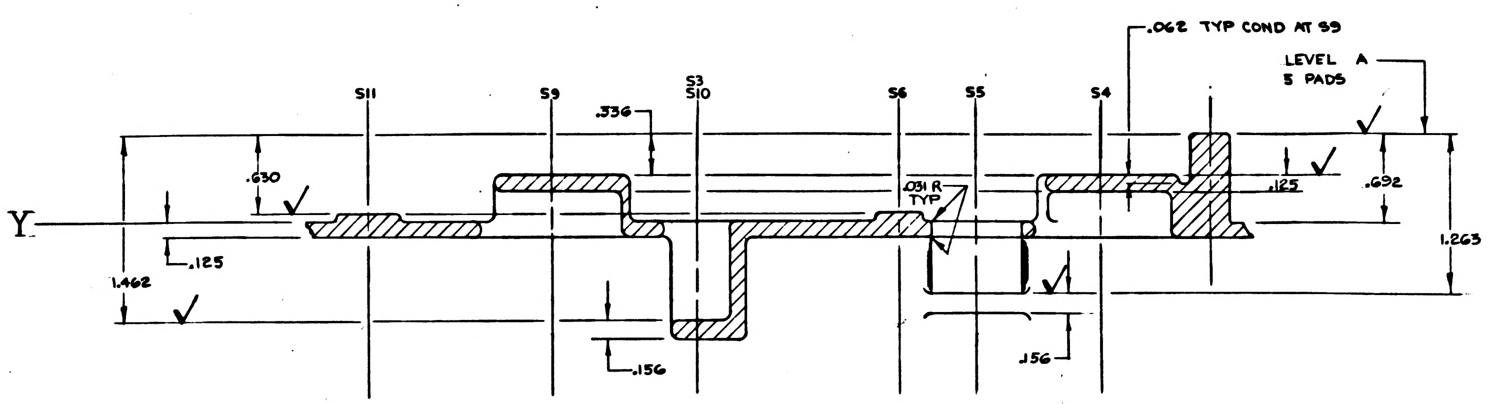
MASTER

1011436

1011436

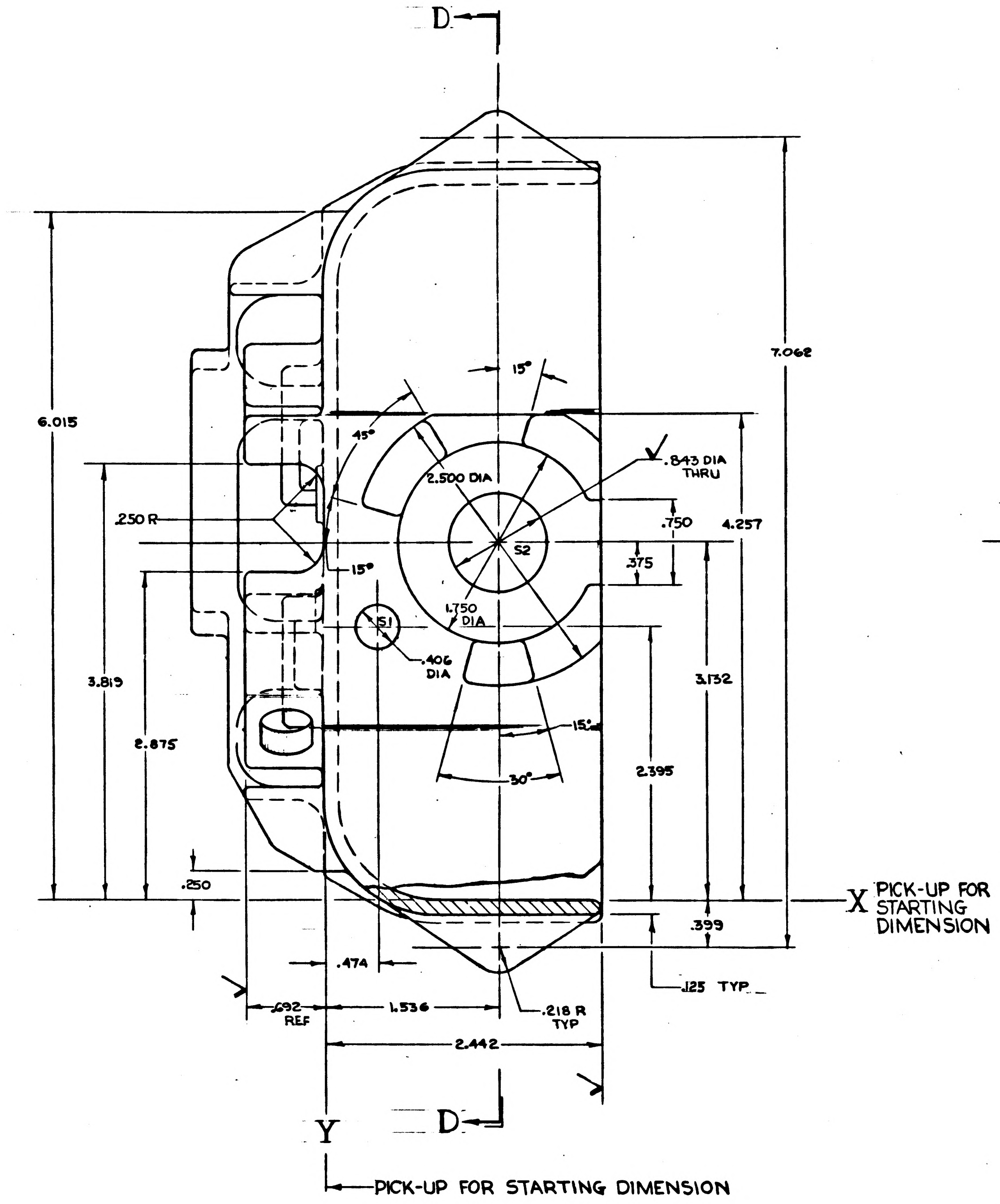
REVISIONS TDRR01905

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

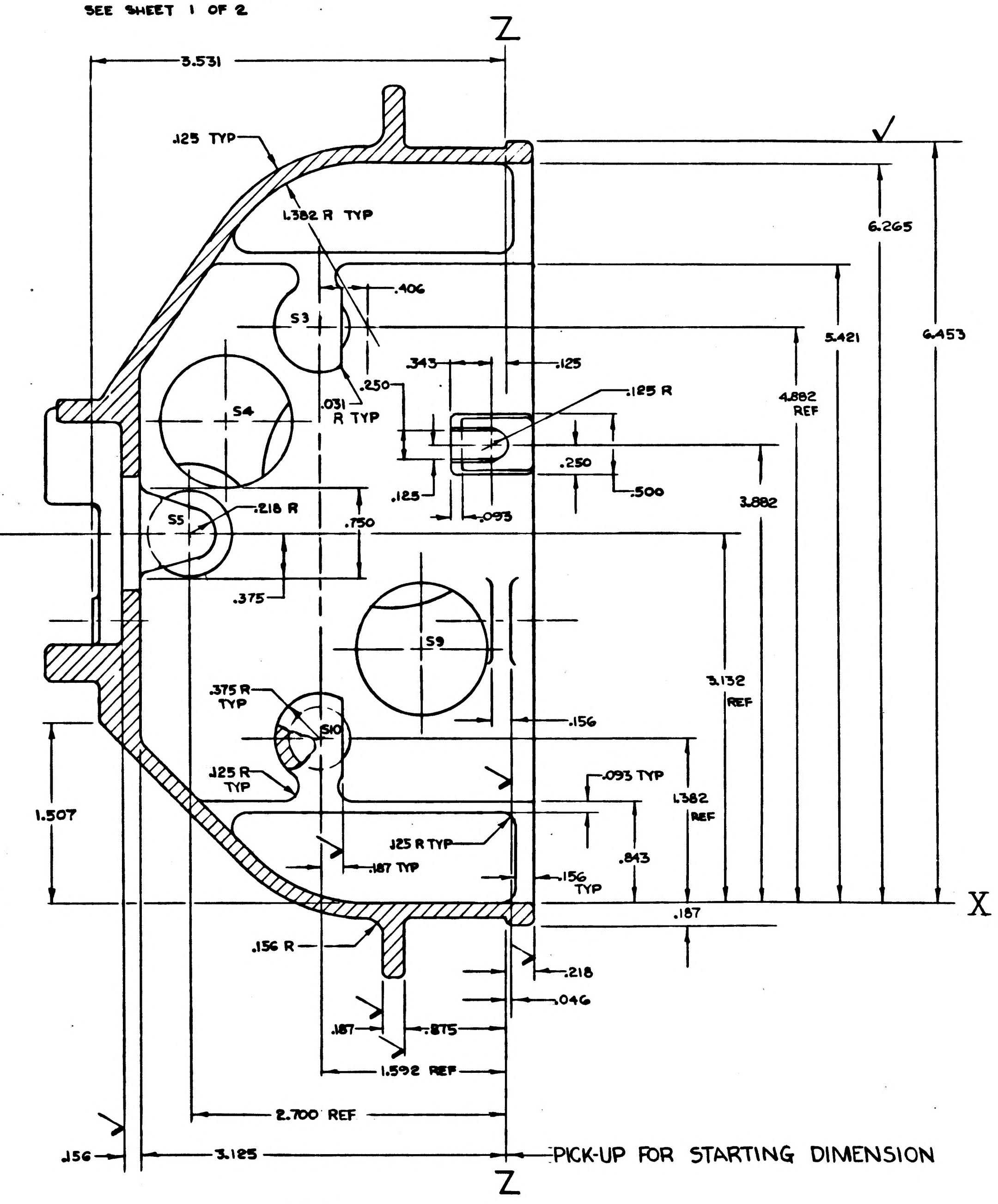


.062 TYP COND AT S9
LEVEL A
3 PADS
S11
S9
S3
S10
S6
S5
S4
.336
.630
.031 R TYP
.125
.692
1.263
Y
.125
1.462
.156
.156

PARTIAL SECTION A-A
SEE SHEET 1 OF 2



D
D
6.015
7.062
15°
45°
2.500 DIA
.843 DIA THRU
.750
4.257
.250 R
S2
.375
15°
1.750 DIA
S1
.406 DIA
3.132
3.819
2.875
15°
30°
2.395
.250
.399
X PICK-UP FOR STARTING DIMENSION
.474
.125 TYP
.692 REF
1.536
.218 R TYP
2.442
Y
PICK-UP FOR STARTING DIMENSION



Z
3.531
.125 TYP
1.382 R TYP
6.265
.406
S3
5.421
6.453
.343
.125
.125 R
4.882 REF
S4
.250
.031 R TYP
.250
.500
.125
.093
3.882
S5
.218 R
.750
.375
S9
3.132 REF
.375 R TYP
S10
.156
.125 R TYP
.093 TYP
1.382 REF
1.507
.125 R TYP
.187 TYP
.843
.156 TYP
.187
X
.156 R
.218
.046
.187
.875
1.592 REF
2.700 REF
.156
3.125
PICK-UP FOR STARTING DIMENSION
Z

SECTION D-D

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011437	1011559
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	±	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
SEE SHEET 1 OF 2

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 2138700000 30

DRAWN R CARROLL DATE 6/25/63
CHECKED W. Witaly 6-27-63
APPROVAL M. Wagner 7/1/63
APPROVAL E. Nbong 7/1/63
NASA APPROVAL 7/3/63
MIT APPROVAL W Wagner 3 July 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, GEARBOX
CASTING

CODE IDENT NO. | SIZE E | NASA NUMBER 1011436

SCALE 2:1 | WEIGHT | CALC ACTUAL | SHEET 2 OF 2

MASTER

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
  a. MACHINED SURFACES TO HAVE 125√.
  b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: BLACK ANODIZE (SULFURIC) PER MIL-A-8625, TYPE II BLACK (KPS-1005A.201).
6. IDENTIFY USING NASA DWG NO., REVISION LETTER, AND MANUFACTURES SYMBOL PER ND1002019.

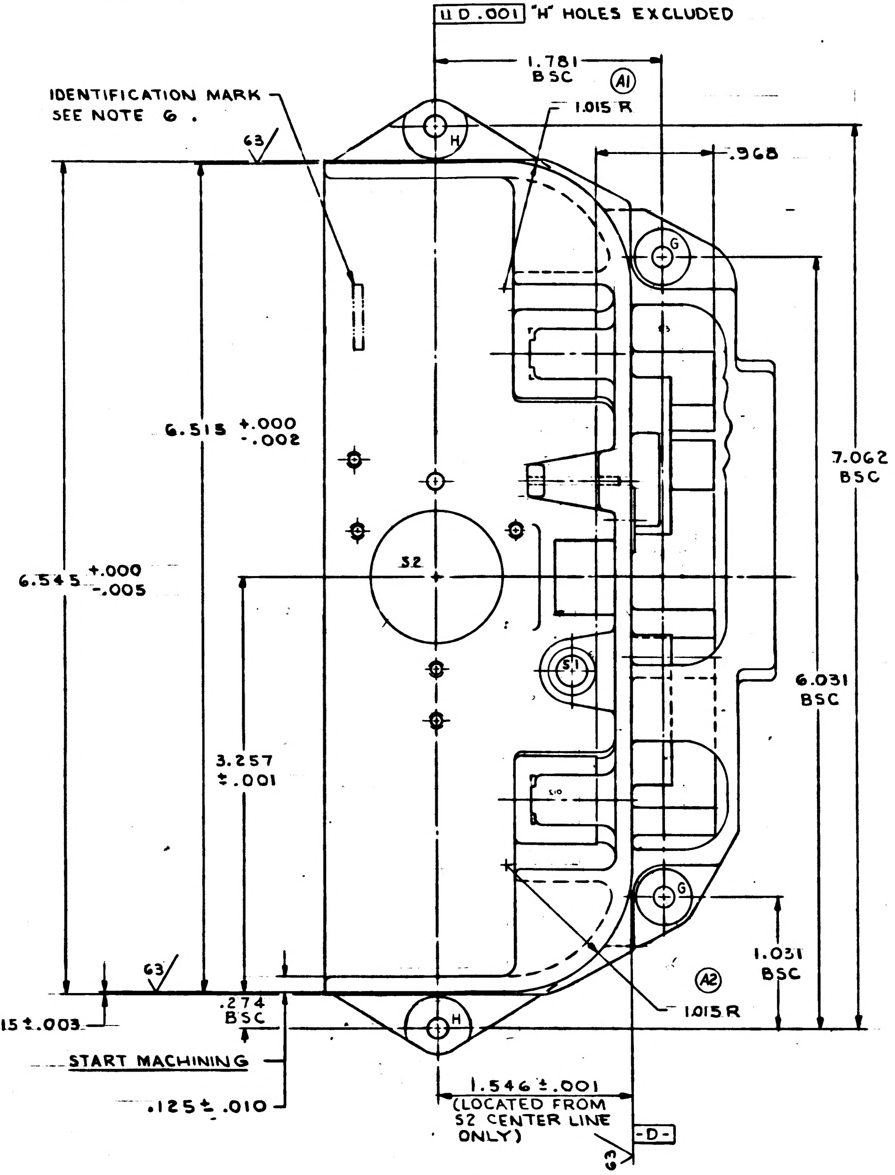
CENTERS	(C.D.) CKECKING DIM
S3-S4	1.1477
S4-S5	.9765
S4-S11	1.4642
S5-S6	.6006
S11-S9	1.4642
S9-S10	1.1477
S1-S2	1.2934

NOTES:
1. C.D. (CHECKING DIMENSIONS) ARE REF. ONLY
2. GEAR TRAINS ARE INDICATED AS SHOWN

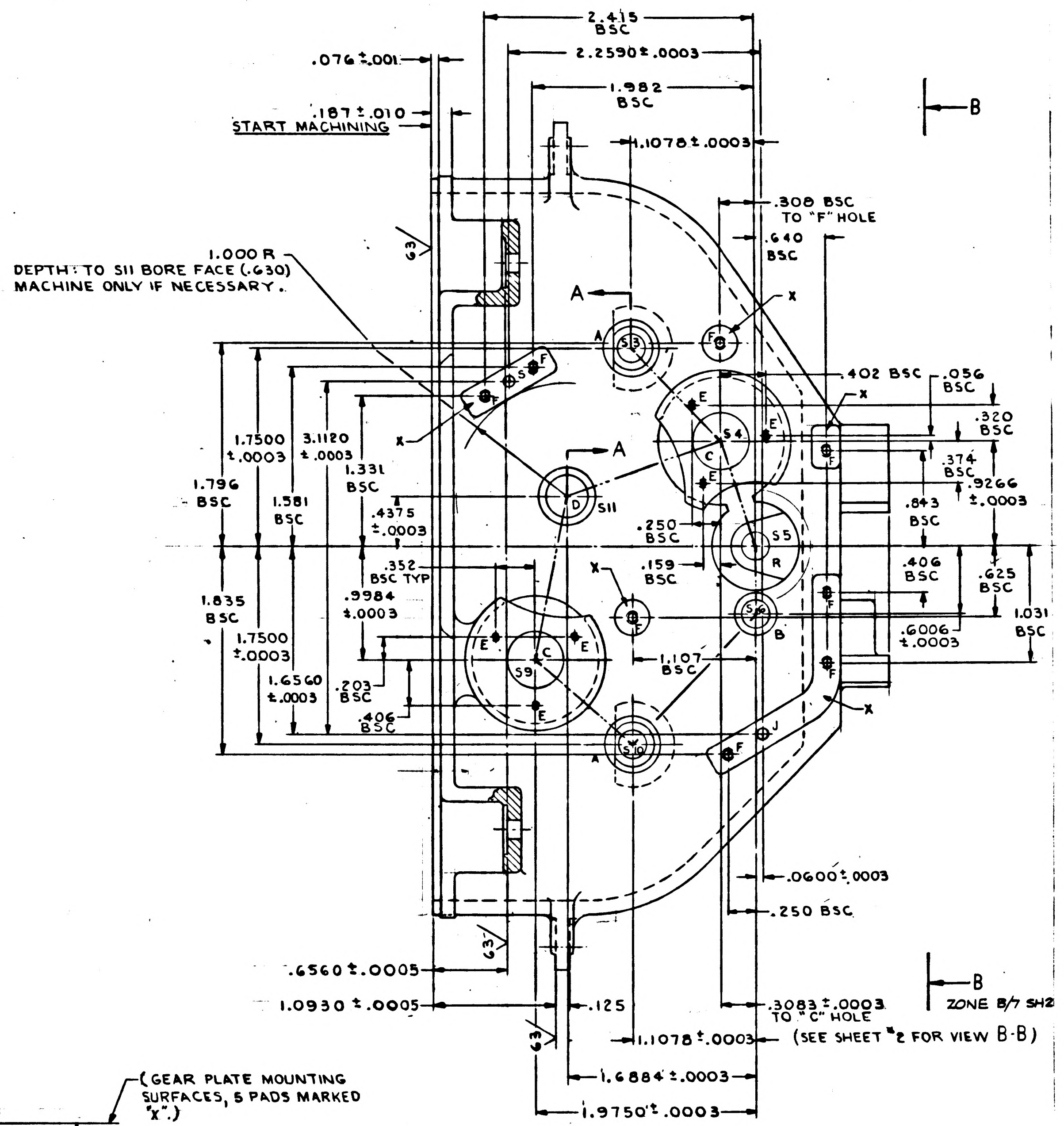
1011437 A

REVISIONS TDRR 01905

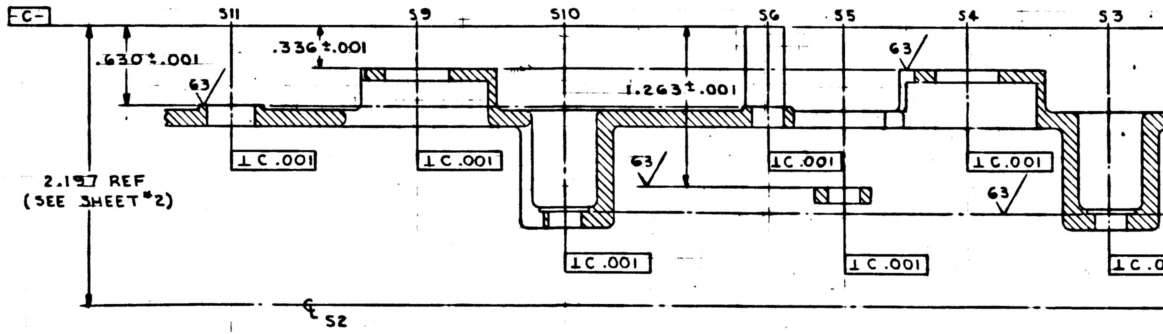
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A2		REVISED PER TDRR NO. 03375	9/26/63	



⊥ D .001 "H" HOLES EXCLUDED
1.781 BSC
A1
1.015 R
IDENTIFICATION MARK SEE NOTE 6.
63
.968
H
G
6.515 +.000 -.002
6.545 +.000 -.005
S2
S1
7.062 BSC
6.031 BSC
3.257 ±.001
63
1.031 BSC
A2
1.015 R
.274 BSC
.015±.003
START MACHINING
.125±.010
1.546±.001 (LOCATED FROM S2 CENTER LINE ONLY)
-D-
63

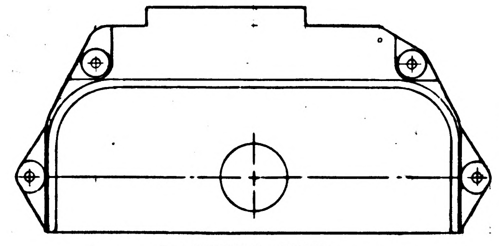


2.415 BSC
.076±.001
2.2590±.0003
1.982 BSC
.187±.010
START MACHINING
1.1078±.0003
.308 BSC TO "F" HOLE
.640 BSC
DEPTH: TO S11 BORE FACE (.630) MACHINE ONLY IF NECESSARY.
1.000 R
63
A
S3
F
X
S4
S5
S6
S9
S11
.402 BSC
.056 BSC
.320 BSC
.374 BSC
.9266 ±.0003
.843 BSC
.406 BSC
.625 BSC
1.031 BSC
.6006 ±.0003
1.7500 ±.0003
3.1120 ±.0003
1.796 BSC
1.581 BSC
1.331 BSC
.4375 ±.0003
.250 BSC
.159 BSC
.352 BSC TYP
.9984 ±.0003
1.835 BSC
1.7500 ±.0003
1.6560 ±.0003
.203 BSC
.406 BSC
1.107 BSC
E
C
D
R
B
J
.0600±.0003
.250 BSC
63
.6560±.0005
1.0930±.0005
.125
.3083±.0003 TO "C" HOLE
ZONE B/7 SH2
B
1.1078±.0003
(SEE SHEET #2 FOR VIEW B-B)
1.6884±.0003
1.9750±.0003



-C-
S11
S9
S10
S6
S5
S4
S3
.630±.001
.336±.001
63
1.263±.001
⊥ C .001
63
2.197 REF (SEE SHEET #2)
1.462±.001
℄ S2
(GEAR PLATE MOUNTING SURFACES, 5 PADS MARKED "X".)

SECTION A A



ACTUAL SIZE

1.000

A	A
SHEET 1	SHEET 2
REVISION STATUS OF SHEETS	

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011462	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± - ; DECIMALS ± .005 ; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL 1011436
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 50 38700 0030
DRAWN S. Museo DATE 6-26-63
CHECKED W. J. Witzig 6-26-63
APPROVAL M. Werner 7-1-63
APPROVAL E. Thomas 7-1-63
NASA APPROVAL 7/3/63
MIT APPROVAL 3/6/63

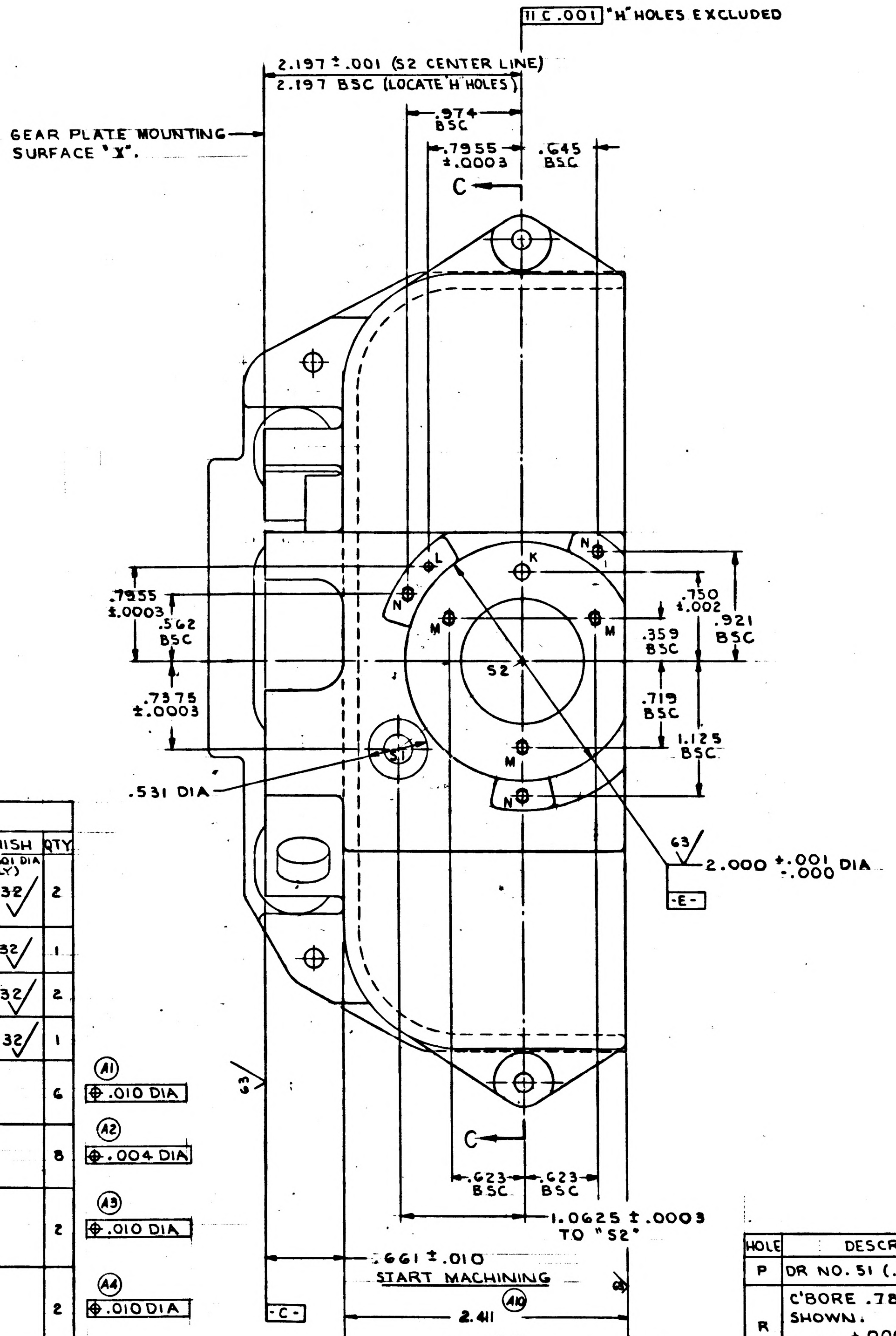
MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, GEAR BOX
(MACHINING)

CODE IDENT NO.
SIZE E
NASA NUMBER 10 437
SCALE 2:1
WEIGHT CALC ACTUAL
SHEET 1 OF 2

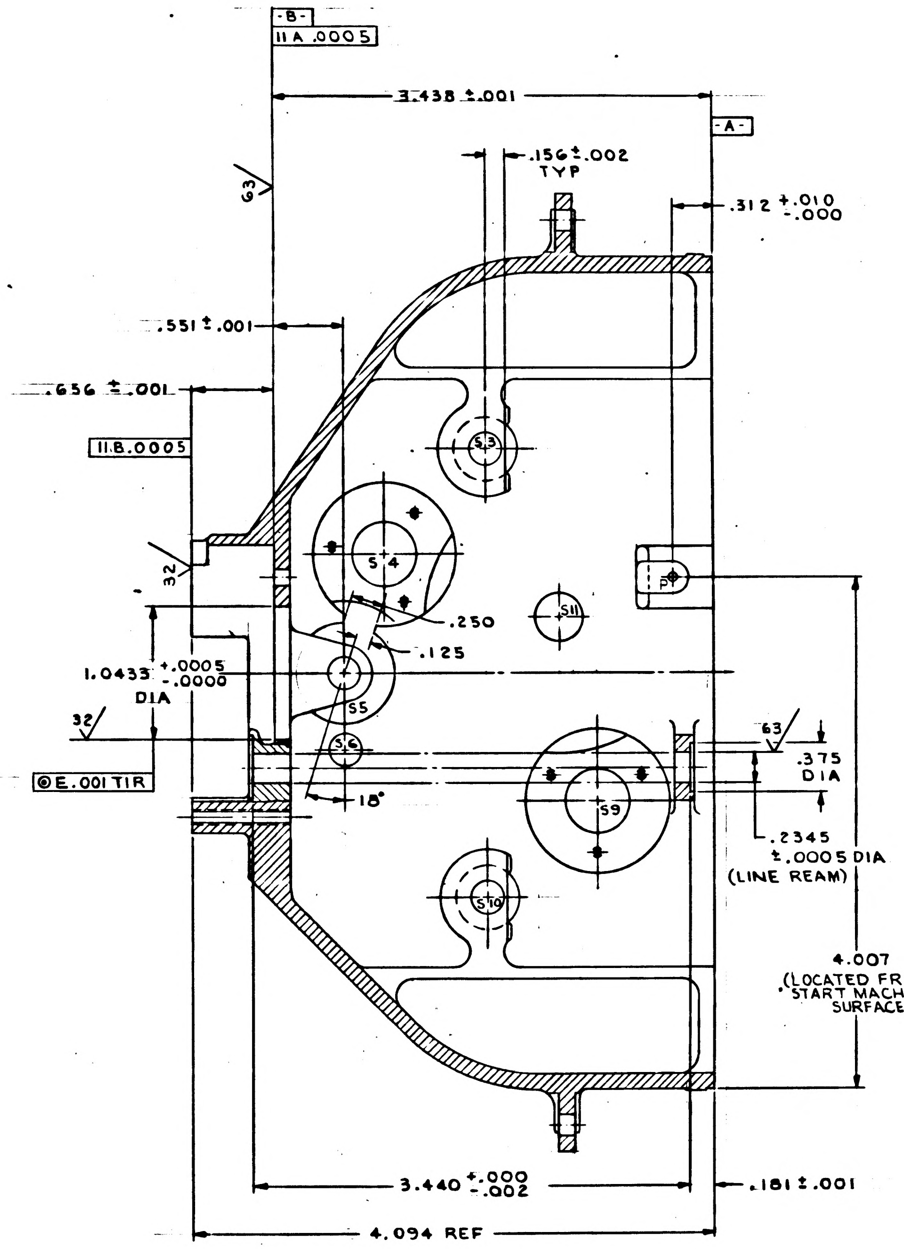
1011437 A

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS TDRR 01905				
A11		REVISED PER TDRR NO. 03375	9/26/63	



⌷ C .001 "H" HOLES EXCLUDED
2.197 ± .001 (S2 CENTER LINE)
2.197 BSC (LOCATE 'H' HOLES)
GEAR PLATE MOUNTING SURFACE 'X'.
.974 BSC
.7955 ±.0003
.645 BSC
C
K
L
N
M
S2
S1
.7955 ±.0003
.562 BSC
.7375 ±.0003
.750 ±.002
.921 BSC
.359 BSC
.719 BSC
1.125 BSC
.531 DIA
63
2.000 +.001 -.000 DIA
-E-
.623 BSC
.623 BSC
1.0625 ± .0003 TO "S2"
.661 ± .010
START MACHINING
A10
-C-
2.411

VIEW B-B



-B-
⌷ A .0005
3.438 ±.001
-A-
63
.156 ± .002 TYP
.312 +.010 -.000
.551 ± .001
.656 ± .001
⌷ B .0005
S3
S4
P
S11
.250
.125
32
1.0433 +.0005 -.0000 DIA
S5
S6
32
◎ E .001 TIR
18°
S9
63
.375 DIA
.2345 ±.0005 DIA (LINE REAM)
S10
4.007 (LOCATED FROM "START MACHINE" SURFACE)
3.440 +.000 -.002
.181 ± .001
4.094 REF

SECTION C-C

HOLE DATA

HOLE	DESCRIPTION	FINISH	QTY	
A	.2501 +.0003 -.0000 DIA THRU C'BORE .390 DIA TO DEPTH SHOWN.	(.2501 DIA ONLY) 32√	2	
B	.2501 +.0003 -.0000 DIA THRU	32√	1	
C	.5002 +.0005 -.0000 DIA THRU	32√	2	
D	.3751 +.0003 -.0000 DIA THRU	32√	1	
E	DR 1.45 MM (.057) THRU 1-64 NC -3B THRU		6	A1 ⊕ .010 DIA
F	DR 5/64 (.078) × .328 DEEP 3-48 NC-3B × .203 DEEP		8	A2 ⊕ .004 DIA
G	DR NO. 24 (.152) THRU C'BORE .437 DIA TO DEPTH SHOWN.		2	A3 ⊕ .010 DIA
H	DR NO. 24 (.152) THRU C'BORE .500 DIA TO DEPTH SHOWN. BOTH SIDES		2	A4 ⊕ .010 DIA
J	.0927 +.0005 -.0000 DIA THRU	32√	1	A5
K	.1240 +.0005 -.0000 DIA THRU	32√	1	A6
L	.0615 +.0005 -.0000 DIA THRU	32√	1	A7
M	DR NO. 43 (.089) THRU 4-40 NC -3B THRU		3	A8 ⊕ .010 DIA
N	DR NO. 43 (.089) × .468 DEEP 4-40 NC -3B × .312 DEEP		3	A9 ⊕ .010 DIA

HOLE	DESCRIPTION	FINISH	QTY
P	DR NO. 51 (.067) × .718 DEEP		1
R	C'BORE .781 DIA TO DEPTH SHOWN. .2501 +.0003 -.0000 DIA THRU	(.2501 DIA ONLY) 32√	1
S	DR NO. 45 (.082) THRU .0927 +.0005 -.0000 DIA × .125 DEEP	(.0927 DIA ONLY) 32√	1

A11

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011462	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± —; DECIMALS ± .005; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL 1011436
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 50387000030
DRAWN S. Musso DATE 6-25-63
CHECKED W. Wilsky 6-26-63
APPROVAL M. Wagner 7-1-63
APPROVAL E. Mang 7-1-63
NASA APPROVAL 7-31-63
MIT APPROVAL W Koffer 3 July 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, GEAR BOX
(MACHINING)

CODE IDENT NO.
SIZE E
NASA NUMBER 1011437
SCALE 2:1
WEIGHT CALC ACTUAL
SHEET 2 OF 2

MASTER

1011437 A

INCHES
PHOTOGRAPHIC SCALE ONLY

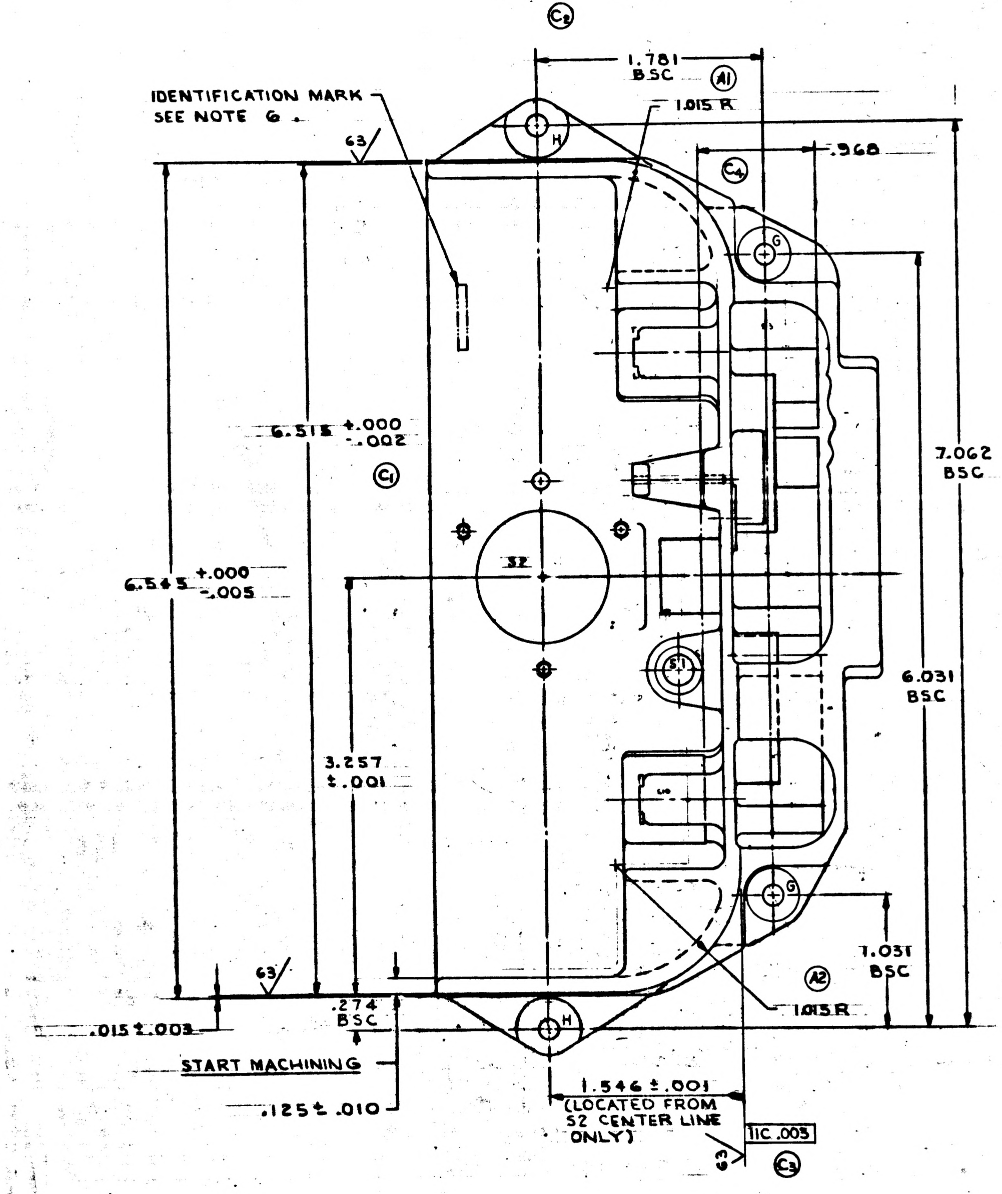
1011437 C

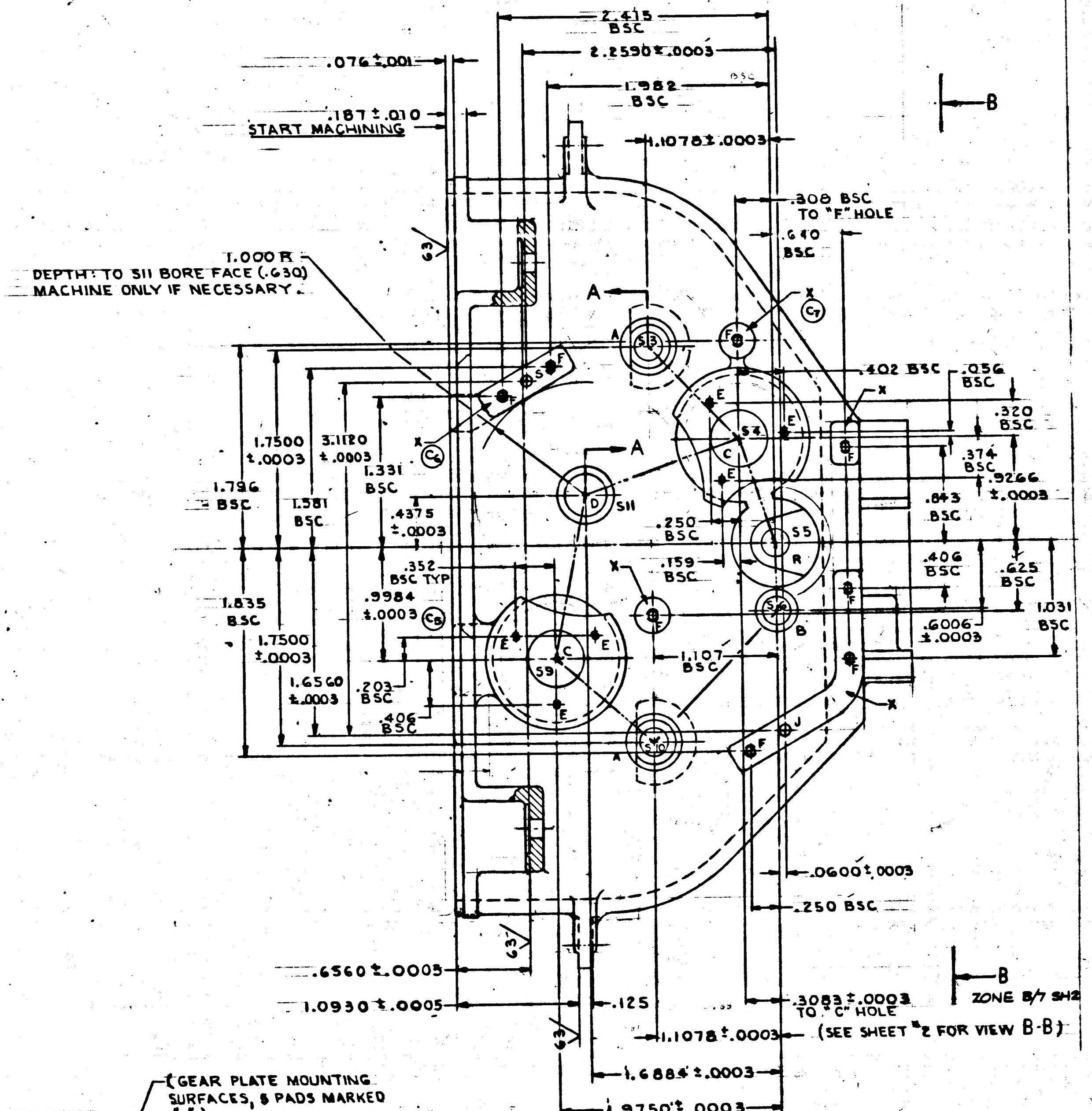
NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. MACHINED SURFACES TO HAVE 125√.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: BLACK ANODIZE (SULFURIC) PER MIL-A-8625, TYPE II BLACK (KPS-1005A.201).
6. IDENTIFY USING NASA DWG NO., REVISION LETTER, AND MANUFACTURES SYMBOL PER ND1002019.

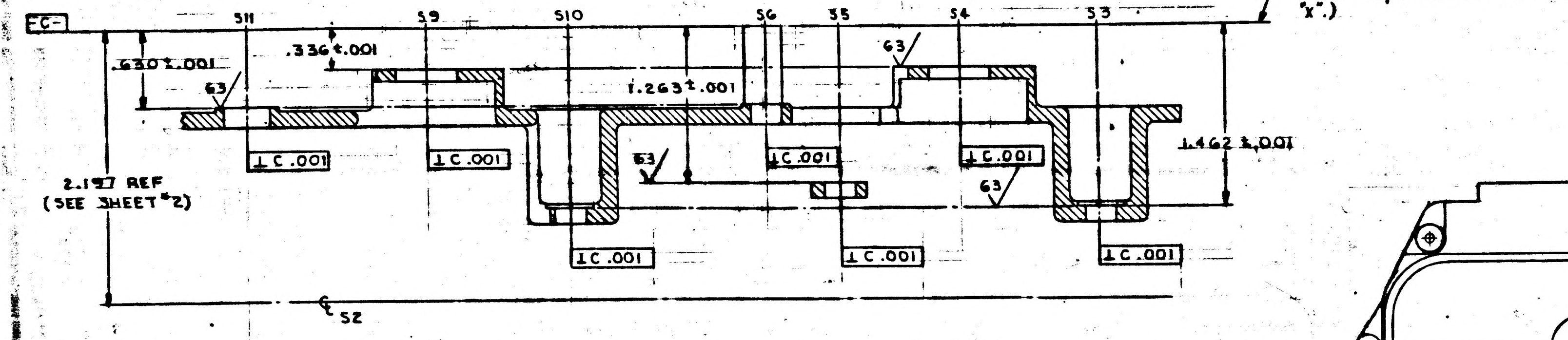
CENTERS	(C.D.) CKECKING DIM
S3-S4	1.1477
S4-S5	.9765
S4-S11	1.4642
S5-S6	.6006
S11-S9	1.4642
S9-S10	1.1477
S1-S2	1.2934

NOTES:
1. C.D. (CHECKING DIMENSIONS) ARE REF. ONLY
2. GEAR TRAINS ARE INDICATED AS SHOWN

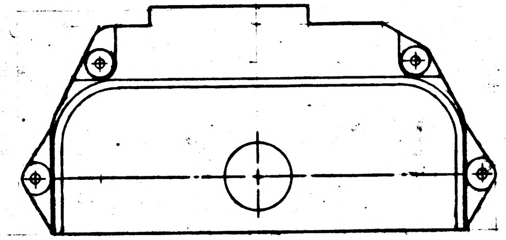
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS TDRR 01905				
A₂		REVISED PER TDRR NO. 03375	9/25/63	
B₁		REVISED PER TDRR NO. 07675	14 APR 64	WK
C₁₀		REVISED PER TDRR NO. 07669	14 APR 64	WK


IDENTIFICATION MARK SEE NOTE 6
63
C₂
1.781 BSC
A1
1.015 R
C₄
.968
H
G
6.515 +.000 -.002
C₁
6.545 +.000 -.005
S2
S1
7.062 BSC
6.031 BSC
3.257 ±.001
1.031 BSC
A2
1.015 R
.015±.003
.274 BSC
START MACHINING
.125±.010
1.546±.001 (LOCATED FROM S2 CENTER LINE ONLY)
⊥ C .003
C₃


2.415 BSC
2.2590±.0003
.076±.001
1.982 BSC
.187±.010
START MACHINING
1.1078±.0003
B
.308 BSC TO "F" HOLE
.640 BSC
1.000 R
DEPTH TO S11 BORE FACE (.630) MACHINE ONLY IF NECESSARY
A
C₇
63
S3
S4
S5
S6
S9
S10
S11
X
E
F
D
C
R
J
.402 BSC
.056 BSC
.320 BSC
.374 BSC
.9266 ±.0003
.843 BSC
.406 BSC
.625 BSC
1.031 BSC
.6006 ±.0003
1.7500 ±.0003
3.1120 ±.0003
1.331 BSC
1.796 BSC
1.581 BSC
.4375 ±.0003
C₆
.250 BSC
.159 BSC
.352 BSC TYP
.9984 ±.0003
C₈
1.835 BSC
1.7500 ±.0003
1.6560 ±.0003
.203 BSC
.406 BSC
1.107 BSC
.0600±.0003
.250 BSC
.6560±.0005
1.0930±.0005
.125
.3083±.0003 TO "C" HOLE
ZONE B/7 SH2
1.1078±.0003
(SEE SHEET 2 FOR VIEW B-B)
1.6884±.0003
1.9750±.0003


(GEAR PLATE MOUNTING SURFACES, 8 PADS MARKED "X".)
FC-
S11
S9
S10
S6
S5
S4
S3
.630±.001
.336±.001
63
1.263±.001
1.462±.001
⊥ C .001
2.197 REF (SEE SHEET 2)
℄ S2

SECTION A A



ACTUAL SIZE

C	C
B	B
A	A
SHEET 1	SHEET 2
REVISION STATUS OF SHEETS	

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011462	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± - ; DECIMALS ± .005 ; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL 1011436
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 50 38700 0030
DRAWN DATE 6-28-63
CHECKED W. J. Sitarz 6-26-63
APPROVAL 7-1-63
APPROVAL 7-1-63
NASA APPROVAL 7/3/63
MIT APPROVAL 3/6/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, GEAR BOX
(MACHINING)

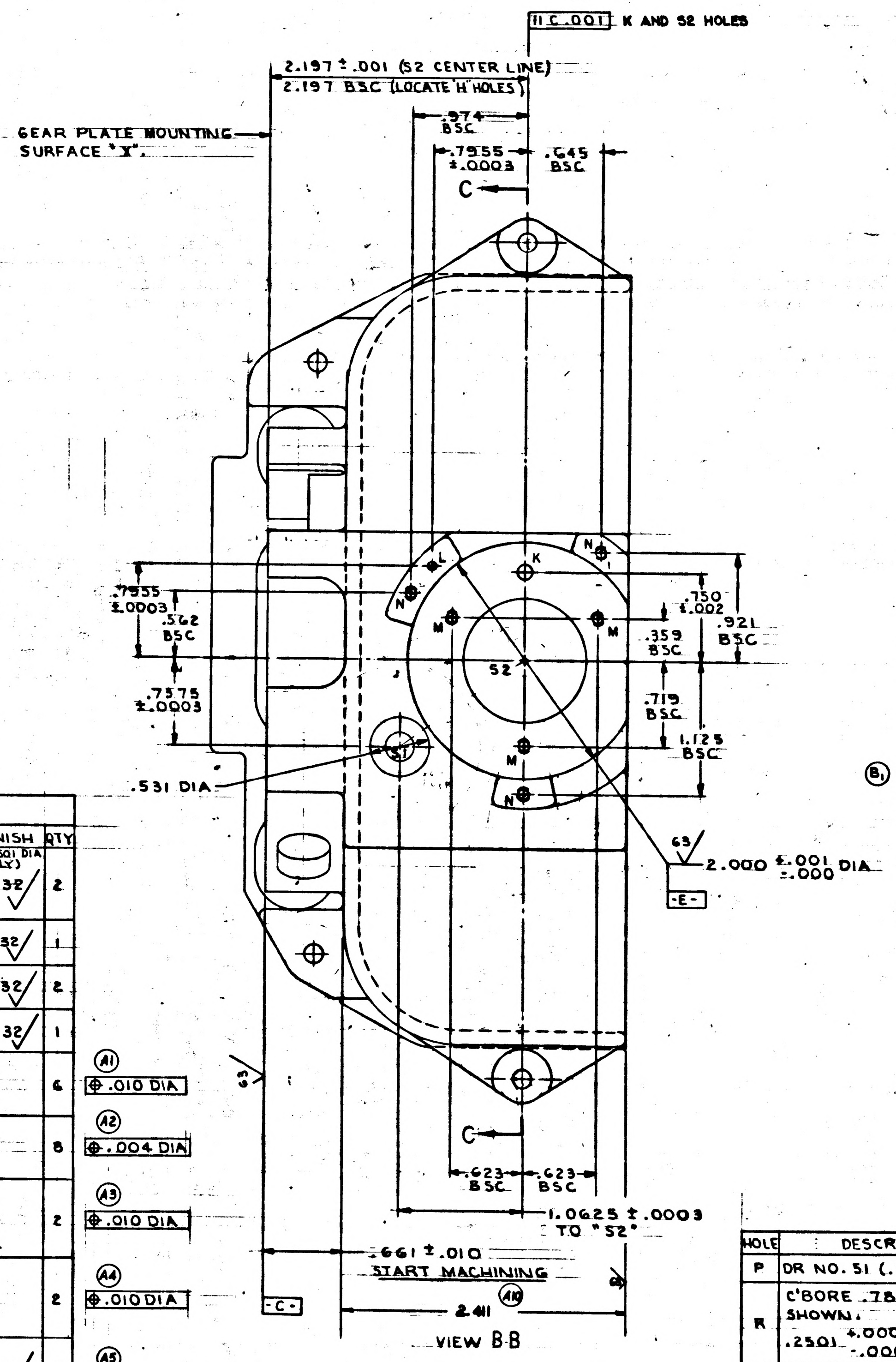
CODE IDENT NO.
SIZE E
NASA NUMBER 1011437
SCALE 2:1
WEIGHT
CALC ACTUAL
SHEET 1 OF 2

INCHES
PHOTOGRAPHIC SCALE ONLY

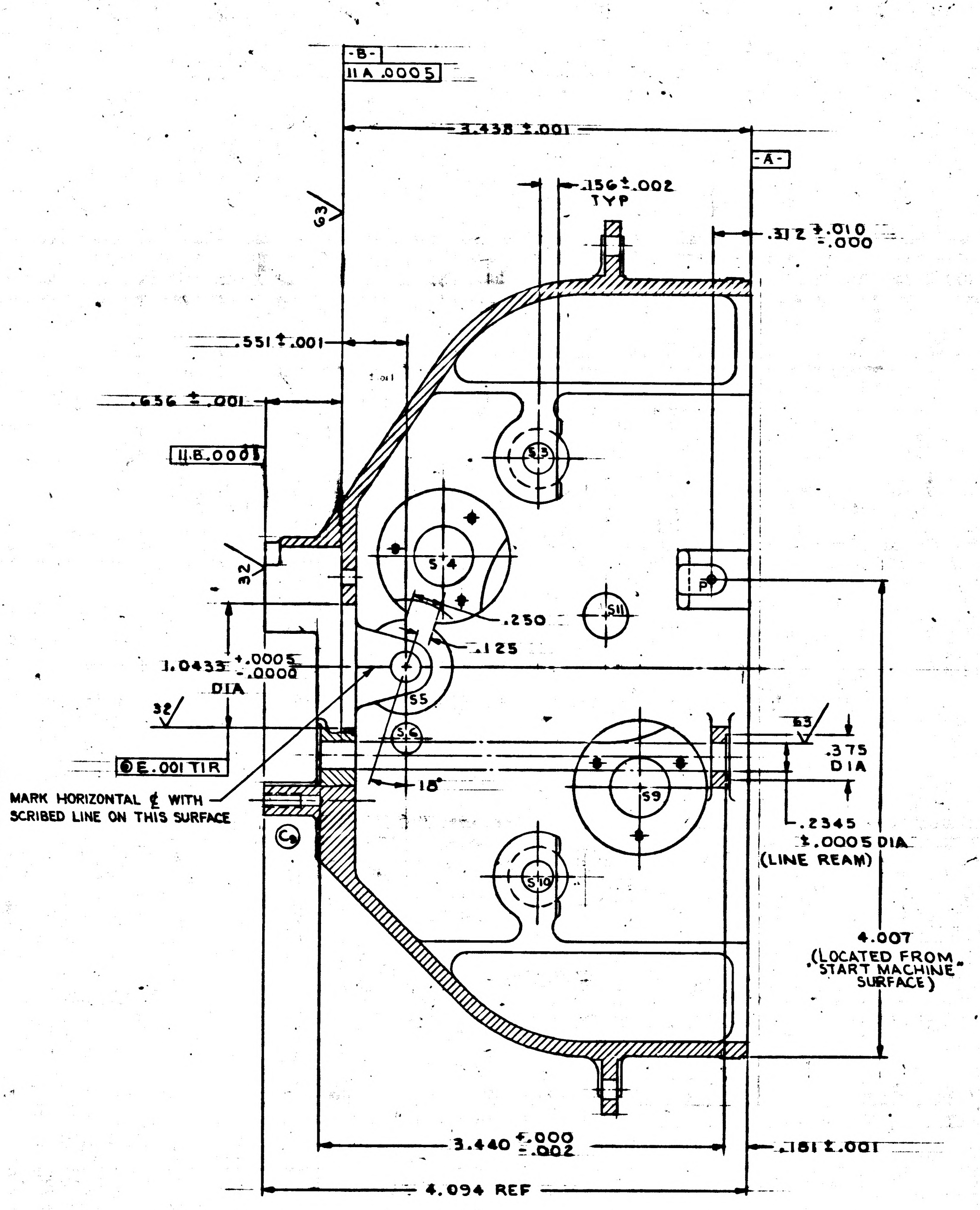
1011437 C

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A11		REVISED PER [illegible] NO. 033[illegible]5	12-10	
B1		REVISED PER TDRR NO. 0[illegible]5	APR 64	W[illegible]
C10		REVISED PER TDRR NO. 075[illegible]9	64	W[illegible]

REVISIONS TDRR 0.9[illegible]5


C8
‖ C .001 K AND S2 HOLES
2.197 ± .001 (S2 CENTER LINE)
2.197 BSC (LOCATE 'H' HOLES)
GEAR PLATE MOUNTING SURFACE 'X'.
.974 BSC
.7955 ±.0003
.645 BSC
C
L
N
K
N
M
M
S2
M
N
S1
.7955 ±.0003
.562 BSC
.7575 ±.0003
.750 ±.002
.921 BSC
.359 BSC
.719 BSC
1.125 BSC
.531 DIA
63
2.000 +.001 −.000 DIA
-E-
B1
63
C
.623 BSC
.623 BSC
1.0625 ± .0003 TO "S2"
.661 ± .010
START MACHINING
A10
-C-
2.411

VIEW B-B


-B-
‖ A .0005
3.438 ± .001
-A-
63
.156 ± .002 TYP
.312 +.010 −.000
.551 ± .001
.636 ± .001
‖ B .0005
S3
S4
P
32
.250
.125
S11
1.0433 +.0005 −.0000 DIA
S5
32
S6
◉ E .001 TIR
18°
63
.375 DIA
S9
MARK HORIZONTAL ℄ WITH SCRIBED LINE ON THIS SURFACE
C9
.2345 ±.0005 DIA (LINE REAM)
S10
4.007 (LOCATED FROM "START MACHINE" SURFACE)
3.440 +.000 −.002
.181 ± .001
4.094 REF

SECTION C-C

C10

HOLE DATA

HOLE	DESCRIPTION	FINISH	QTY	
A	.2501 +.0003 −.0000 DIA THRU C'BORE .390 DIA TO DEPTH SHOWN.	(.2501 DIA ONLY) 32 ✓	2	
B	.2501 +.0003 −.0000 DIA THRU	32 ✓	1	
C	.5002 +.0005 −.0000 DIA THRU	32 ✓	2	
D	.3751 +.0003 −.0000 DIA THRU	32 ✓	1	
E	DR 1.45 MM (.057) THRU 1-64 NC -3B THRU		6	A1 ⊕ .010 DIA
F	DR $\frac{5}{64}$ (.078) × .328 DEEP 3-48 NC-3B × .203 DEEP		8	A2 ⊕ .004 DIA
G	DR NO. 24 (.152) THRU C'BORE .437 DIA TO DEPTH SHOWN.		2	A3 ⊕ .010 DIA
H	DR NO. 24 (.152) THRU C'BORE .500 DIA TO DEPTH SHOWN. BOTH SIDES		2	A4 ⊕ .010 DIA
J	.0927 +.0005 −.0000 DIA THRU	32 ✓	1	A5
K	.1240 +.0005 −.0000 DIA THRU	32 ✓	1	A6
L	.0615 +.0005 −.0000 DIA THRU	32 ✓	1	A7
M	DR NO. 43 (.089) THRU 4-40 NC -3B THRU		3	A8 ⊕ .010 DIA
N	DR NO. 43 (.089) × .468 DEEP 4-40 NC -3B × .312 DEEP		3	A9 ⊕ .010 DIA

HOLE	DESCRIPTION	FINISH	QTY
P	DR NO. 51 (.067) × .718 DEEP		1
R	C'BORE .781 DIA TO DEPTH SHOWN. .2501 +.0003 −.0000 DIA THRU	(.2501 DIA ONLY) 32 ✓	1
S	DR NO. 45 (.082) THRU .0927 +.0005 −.0000 DIA × .125 DEEP	(.0927 DIA ONLY) 32 ✓	1

A11

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011462	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL 1011436

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 50387000030

DRAWN S. M[illegible] DATE 6-25-63
CHECKED W. Wi[illegible] 6-26-63
APPROVAL [illegible] 7-1-63
APPROVAL [illegible] 7-1-63
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, GEAR BOX
(MACHINING)

CODE IDENT NO.
SIZE E
NASA NUMBER 10114[illegible]

SCALE
SHEET

1011437C

INCHES
PHOTOGRAPHIC SCALE ONLY

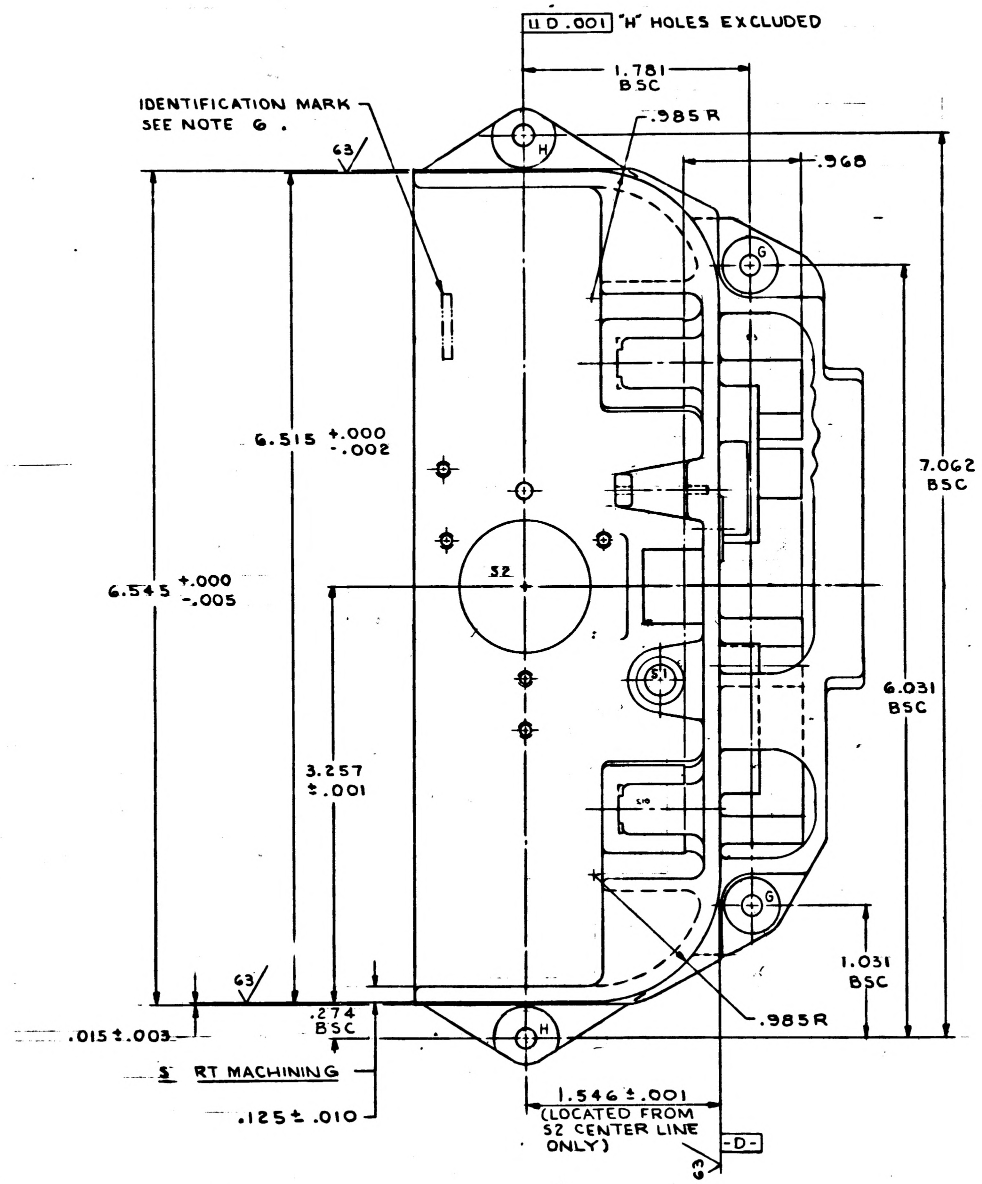
NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
    a. MACHINED SURFACES TO HAVE 125√.
    b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: BLACK ANODIZE (SULFURIC) PER MIL-A-8625, TYPE I BLACK (KPS-1005A.201).
6. IDENTIFY USING NASA DWG NO., REVISION LETTER, AND MANUFACTURES SYMBOL PER ND1002019.

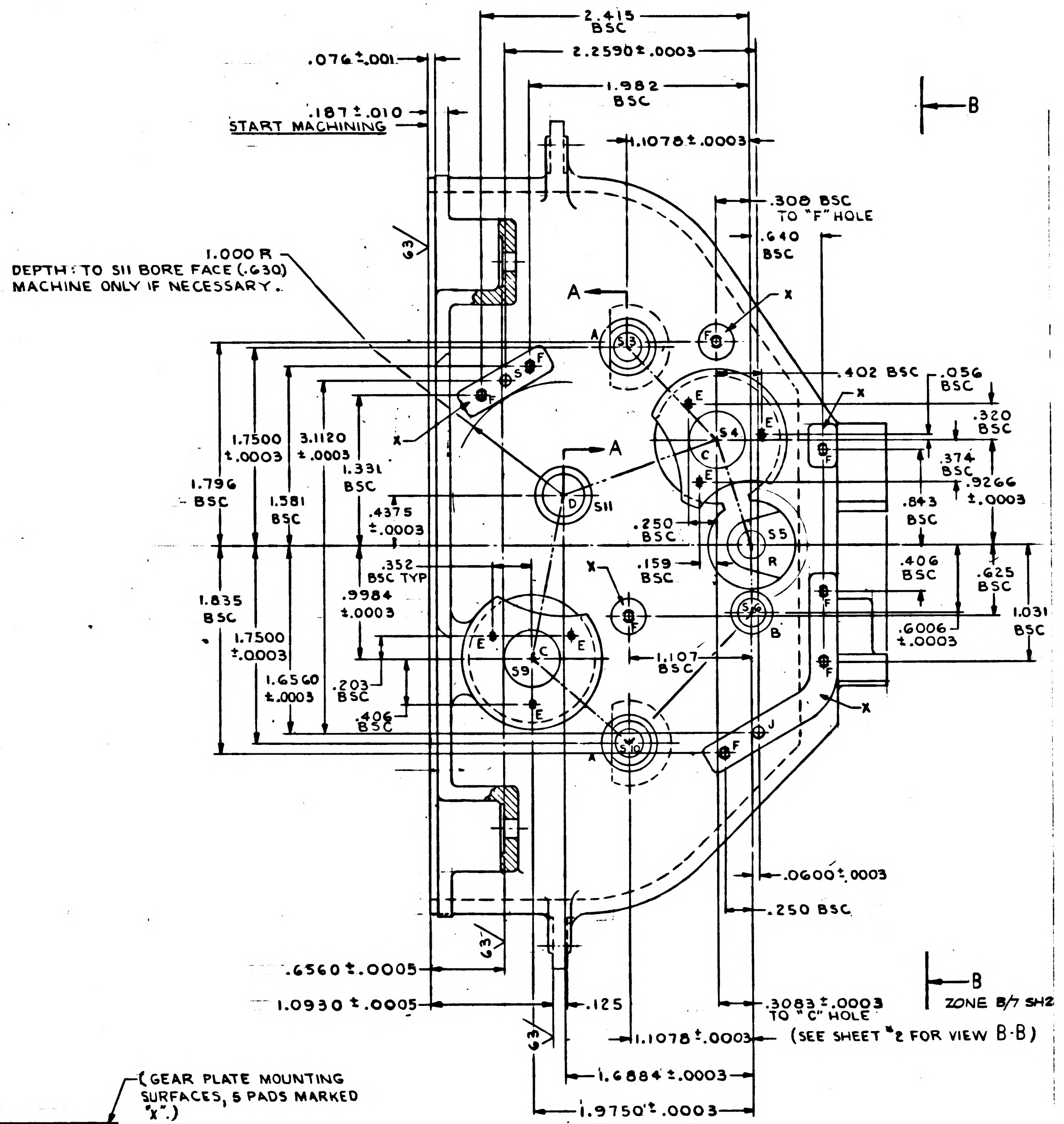
CENTERS	(C.D.) CKECKING DIM
S3-S4	1.1477
S4-S5	.9765
S4-S11	1.4642
S5-S6	.6006
S11-S9	1.4642
S9-S10	1.1477
S1-S2	1.2934

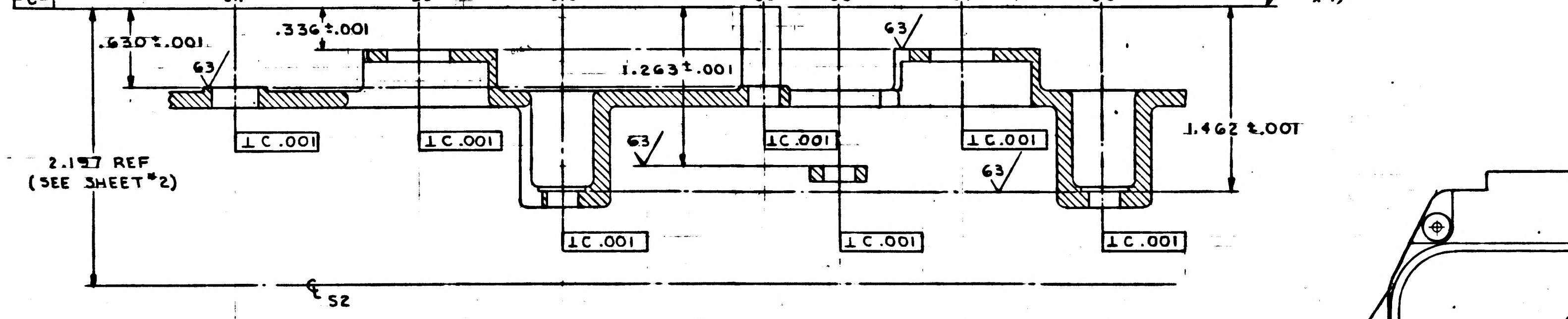
NOTES:
1. ~~C.D.~~ (CHECKING DIMENSIONS) ARE REF. ONLY
2. GEAR TRAINS ARE INDICATED AS SHOWN

	1011437

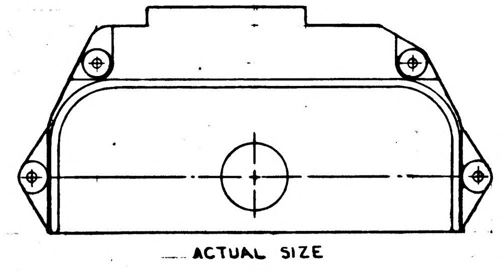
REVISIONS TCRR 6105				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL


.001 "H" HOLES EXCLUDED
1.781 BSC
IDENTIFICATION MARK SEE NOTE 6.
.985 R
.968
63
6.515 +.000 -.002
6.545 +.000 -.005
7.062 BSC
S2
S1
H
G
6.031 BSC
3.257 ±.001
1.031 BSC
.274 BSC
.015 ±.003
START MACHINING
.125 ± .010
1.546 ±.001 (LOCATED FROM S2 CENTER LINE ONLY)
-D-
.985 R


2.415 BSC
2.2590 ±.0003
.076 ±.001
1.982 BSC
.187 ±.010 START MACHINING
.1078 ±.0003
B
63
.308 BSC TO "F" HOLE
.640 BSC
1.000 R
DEPTH: TO S11 BORE FACE (.630) MACHINE ONLY IF NECESSARY.
A
X
.402 BSC
.056 BSC
.320 BSC
.374 BSC
.9266 ±.0003
1.7500 ±.0003
3.1120 ±.0003
1.331 BSC
1.796 BSC
1.581 BSC
.4375 ±.0003
.250 BSC
.843 BSC
S11
S4
S5
S6
S9
S10
S3
.352 BSC TYP
.159 BSC
.406 BSC
.625 BSC
1.031 BSC
.6006 ±.0003
1.835 BSC
.9984 ±.0003
1.7500 ±.0003
1.107 BSC
1.6560 ±.0003
.203 BSC
.406 BSC
.0600 ±.0003
.250 BSC
.6560 ±.0005
1.0930 ±.0005
.125
.3083 ±.0003 TO "C" HOLE
ZONE B/7 SH2
(SEE SHEET #2 FOR VIEW B-B)
.1078 ±.0003
1.6884 ±.0003
1.9750 ±.0003


-C-
S11
S9
S10
S6
S5
S4
S3
(GEAR PLATE MOUNTING SURFACES, 5 PADS MARKED "X".)
.630 ±.001
.336 ±.001
63
1.263 ±.001
⊥ C .001
63
1.462 ±.001
2.197 REF (SEE SHEET #2)
℄ S2

SECTION A A



ACTUAL SIZE
1.000

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011462	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± - ; DECIMALS ± .005 ; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL 1011436
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 50 38700 0030
DRAWN S. Musso DATE 6-25-63
CHECKED W. Vitzthum 6-26-63
APPROVAL M. Werner 7-1-63
APPROVAL E. Mowry 7-1-63
NASA APPROVAL 7/3/63
MIT APPROVAL 3/6/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

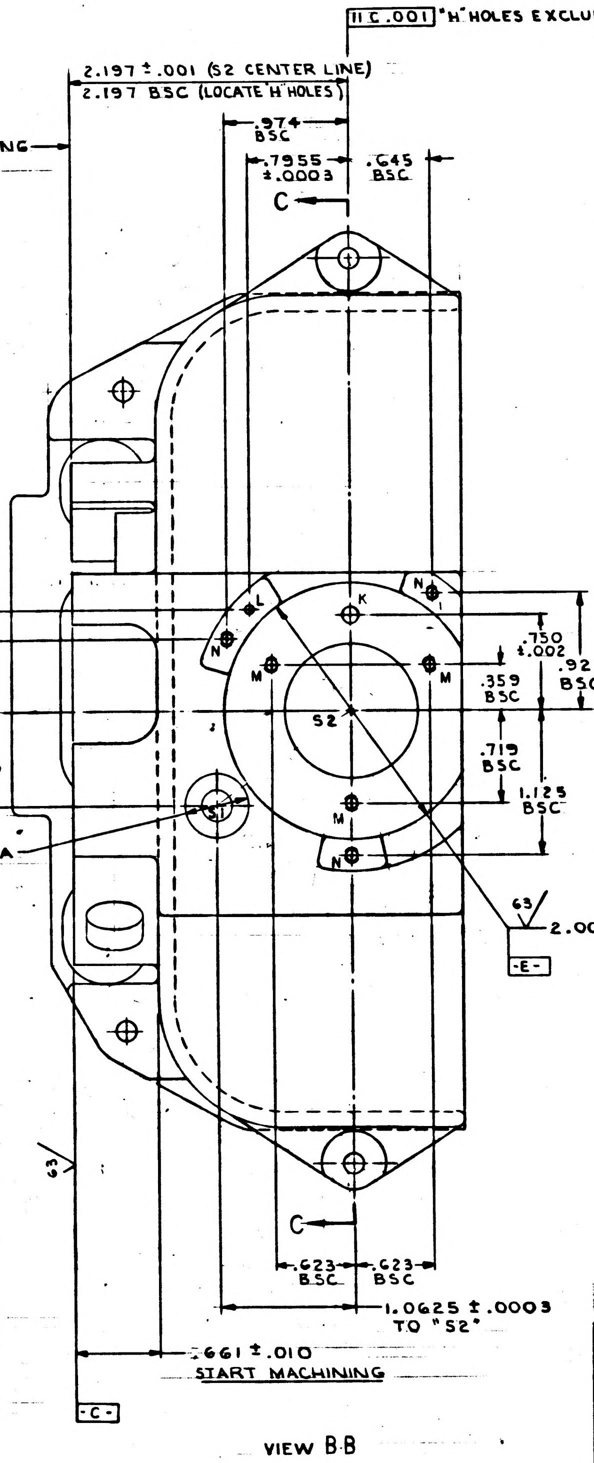
TITLE
HOUSING, GEAR BOX
(MACHINING)

CODE IDENT NO.
SIZE E
NASA NUMBER 1011437
SCALE 2:1
WEIGHT CALC ACTUAL
SHEET 1 OF 2

INCHES
PHOTOGRAPHIC SCALE ONLY

1011437

SYM	ZONE	REVISIONS DESCRIPTION	DATE	APPROVAL

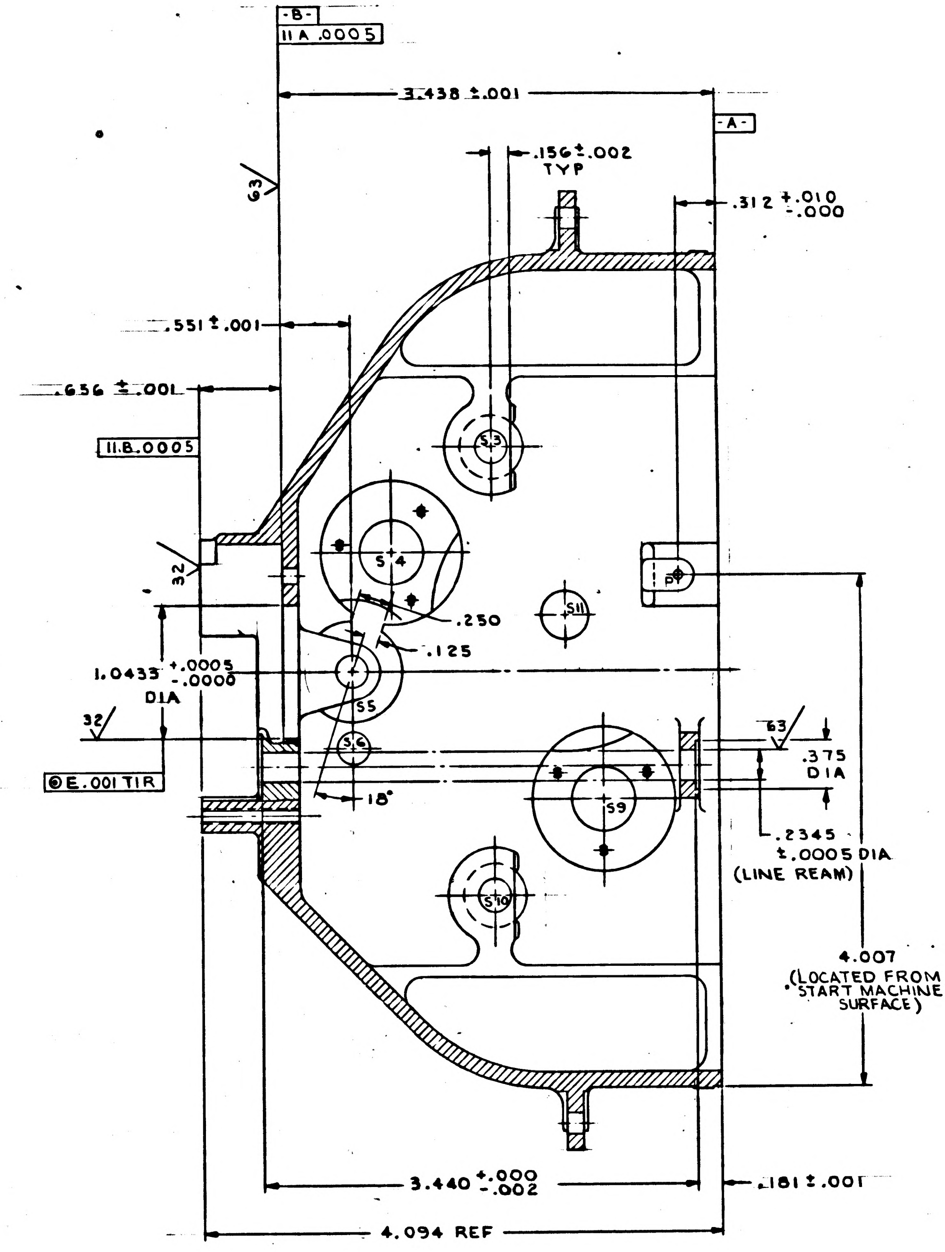


⏥ .001 "H" HOLES EXCLUDED
2.197 ±.001 (S2 CENTER LINE)
2.197 BSC (LOCATE 'H' HOLES)
GEAR PLATE MOUNTING SURFACE "X"
.974 BSC
.7955 ±.0003
.645 BSC
C
N
L
K
N
M
M
M
N
S2
S1
.7555 ±.0003
.562 BSC
.7375 ±.0003
.531 DIA
.750 ±.002
.921 BSC
.359 BSC
.719 BSC
1.125 BSC
63
2.000 +.001 -.000 DIA
-E-
63
C
.623 BSC
.623 BSC
1.0625 ±.0003 TO "S2"
.661 ±.010 START MACHINING
-C-

VIEW B-B

HOLE	HOLE DATA DESCRIPTION	FINISH	QTY	
A	.2501 $^{+.0003}_{-.0000}$ DIA THRU C'BORE .390 DIA TO DEPTH SHOWN.	(.2501 DIA ONLY) 32√	2	
B	.2501 $^{+.0003}_{-.0000}$ DIA THRU	32√	1	
C	.5002 $^{+.0005}_{-.0000}$ DIA THRU	32√	2	
D	.3751 $^{+.0003}_{-.0000}$ DIA THRU	32√	1	
E	DR 1.45 MM (.057) THRU REDRILL × .015 DEEP 1-64 NC-3B THRU		6	⌖ .010 DIA
F	DR $\frac{5}{64}$ (.078) × .328 DEEP REDRILL × .020 DEEP 3-48 NC-3B × .203 DEEP		8	⌖ .004 DIA
G	DR NO. 24 (.152) THRU REDRILL × .015 DEEP. BOTH SIDES C'BORE .437 DIA TO DEPTH SHOWN.		2	⌖ .010 DIA
H	DR NO. 24 (.152) THRU REDRILL × .015 DEEP. BOTH SIDES C'BORE .500 DIA TO DEPTH SHOWN. BOTH SIDES		2	⌖ .010 DIA
J	.0927 $^{+.0005}_{-.0000}$ DIA THRU REDRILL × .020 DEEP	32√	1	
K	.240 $^{+.0005}_{-.0000}$ DIA THRU REDRILL × .020 DEEP	32√	1	
L	.0615 $^{+.0005}_{-.0000}$ DIA THRU REDRILL × .020 DEEP	32√	1	
M	DR NO. 43 (.089) THRU REDRILL × .025 DEEP 4-40 NC-3B THRU		3	⌖ .010 DIA
N	DR NO. 43 (.089) × .468 DEEP REDRILL × .025 DEEP 4-40 NC-3B × .312 DEEP		3	⌖ .010 DIA

HOLE	DESCRIPTION	FINISH	QTY
P	DR NO. 51 (.067) × .718 DEEP		1
R	C'BORE .781 DIA TO DEPTH SHOWN. .2501 $^{+.0003}_{-.0000}$ DIA THRU	(.2501 DIA ONLY) 32√	1
S	DR NO. 45 (.082) THRU .0927 $^{+.0005}_{-.0000}$ DIA × .125 DEEP REDRILL × .020 DEEP	(.0927 DIA ONLY) 32√	1



-B-
// A .0005
3.438 ±.001
-A-
.156 ±.002 TYP
.312 +.010 -.000
63
.551 ±.001
.656 ±.001
// B .0005
S3
S4
P
S11
.250
.125
32
1.0433 +.0005 -.0000 DIA
S5
32
S6
18°
◎ E .001 TIR
S9
S10
63
.375 DIA
.2345 ±.0005 DIA (LINE REAM)
4.007 (LOCATED FROM "START MACHINE" SURFACE)
3.440 +.000 -.002
.181 ±.001
4.094 REF

SECTION C-C

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011462	1011553

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ±.005 ANGLES ±1°
DO NOT SCALE THIS DRAWING
MATERIAL 1011436
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 50387000030
DRAWN S. M[illegible] DATE 6-25-63
CHECKED W. Wilkey 6-26-63
APPROVAL M. Wagner 7-1-63
APPROVAL E. Mang 7-1-63
NASA APPROVAL 7-3-63
MIT APPROVAL W Kupfer 3 July 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
TITLE HOUSING, GEAR BOX (MACHINING)
CODE IDENT NO.
SIZE E
NASA NUMBER 1011437
SCALE 2 : 1
WEIGHT
CALC ACTUAL
SHEET 2 OF 2

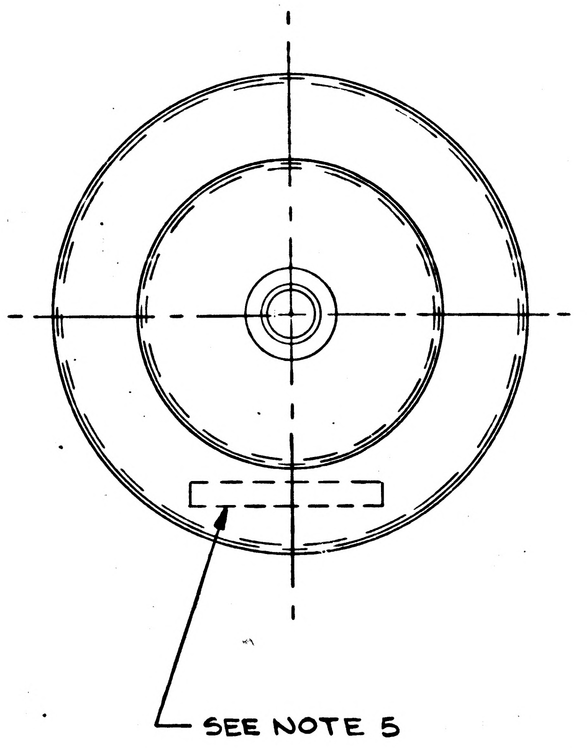
1011437

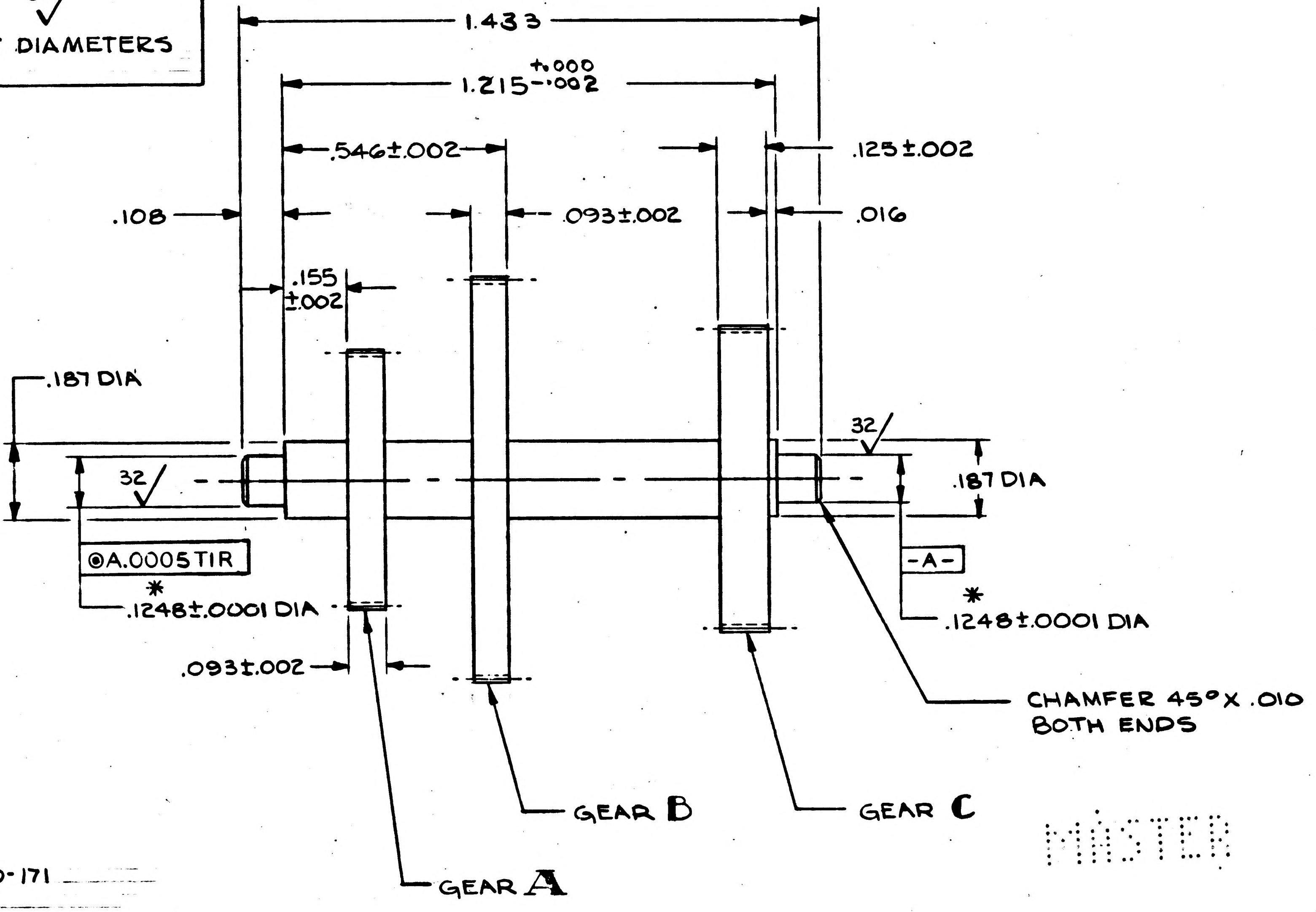
SPUR GEAR DATA

	GEAR A	GEAR B	GEAR C
NO. OF TEETH	75	78	5
DIAMETRAL PITCH	120	80	10
PRESSURE ANGLE	20°	20°	20°
PITCH DIAMETER	.62500	.97500	.545 (SPECIAL)
OUTSIDE DIAMETER	$.64167^{+.0000}_{-.0015}$	$1.0000^{+.0000}_{-.0020}$	.750 (SPECIAL)
AGMA CLASS	PREC 1D	PREC 1D	PREC. 1D
GEAR TEETH FINISH	32√	32√	32√

TOTAL COMPOSITE ERROR TO BE CHECKED AGAINST DIAMETERS MARKED *.

REVISIONS TDRR 01905				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4	–	REVISED PER TDRR NO. 03053	10/7/63	WK

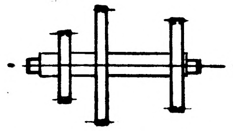




MASTER

6. FINISH: PASSIVATE IN ACCORDANCE WITH MIL-STD-171 TABLE V-A FINISH NO. 5.4.2. (KPS-10051-200).
5. IDENTIFY PER ND1002019, WITH NASA PART NO. REV LETTER AND MFR'S SYM (KIC)
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
3. UNLESS OTHERWISE SPECIFIED:
   a. 125√ FINISH ALL OVER
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327

NOTES:



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011430	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	±	±.005	±

DO NOT SCALE THIS DRAWING

MATERIAL
CORROSION RESISTANT STEEL
FED. SPEC. QQ-S-763
CLASS 303 COND. A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 35387000030

DRAWN V. LOZITO DATE 6-1-63
CHECKED W. Witaky 6-17-63
APPROVAL M. Werner 7-1-63
APPROVAL E. [illegible] 7-1-63
NASA APPROVAL 7/3/63
MIT APPROVAL 3 [illegible] 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SHAFT, PINION

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011438

SCALE
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011438 A

1011438 B

REVISIONS TDRR 01905				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4	–	REVISED PER TDRR NO. 03053	10/[illegible]/63	WK
B2		REVISED PER TDRR NO. 03805	10/28/63	WK

SPUR GEAR DATA

	GEAR A	GEAR B	GEAR C
NO. OF TEETH	75	78	5
DIAMETRAL PITCH	120	80	10
PRESSURE ANGLE	20°	20°	20°
PITCH DIAMETER	.62500	.97500	.545 (SPECIAL)
OUTSIDE DIAMETER	$.64167^{+.0000}_{-.0015}$	$1.0000^{+.0000}_{-.0020}$	.750 (SPECIAL)
AGMA CLASS	PREC 1D	PREC 1D	
GEAR TEETH FINISH	32/√	32/√	32/√

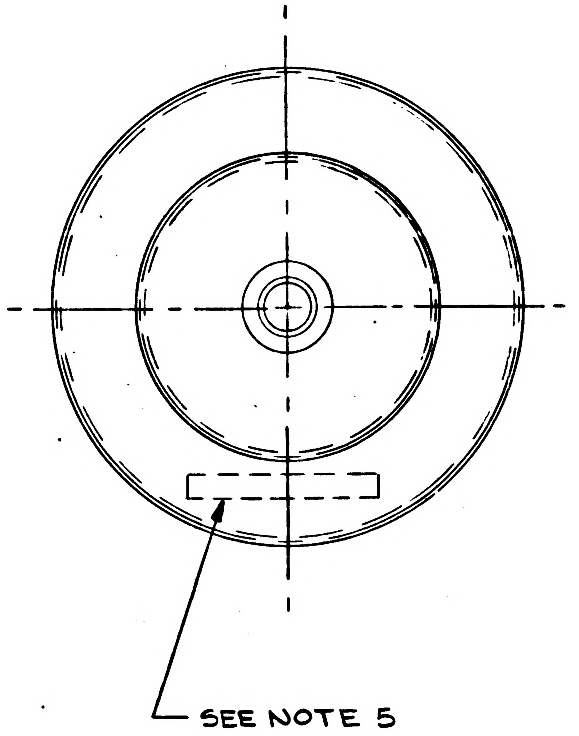
TOTAL COMPOSITE ERROR TO BE CHECKED AGAINST DIAMETERS MARKED *.

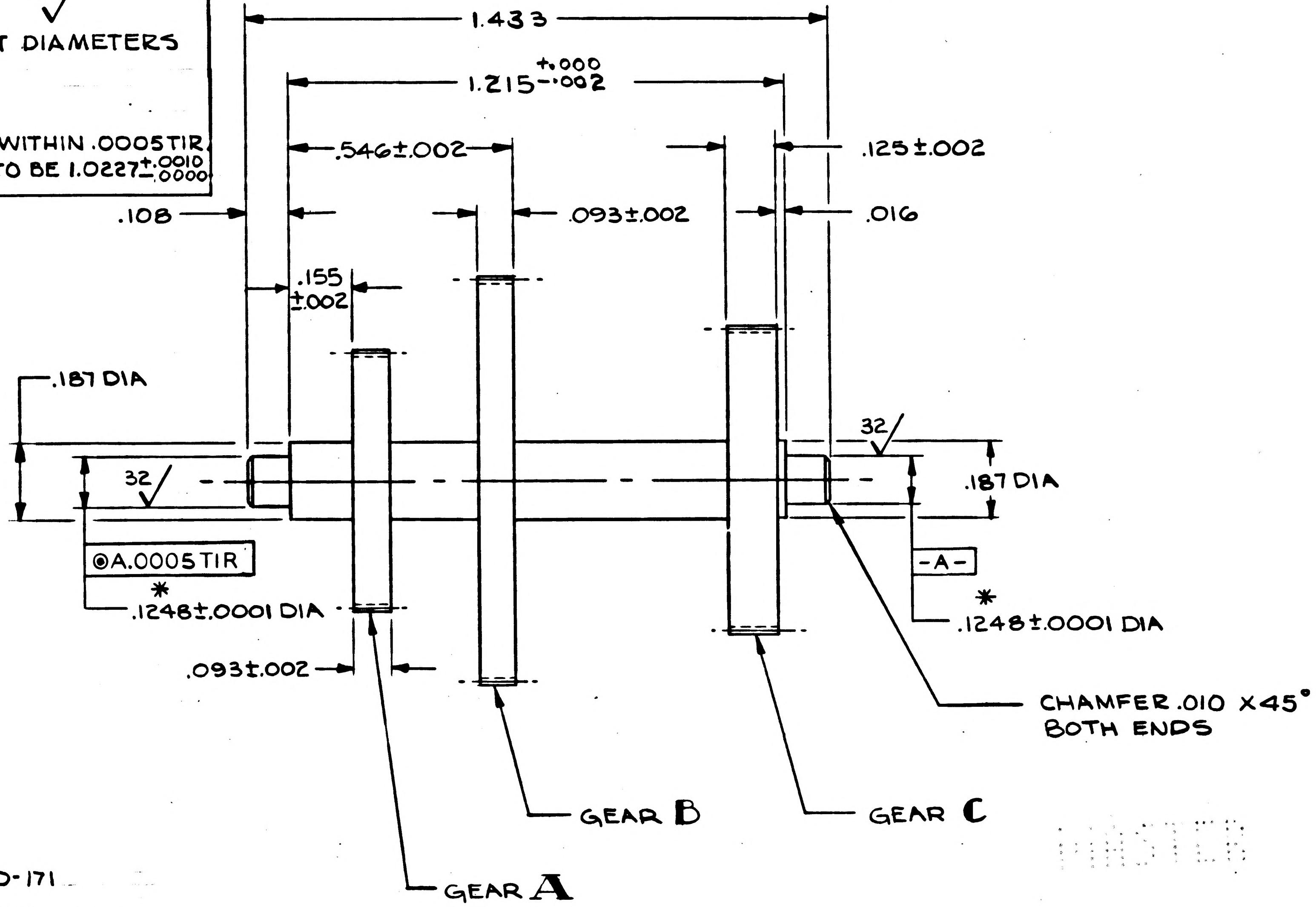
NOTE: (FOLLOWING NOTES APPLY TO GEAR "C" ONLY).

a) MEASUREMENT OVER .192 DIA WIRES = 0.7646 ± .0005.

b) O.D. OF GEAR TO BE CONCENTRIC TO .1248 ± .0001 DIAS WITHIN .0005 TIR.

c) CENTER DISTANCE, WHEN MESHED WITH 15T, 10P MASTER TO BE $1.0227^{+.0010}_{-.0000}$.





6 FINISH: PASSIVATE IN ACCORDANCE WITH MIL-STD-171 TABLE V-A FINISH NO. 5.4.2. (KPS-10051-200).

5 IDENTIFY PER ND1002019 WITH NASA PART NO. REV LETTER AND MFR'S SYM (KIC)

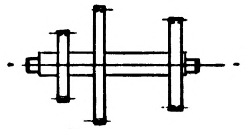
4 REMOVE BURRS IN ACCORDANCE WITH ND1002079

3 UNLESS OTHERWISE SPECIFIED:
- a 125/√ FINISH ALL OVER
- b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.

2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.

1 INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327

NOTES:



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011430	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	±	±.005	±

DO NOT SCALE THIS DRAWING

MATERIAL
CORROSION RESISTANT STEEL
FED SPEC. QQ-S-763
CLASS 303 COND. A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK

KIC PN 35387000030

DRAWN V. Lozito DATE 6-1-63
CHECKED W. Witaky 6-17-63
APPROVAL M. Werner 7-1-63
APPROVAL E. [illegible] 7-1-63

NASA APPROVAL [illegible] 7/3/63

MIT APPROVAL [illegible] 7/[illegible]/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SHAFT, PINION

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011438

SCALE | WEIGHT CALC ACTUAL | SHEET 1 OF 1

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011438 C

REVISIONS TDRR 01905

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO. 03053	10 Sep 63	WK
B2		REVISED PER TDRR NO. 03805	10 Oct 63	WK
C2		REVISED PER TDRR NO. 05011	12/19/63	

SPUR GEAR DATA

	GEAR A	GEAR B	GEAR C
NO. OF TEETH	75	78	5
DIAMETRAL PITCH	120	80	10
PRESSURE ANGLE	20°	20°	20°
PITCH DIAMETER	.62500	.97500	.545 (SPECIAL)
OUTSIDE DIAMETER	$.64167^{+.0000}_{-.0015}$	$1.0000^{+.0000}_{-.0020}$	.750 (SPECIAL)
AGMA CLASS	PREC 1D	PREC 1D	
GEAR TEETH FINISH	32√	32√	32√

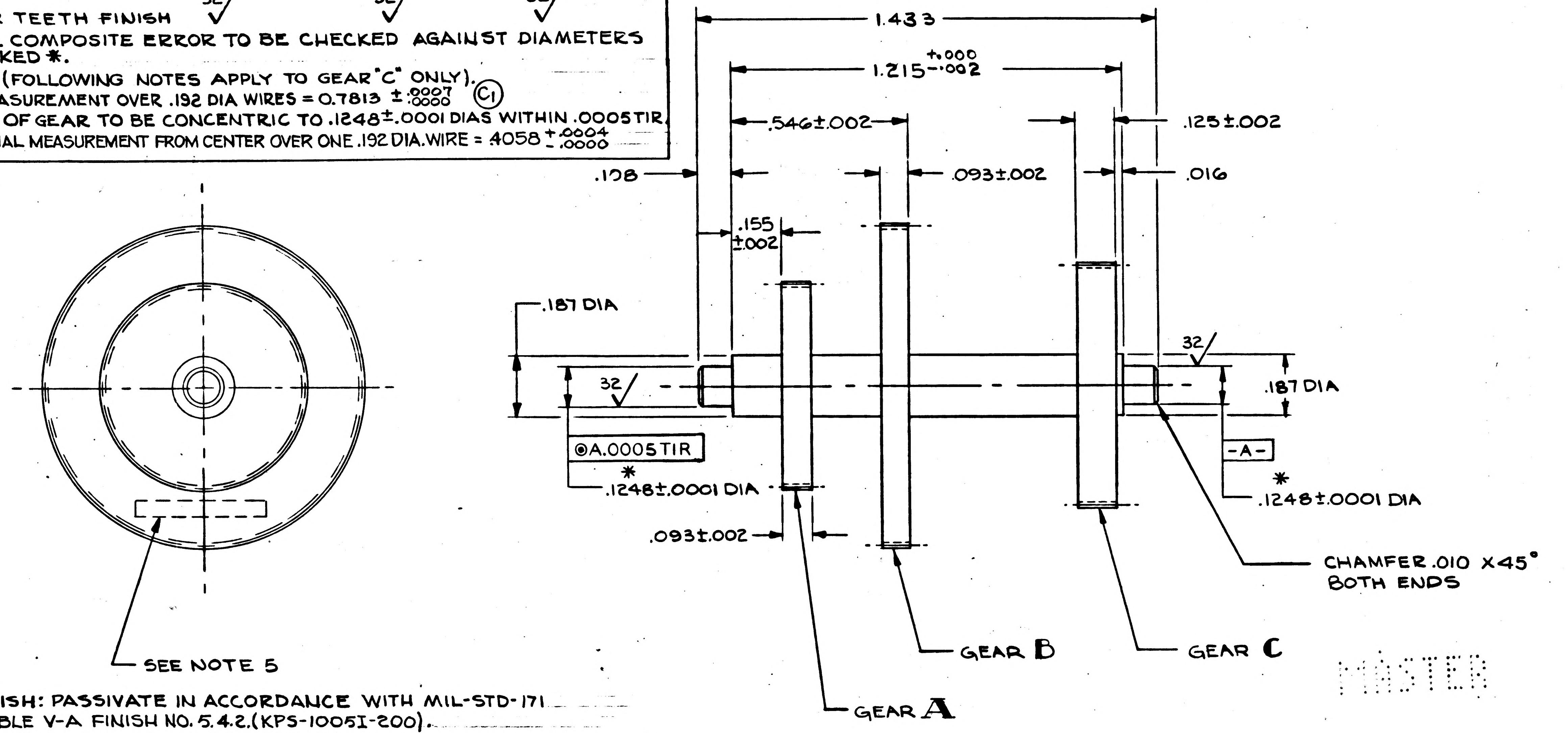
TOTAL COMPOSITE ERROR TO BE CHECKED AGAINST DIAMETERS MARKED *.

NOTE: (FOLLOWING NOTES APPLY TO GEAR "C" ONLY).

a) MEASUREMENT OVER .192 DIA WIRES = 0.7813 $^{+.0007}_{-.0000}$ (C1)

b) O.D. OF GEAR TO BE CONCENTRIC TO .1248±.0001 DIAS WITHIN .0005TIR.

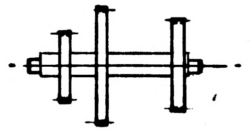
(C2) c) RADIAL MEASUREMENT FROM CENTER OVER ONE .192 DIA. WIRE = .4058 $^{+.0004}_{-.0000}$



MASTER

6. FINISH: PASSIVATE IN ACCORDANCE WITH MIL-STD-171 TABLE V-A FINISH NO. 5.4.2. (KPS-10051-200).
5. IDENTIFY PER ND1002019, WITH NASA PART NO. REV LETTER AND MFR'S SYM (KIC)
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
3. UNLESS OTHERWISE SPECIFIED:
   a. 125√ FINISH ALL OVER
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327

NOTES:



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011430	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	±	±.005	±

DO NOT SCALE THIS DRAWING

MATERIAL
CORROSION RESISTANT STEEL
FED. SPEC. QQ-S-763
CLASS 303 COND. A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 35387000030

DRAWN V. LOZITO DATE 6-1-63
CHECKED W. Witaky 6-17-63
APPROVAL M. Werner 7-1-63
APPROVAL E. Ne[illegible] 7-1-63
NASA APPROVAL 7/3/63
MIT APPROVAL 3 July 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SHAFT, PINION

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011438

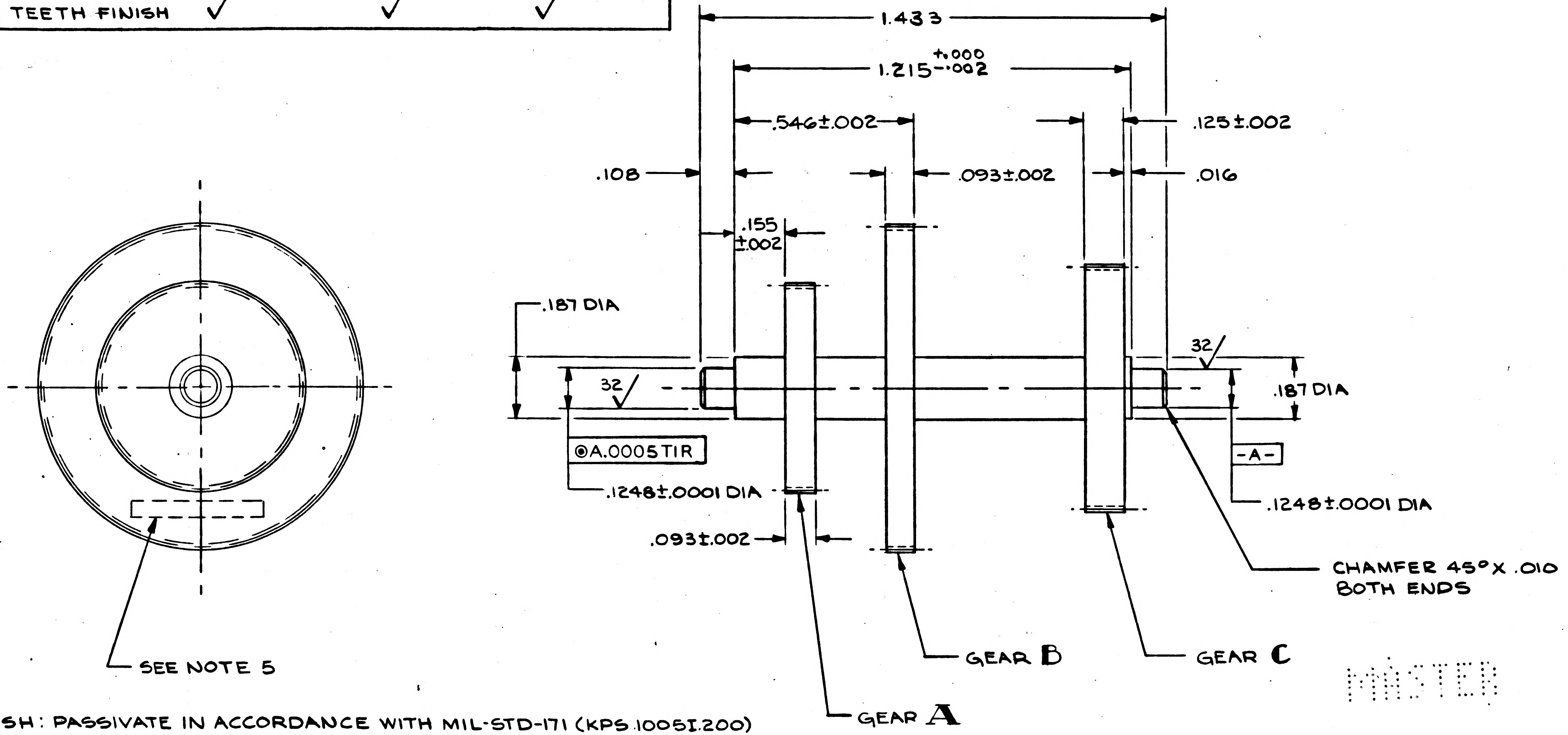
SCALE | WEIGHT CALC ACTUAL | SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

SPUR GEAR DATA

	GEAR **A**	GEAR **B**	GEAR **C**
NO. OF TEETH	75	78	5
DIAMETRAL PITCH	120	80	10
PRESSURE ANGLE	20°	20°	20°
PITCH DIAMETER	.62500	.97500	.545 (SPECIAL)
OUTSIDE DIAMETER	$.64167^{+.0000}_{-.0015}$	$1.0000^{+.0000}_{-.0020}$	.750 (SPECIAL)
AGMA CLASS	PREC 1D	PREC 1D	PREC. 1D
GEAR TEETH FINISH	32/✓	32/✓	32/✓

REVISIONS TDRR 01905				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

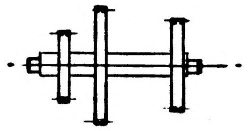


1.433
1.215 +.000 −.002
.546±.002
.125±.002
.108
.093±.002
.016
.155 ±.002
.187 DIA
32/
32/
.187 DIA
⊚A.0005TIR
-A-
.1248±.0001 DIA
.1248±.0001 DIA
.093±.002
CHAMFER 45°X .010 BOTH ENDS
SEE NOTE 5
GEAR B
GEAR C
GEAR A

MASTER

6 FINISH: PASSIVATE IN ACCORDANCE WITH MIL-STD-171 (KPS 1005I.200)
5 IDENTIFY PER ND1002019, WITH NASA PART NO. REV LETTER AND MFR'S SYM (KIC)
4 REMOVE BURRS IN ACCORDANCE WITH ND1002079
3 UNLESS OTHERWISE SPECIFIED:
  a. 125/✓ FINISH ALL OVER
  b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
1 INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327

NOTES:



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011430	1011559
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	±	±.005	±

DO NOT SCALE THIS DRAWING

MATERIAL
STAINLESS STEEL
A.I.S.I 303
FED SPEC. QQ-S-763
CLASS 303 COND. A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 35387000030

DRAWN V. Lozito DATE 6-1-63
CHECKED W. Witzky 6-17-63
APPROVAL M. Werner 7-1-63
APPROVAL E. [illegible] 7-1-63
NASA APPROVAL [illegible] 7/3/63
MIT APPROVAL [illegible] 3 July 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SHAFT, PINION

CODE IDENT NO.
SIZE C
NASA NUMBER 1011438
SCALE
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011438

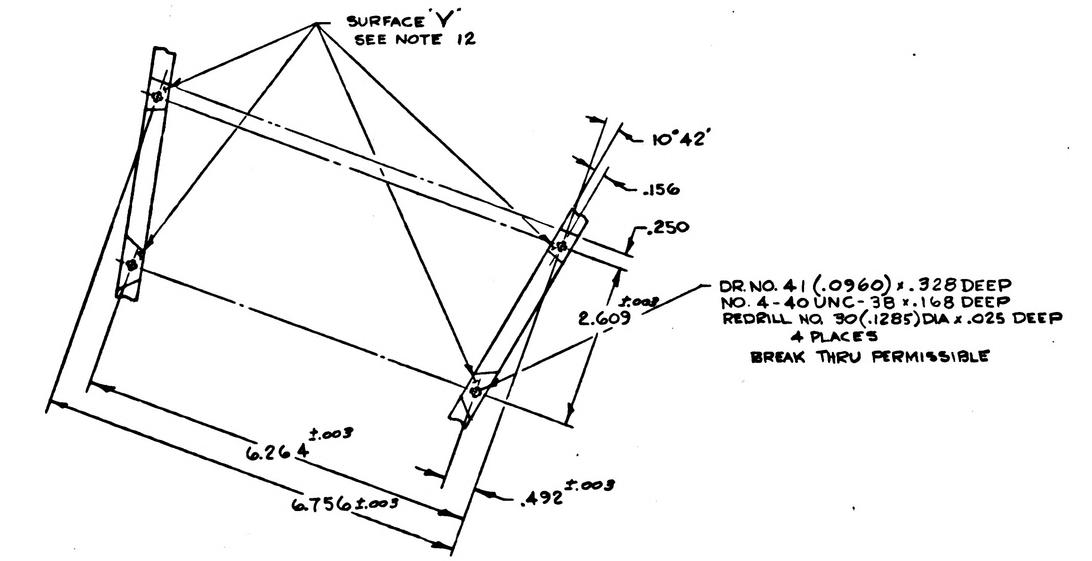
E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

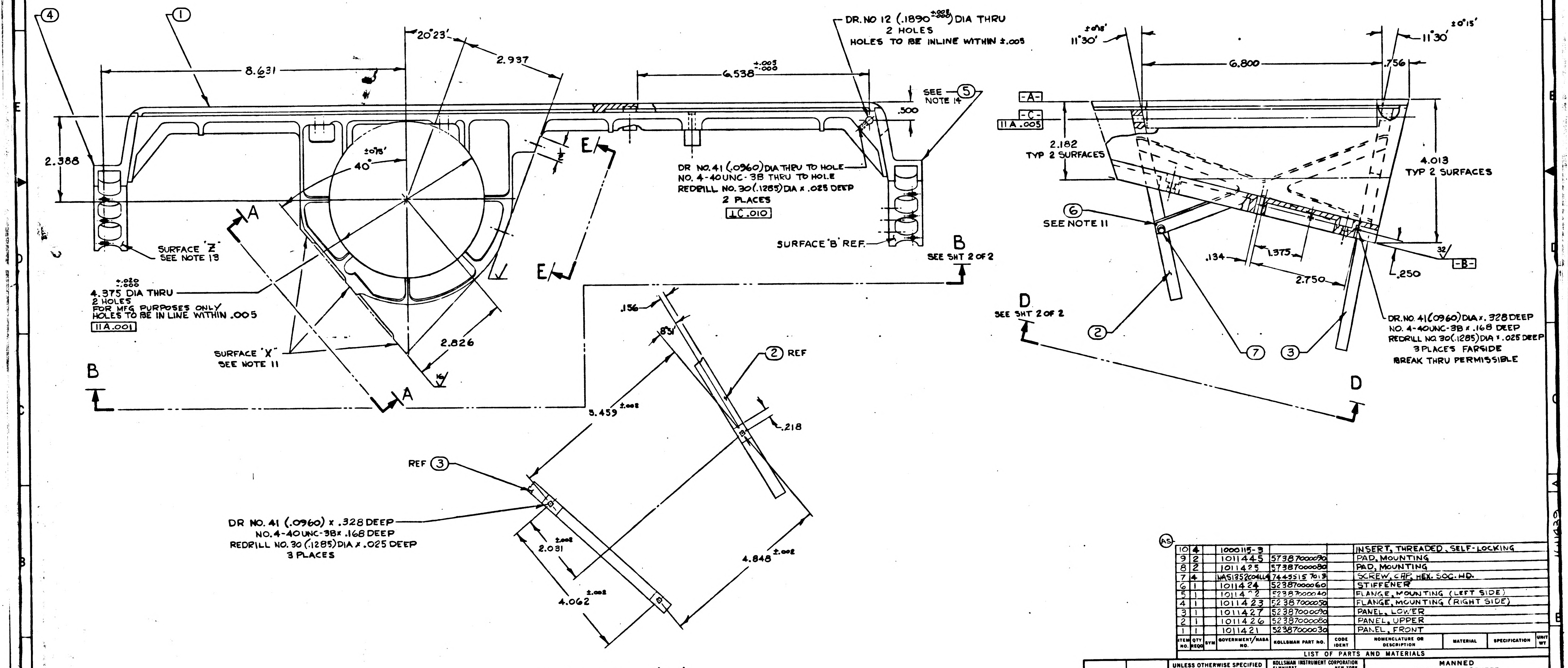
1011439 A

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS 01739				
A_5		GENERAL CHANGES SEE TDRR NO. 02265	7-26-63	WL 8/6/63

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a) 125√ FINISH ALL OVER.
   b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. PART TO BE PENETRANT INSPECTED PER MIL-I-6866 METHOD II.
6. PART TO BE SUBJECTED TO RADIOGRAPHIC INSPECTION PER MIL-I-6865 CL I, LEVEL II.
7. TRANSFER SERIAL NO. PER ND 1002019.
8. USE BROACHING TOOL FOR ITEMS ⑩ & ⑪ PER ND1002121.
9. BRAZING TO BE IN ACCORDANCE PER ND1002191.
10. HEAT TREAT (STABILIZE ONLY) PER ND 1002092.
11. SURFACES MARKED 'X' TO BE IN PLANE WITHIN .0005 & PARALLEL TO ℄ OF, 4.375 DIA WITHIN .001 AFTER INSTALLATION OF ITEM NO. 6.
12. SURFACES MARKED 'Y' TO BE IN PLANE WITHIN .005 & PARALLEL TO ℄ OF 4.375 DIA WITHIN .005.
13. SURFACE MARKED 'Z' TO BE IN PLANE WITH -B- WITHIN .001.
14. EDGES OF 6.515 RECESS IN ITEM 5 TO BE IN LINE WITH EDGES OF PANEL OPENING (ITEM 1) WITHIN ±.003 (A4)


SURFACE 'Y'
SEE NOTE 12
10°42'
.156
.250
DR. NO. 41 (.0960) x .328 DEEP
NO. 4-40 UNC-3B x .168 DEEP
REDRILL NO. 30 (.1285) DIA x .025 DEEP
4 PLACES
BREAK THRU PERMISSIBLE
2.609 ±.003
6.264 ±.003
6.756 ±.003
.492 ±.003

PARTIAL VIEW E-E


④
①
8.631
20°23'
2.937
6.538 +.005 -.000
DR. NO 12 (.1890 +.002 -.000) DIA THRU
2 HOLES
HOLES TO BE INLINE WITHIN ±.005
SEE NOTE 14 ⑤
.500
2.388
40° ±0°15'
E
E
DR NO. 41 (.0960) DIA THRU TO HOLE
NO. 4-40 UNC-3B THRU TO HOLE
REDRILL NO. 30 (.1285) DIA x .025 DEEP
2 PLACES
⊥ C .010
SURFACE 'Z'
SEE NOTE 13
SURFACE 'B' REF.
B
SEE SHT 2 OF 2
4.375 +.020 -.000 DIA THRU
2 HOLES
FOR MFG PURPOSES ONLY
HOLES TO BE IN LINE WITHIN .005
∥ A .001
A
A
SURFACE 'X'
SEE NOTE 11
2.826
16
B
±0°8' 11°30'
±0°15' 11°30'
6.800
.756
-A-
-C-
∥ A .005
2.182
TYP 2 SURFACES
4.013
TYP 2 SURFACES
⑥
SEE NOTE 11
.134
.375
2.750
32
-B-
.250
D
SEE SHT 2 OF 2
②
⑦
③
DR. NO. 41 (.0960) DIA x .328 DEEP
NO. 4-40 UNC-3B x .168 DEEP
REDRILL NO. 30 (.1285) DIA x .025 DEEP
3 PLACES FARSIDE
BREAK THRU PERMISSIBLE
D
.156
18°
② REF
.218
5.459 ±.002
REF ③
DR NO. 41 (.0960) x .328 DEEP
NO. 4-40 UNC-3B x .168 DEEP
REDRILL NO. 30 (.1285) DIA x .025 DEEP
3 PLACES
2.031 ±.002
4.848 ±.002
4.062 ±.002

PARTIAL VIEW A-A

(A5)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
10	4		1000115-3			INSERT, THREADED, SELF-LOCKING			
9	2		1011445	57387000090		PAD, MOUNTING			
8	2		1011425	57387000080		PAD, MOUNTING			
7	4		NAS1352C04LL4	74455157013		SCREW, CAP, HEX. SOC. HD.			
6	1		1011424	52387000060		STIFFENER			
5	1		1011422	52387000040		FLANGE, MOUNTING (LEFT SIDE)			
4	1		1011423	52387000050		FLANGE, MOUNTING (RIGHT SIDE)			
3	1		1011427	52387000090		PANEL, LOWER			
2	1		1011426	52387000080		PANEL, UPPER			
1	1		1011421	52387000030		PANEL, FRONT			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011559	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ±.005; ANGLES ±0°30'
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 87387000010
DRAWN K. Sockie DATE 6/4/63
CHECKED 6/14/63
APPROVAL M. Werner 6/
APPROVAL E. 6-25-63
NASA APPROVAL W. J. 6-26-63
MIT APPROVAL 26 Jun 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING.
BRAZING AND MACHINING

CODE IDENT NO.
SIZE E
NASA NUMBER 1011439
SCALE 1:1
WEIGHT CALC ACTUAL
SHEET 1 OF 2

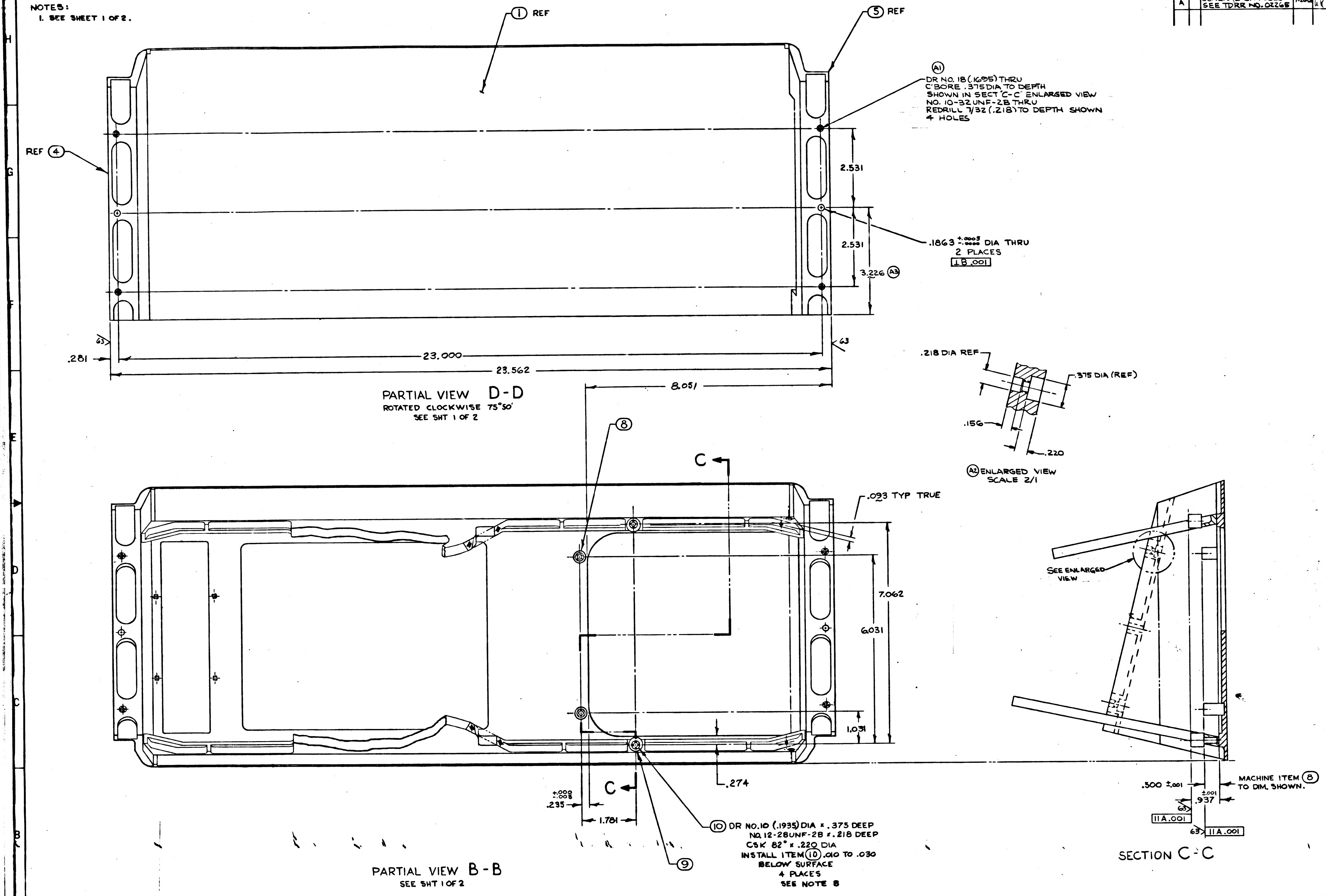
MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011439 A

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS 01739				
A		GENERAL CHANGES SEE TDRR NO. 02265	7-26-63	8/6/63

NOTES:
1. SEE SHEET 1 OF 2.



① REF
⑤ REF
REF ④
Ⓐ1
DR NO. 18 (.1695) THRU
C'BORE .375 DIA TO DEPTH
SHOWN IN SECT "C-C" ENLARGED VIEW
NO. 10-32 UNF-2B THRU
REDRILL 7/32 (.218) TO DEPTH SHOWN
4 HOLES
2.531
2.531
3.226 Ⓐ3
.1863 +.0005 -.0000 DIA THRU
2 PLACES
⊥B .001
63
.281
23.000
23.562
8.051
.218 DIA REF
.375 DIA (REF)
.156
.220
Ⓐ2 ENLARGED VIEW
SCALE 2/1
⑧
C
.093 TYP TRUE
7.062
6.031
1.031
SEE ENLARGED VIEW
.274
C
+.000 -.005
.235
1.781
⑨
⑩ DR NO. 10 (.1935) DIA x .375 DEEP
NO. 12-28 UNF-2B x .218 DEEP
CSK 82° x .220 DIA
INSTALL ITEM ⑩ .010 TO .030
BELOW SURFACE
4 PLACES
SEE NOTE 8
.500 ±.001
±.001
.937
MACHINE ITEM ⑧
TO DIM. SHOWN.
63
11 A .001
63
11 A .001

PARTIAL VIEW D-D
ROTATED CLOCKWISE 75°50'
SEE SHT 1 OF 2

PARTIAL VIEW B-B
SEE SHT 1 OF 2

SECTION C-C

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011559 NEXT ASSY	1011559 USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	KOLLSMAN INSTRUMENT CORPORATION ELMHURST NEW YORK
APPLICATION		TOL ON: FRACTIONS ± 1/64; DECIMALS ± .005; ANGLES ± 0°30'	KIC PN 87387000010
		DO NOT SCALE THIS DRAWING	DRAWN Wysocki DATE 6/4/63
		MATERIAL ~	CHECKED 6/19/63
			APPROVAL 6/19/63
			APPROVAL 6-25-63
			NASA APPROVAL 6-26-63
		CONTRACT	MIT APPROVAL 26 Jun 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE HOUSING, BRAZING AND MACHINING

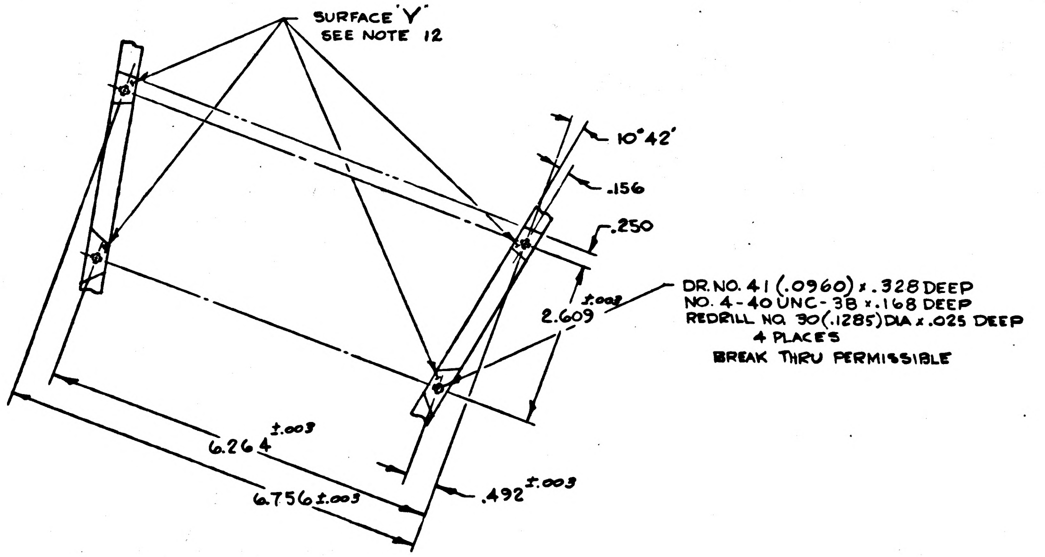
CODE IDENT NO.	SIZE	NASA NUMBER
	E	1011439
SCALE 1:1	WEIGHT CALC ACTUAL	SHEET 2 OF 2

INCHES
PHOTOGRAPHIC SCALE ONLY

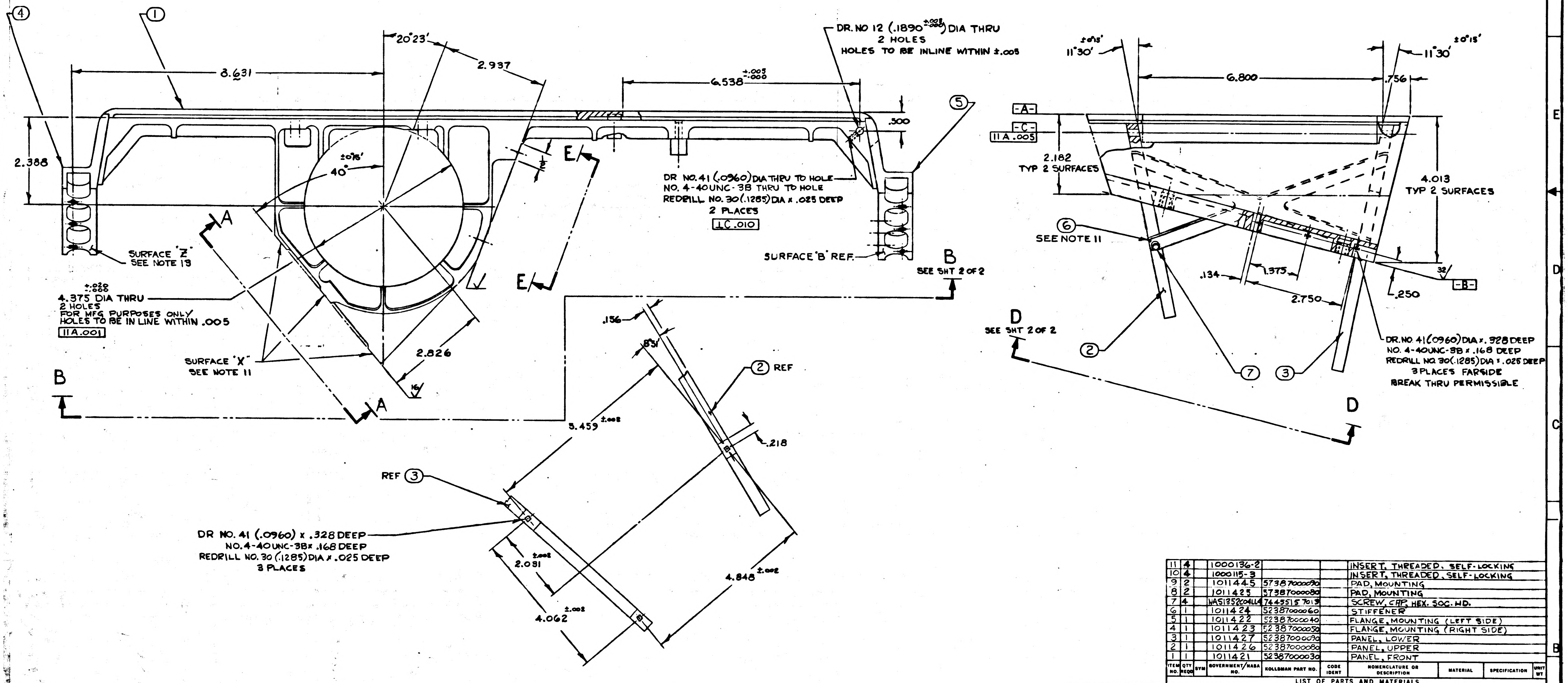
REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a) 125/✓ FINISH ALL OVER.
   b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. PART TO BE PENETRANT INSPECTED PER MIL-I-6866 METHOD II.
6. PART TO BE SUBJECTED TO RADIOGRAPHIC INSPECTION PER MIL-I-6865 CL I, LEVEL II.
7. TRANSFER SERIAL NO. PER ND1002019.
8. USE BROACHING TOOL FOR ITEMS ⑩ & ⑪ PER ND1002121.
9. BRAZING TO BE IN ACCORDANCE PER ND1002191.
10. HEAT TREAT (STABILIZE ONLY) PER ND1002092.
11. SURFACES MARKED "X" TO BE IN PLANE WITHIN .0005 & PARALLEL TO ℄ OF 4.375 DIA WITHIN .001 AFTER INSTALLATION OF ITEM NO. 6.
12. SURFACES MARKED "Y" TO BE IN PLANE WITHIN .005 & PARALLEL TO ℄ OF 4.375 DIA WITHIN .005.
13. SURFACE MARKED "Z" TO BE IN PLANE WITH -B- WITHIN .001.


SURFACE 'Y'
SEE NOTE 12
10°42'
.156
.250
DR. NO. 41 (.0960) x .328 DEEP
NO. 4-40UNC-3B x .168 DEEP
REDRILL NO. 30 (.1285) DIA x .025 DEEP
4 PLACES
BREAK THRU PERMISSIBLE
2.609 ±.003
6.264 ±.003
6.756 ±.003
.492 ±.003

PARTIAL VIEW E-E


④
①
20°23'
3.631
2.937
6.538 +.003 -.000
DR. NO 12 (.1890 +.003 -.000) DIA THRU
2 HOLES
HOLES TO BE INLINE WITHIN ±.005
⑤
.500
2.388
40° ±0°15'
E
E
A
A
DR NO. 41 (.0960) DIA THRU TO HOLE
NO. 4-40UNC-3B THRU TO HOLE
REDRILL NO. 30 (.1285) DIA x .025 DEEP
2 PLACES
⊥ C .010
SURFACE 'Z'
SEE NOTE 13
SURFACE 'B' REF.
B
SEE SHT 2 OF 2
4.375 +.020 -.000 DIA THRU
2 HOLES
FOR MFG PURPOSES ONLY
HOLES TO BE IN LINE WITHIN .005
∥ A .001
SURFACE 'X'
SEE NOTE 11
2.826
B
11°30' ±0°15'
6.800
.756
11°30' ±0°15'
-A-
-C-
∥ A .005
2.182
TYP 2 SURFACES
4.013
TYP 2 SURFACES
⑥
SEE NOTE 11
.134
.375
2.750
.250
-B-
D
SEE SHT 2 OF 2
②
⑦
③
DR. NO. 41 (.0960) DIA x .328 DEEP
NO. 4-40UNC-3B x .168 DEEP
REDRILL NO. 30 (.1285) DIA x .025 DEEP
3 PLACES FARSIDE
BREAK THRU PERMISSIBLE
D
.156
85°
② REF
.218
5.459 ±.002
REF ③
DR NO. 41 (.0960) x .328 DEEP
NO. 4-40UNC-3B x .168 DEEP
REDRILL NO. 30 (.1285) DIA x .025 DEEP
3 PLACES
2.031 ±.002
4.848 ±.002
4.062 ±.002

PARTIAL VIEW A-A

LIST OF PARTS AND MATERIALS

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
11	4		1000136-2			INSERT, THREADED, SELF-LOCKING			
10	4		1000115-3			INSERT, THREADED, SELF-LOCKING			
9	2		1011445	57387000090		PAD, MOUNTING			
8	2		1011425	57387000080		PAD, MOUNTING			
7	4		NAS1352C04LL4	74455157013		SCREW, CAP, HEX. SOC. HD.			
6	1		1011424	52387000060		STIFFENER			
5	1		1011422	52387000040		FLANGE, MOUNTING (LEFT SIDE)			
4	1		1011423	52387000050		FLANGE, MOUNTING (RIGHT SIDE)			
3	1		1011427	52387000090		PANEL, LOWER			
2	1		1011426	52387000080		PANEL, UPPER			
1	1		1011421	52387000030		PANEL, FRONT			

NEXT ASSY	USED ON
1011559	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ± .005; ANGLES ± 0°30'
DO NOT SCALE THIS DRAWING
MATERIAL ~
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 87387000010
DRAWN Wysocki DATE 6/4/63
CHECKED 6/19/63
APPROVAL M. Warner 6/19/63
APPROVAL E. Thorup 6-25-63
NASA APPROVAL W.J. Rhine 6-26-63
MIT APPROVAL W. Kupfer 26 Jun 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING,
BRAZING AND MACHINING

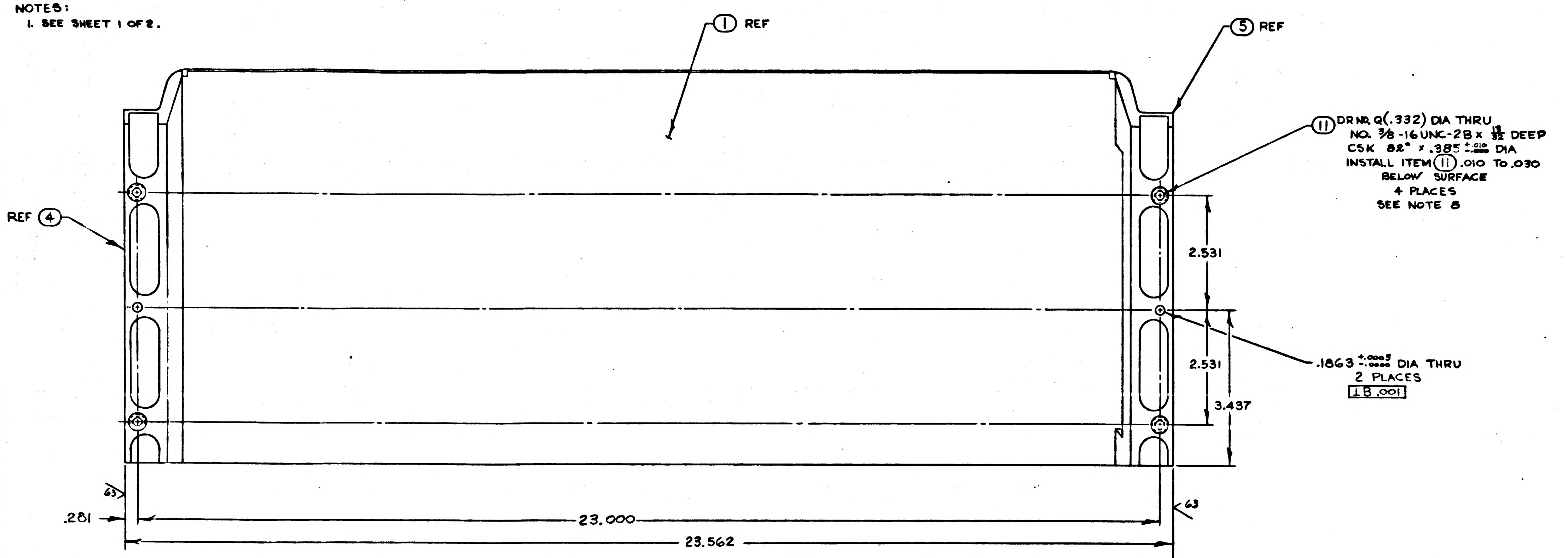
CODE IDENT NO.
SIZE E
NASA NUMBER 1011439
SCALE 1:1
WEIGHT CALC ACTUAL
SHEET 1 OF 2

MASTER

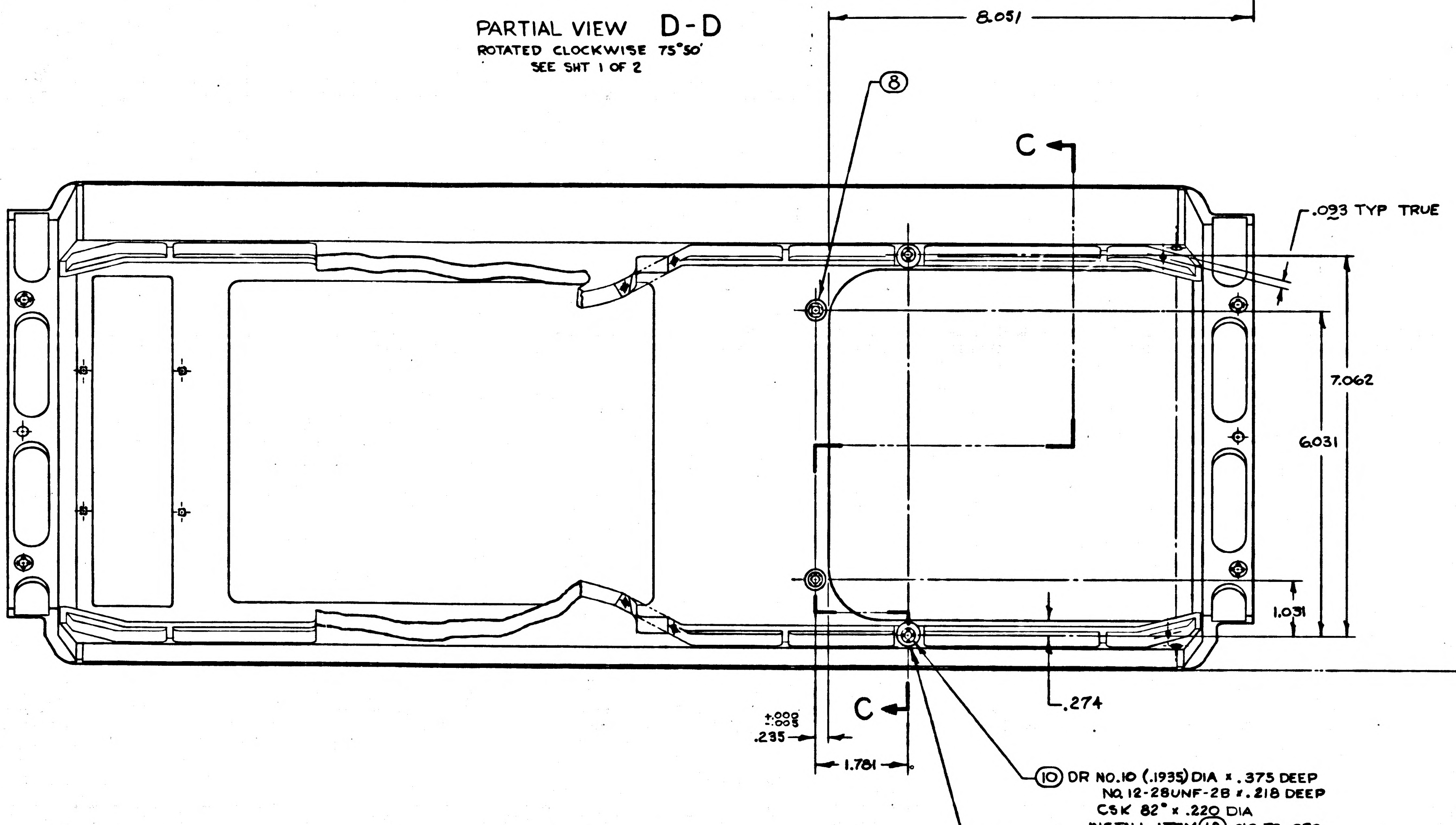
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTES:
1. SEE SHEET 1 OF 2.

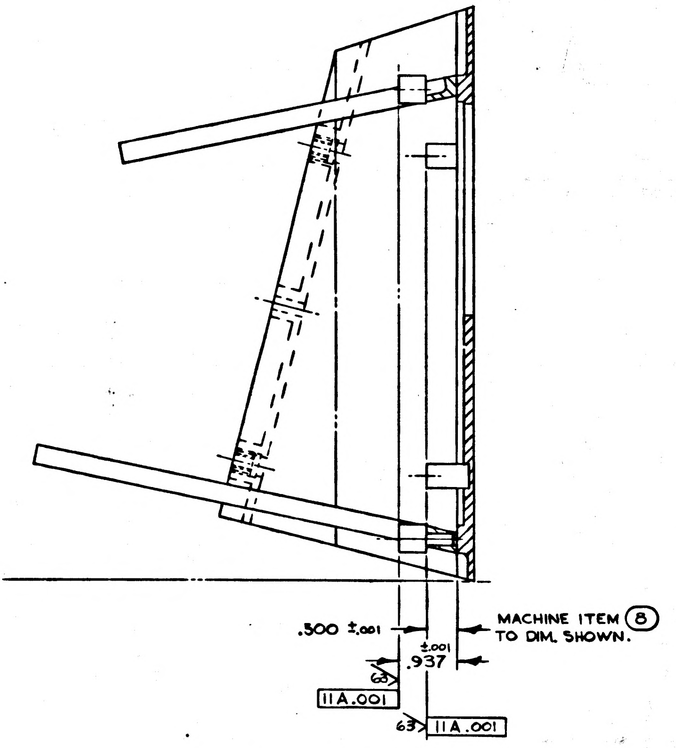
REVISIONS 01739				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL


(1) REF
(5) REF
REF (4)
(11) DR NO. Q(.332) DIA THRU
NO. 3/8-16UNC-2B x 13/32 DEEP
CSK 82° x .385 +.010 -.000 DIA
INSTALL ITEM (11) .010 TO .030
BELOW SURFACE
4 PLACES
SEE NOTE 8
2.531
2.531
3.437
.1863 +.0005 -.0000 DIA THRU
2 PLACES
⊥B.001
63
.281
23.000
23.562
63

PARTIAL VIEW D-D
ROTATED CLOCKWISE 75°50'
SEE SHT 1 OF 2


8.051
(8)
C
C
.093 TYP TRUE
7.062
6.031
1.031
.274
+.000 -.005
.235
1.781
(9)
(10) DR NO.10 (.1935) DIA x .375 DEEP
NO. 12-28UNF-2B x .218 DEEP
CSK 82° x .220 DIA
INSTALL ITEM (10) .010 TO .030
BELOW SURFACE
4 PLACES
SEE NOTE 8

PARTIAL VIEW B-B
SEE SHT 1 OF 2


.300 ±.001
±.001
.937
MACHINE ITEM (8)
TO DIM. SHOWN.
63
11A.001
63
11A.001

SECTION C-C

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011559	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 0°30'

DO NOT SCALE THIS DRAWING
MATERIAL ~
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 87387000010
DRAWN Wysocki DATE 6/4/63
CHECKED 6/19/63
APPROVAL 6/19/63
APPROVAL 6-25-63
NASA APPROVAL 6-26-63
MIT APPROVAL 26 June 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING,
BRAZING AND MACHINING

CODE IDENT NO. | SIZE E | NASA NUMBER 1011439
SCALE 1:1 | WEIGHT | CALC ACTUAL | SHEET 2 OF 2

MASTER

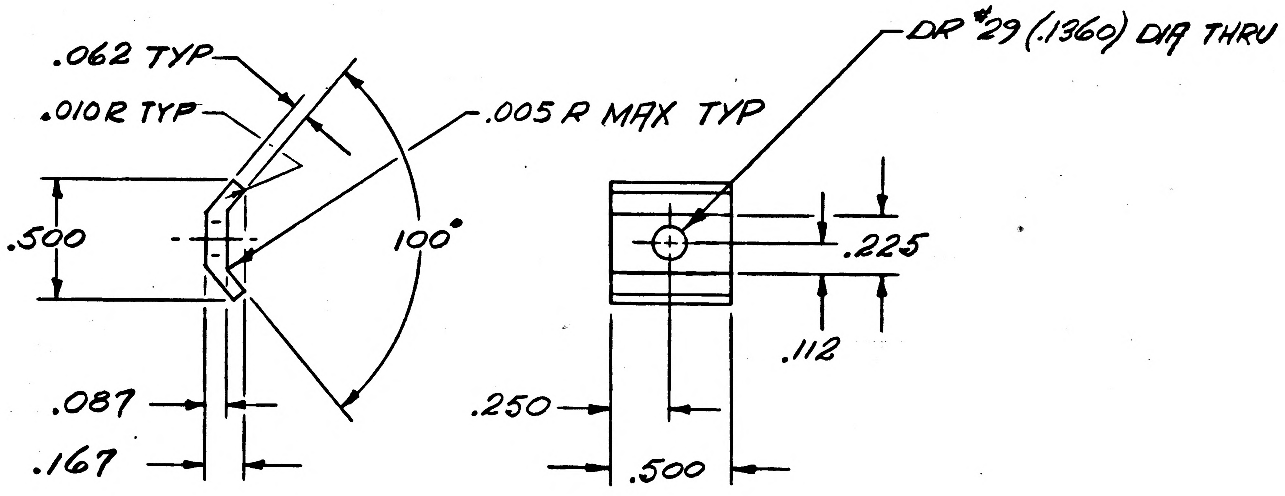
INCHES
PHOTOGRAPHIC SCALE ONLY

1011440

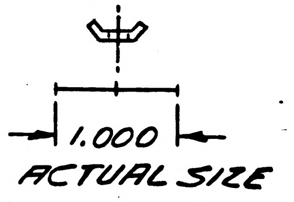
SYM	ZONE	REVISIONS TDRR 01905 DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 125√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. MATERIAL: STAINLESS STEEL AISI #302 FED SPEC QQ-S-766 CLASS 302, COND A.
6. FINISH: PASSIVATE PER MIL-STD-171 (KPS10051.200)
7. BLACKEN PER MIL-C-13924, CLASS 3 (KPS10058.100)



MASTER



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011559	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 5

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 54387000010

DRAWN E. TYLS DATE 3 JUNE '63
CHECKED 6/21/63
APPROVAL M. Wemer 6-22-63
APPROVAL E. Thorup 6-28-63
NASA APPROVAL 7/3/63
MIT APPROVAL 7/3/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
CLAMP, MIRROR

CODE IDENT NO.
SIZE C
NASA NUMBER 1011440
SCALE 2:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

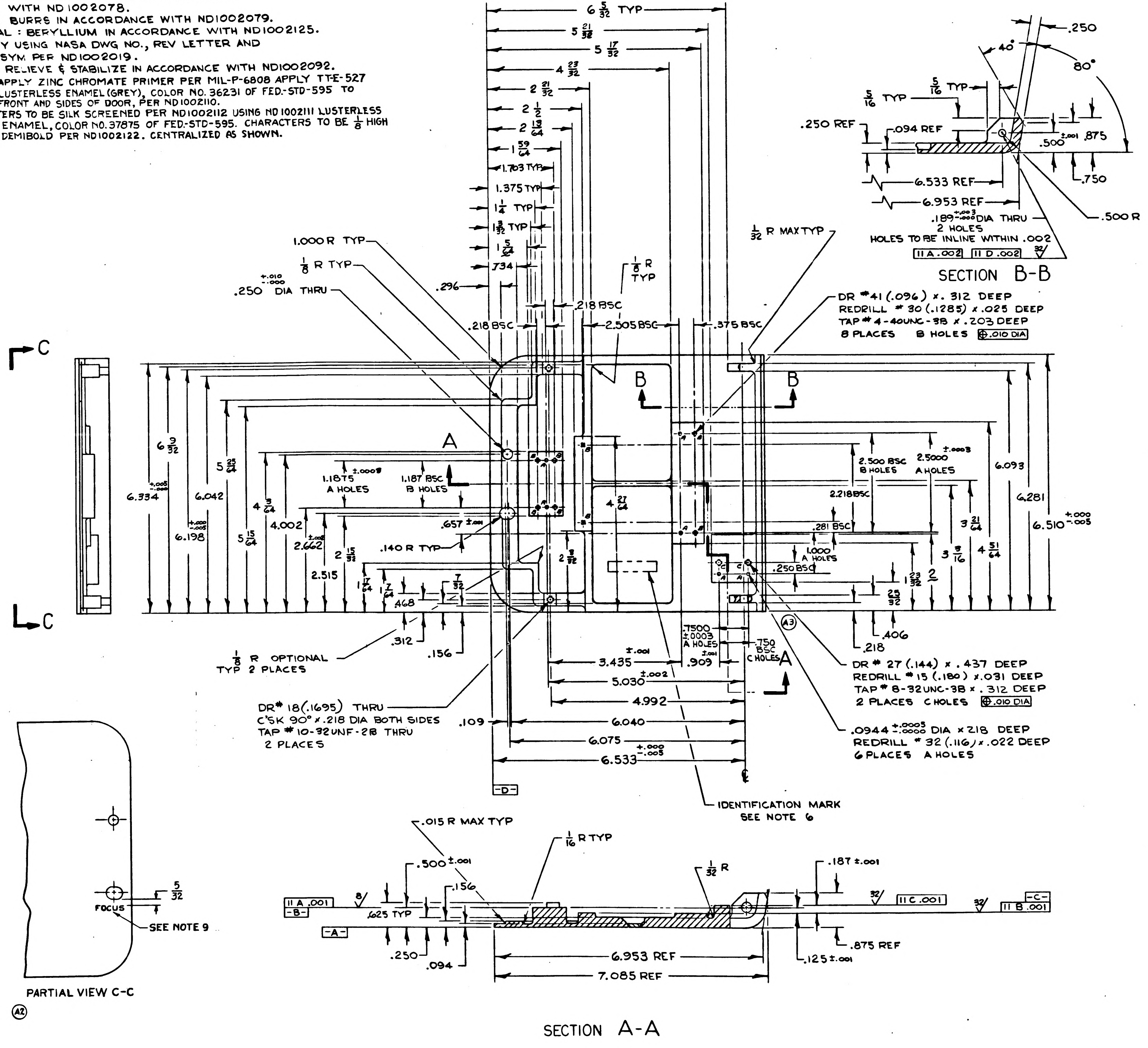
1011440

1011442 A

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	3	REVISED PER TDRR NO. 03813	10 Oct	4K

REVISIONS TDRR 0?322

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
    a. 125/ FINISH ALL OVER.
    b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. MATERIAL : BERYLLIUM IN ACCORDANCE WITH ND1002125.
6. IDENTIFY USING NASA DWG NO., REV LETTER AND MFR'S SYM PER ND1002019.
7. STRESS RELIEVE & STABILIZE IN ACCORDANCE WITH ND1002092.
8. FINISH: APPLY ZINC CHROMATE PRIMER PER MIL-P-6808 APPLY TT-E-527 LUSTERLESS ENAMEL (GREY), COLOR NO. 36231 OF FED.-STD-595 TO FRONT AND SIDES OF DOOR, PER ND1002110. Ⓐ
9. CHARACTERS TO BE SILK SCREENED PER ND1002112 USING ND1002111 LUSTERLESS (WHITE) ENAMEL, COLOR NO. 37875 OF FED.-STD-595. CHARACTERS TO BE $\frac{1}{8}$ HIGH FUTURA DEMIBOLD PER ND1002122. CENTRALIZED AS SHOWN.


6 5/32 TYP
5 21/32
5 17/32
4 23/32
2 21/32
2 1/2
2 13/64
1 59/64
1.703 TYP
1.375 TYP
1 1/4 TYP
1 3/32 TYP
1 5/64
.734
.296
.218 BSC
.218 BSC
2.505 BSC
.375 BSC
1.000 R TYP
1/8 R TYP
+.010 -.000 .250 DIA THRU
1/8 R TYP
1/32 R MAX TYP
C
C
A
A
B
B
6 9/32
+.005 -.000 6.334
6.042
+.000 -.005 6.198
5 25/64
5 15/64
4 3/64
4.002
±.002 2.662
2 15/32
2.515
1 17/64
1 7/64
.468
7/32
.312
.156
±.0005 1.1875 A HOLES
1.187 BSC B HOLES
.657 ±.001
.140 R TYP
2 3/32
4 27/64
1/8 R OPTIONAL TYP 2 PLACES
DR# 18 (.1695) THRU
C'SK 90° x .218 DIA BOTH SIDES
TAP # 10-32UNF-2B THRU
2 PLACES
.109
6.040
6.075
+.000 -.005 6.533
-D-
±.001 3.435
±.002 5.030
4.992
.7500 ±.0003 A HOLES
±.001 .909
.750 BSC C HOLES
2.500 BSC B HOLES
±.0003 2.5000 A HOLES
2.218 BSC
.281 BSC
1.000 A HOLES
.250 BSC
1 23/32
2
25/32
.406
.218
3 21/64
3 3/16
4 51/64
6.093
6.281
+.000 -.005 6.510
A3
DR # 41 (.096) x .312 DEEP
REDRILL # 30 (.1285) x .025 DEEP
TAP # 4-40UNC-3B x .203 DEEP
8 PLACES B HOLES ⊕.010 DIA
DR # 27 (.144) x .437 DEEP
REDRILL # 15 (.180) x .031 DEEP
TAP # 8-32UNC-3B x .312 DEEP
2 PLACES C HOLES ⊕.010 DIA
.0944 +.0005 -.0000 DIA x .218 DEEP
REDRILL # 32 (.116) x .022 DEEP
6 PLACES A HOLES
IDENTIFICATION MARK SEE NOTE 6
.250
40°
80°
5/16 TYP
5/16 TYP
.250 REF
.094 REF
.500 ±.001
.875
.750
6.533 REF
6.953 REF
.500 R
+.003 -.000 .189 DIA THRU
2 HOLES
HOLES TO BE INLINE WITHIN .002
11 A .002
11 D .002
32/
SECTION B-B
FOCUS
5/32
SEE NOTE 9
PARTIAL VIEW C-C
A2
.015 R MAX TYP
1/16 R TYP
1/32 R
.500 ±.001
.156
.625 TYP
.187 ±.001
11 A .001
-B-
-A-
8/
32/
11 C .001
32/
-C-
11 B .001
.250
.094
6.953 REF
7.085 REF
.875 REF
.125 ±.001
SECTION A-A

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011473	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS $\pm\frac{1}{64}$ DECIMALS ±.005 ANGLES ±0°30'
DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE 5
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52387000130
DRAWN Wysocki DATE 7-17-63
CHECKED M. Farwell 7-19-63
APPROVAL M. Kerner 7-30-63
APPROVAL E. Thomp 7-30-63
NASA APPROVAL W. J. Rhine 7-31-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
DOOR, ACCESS

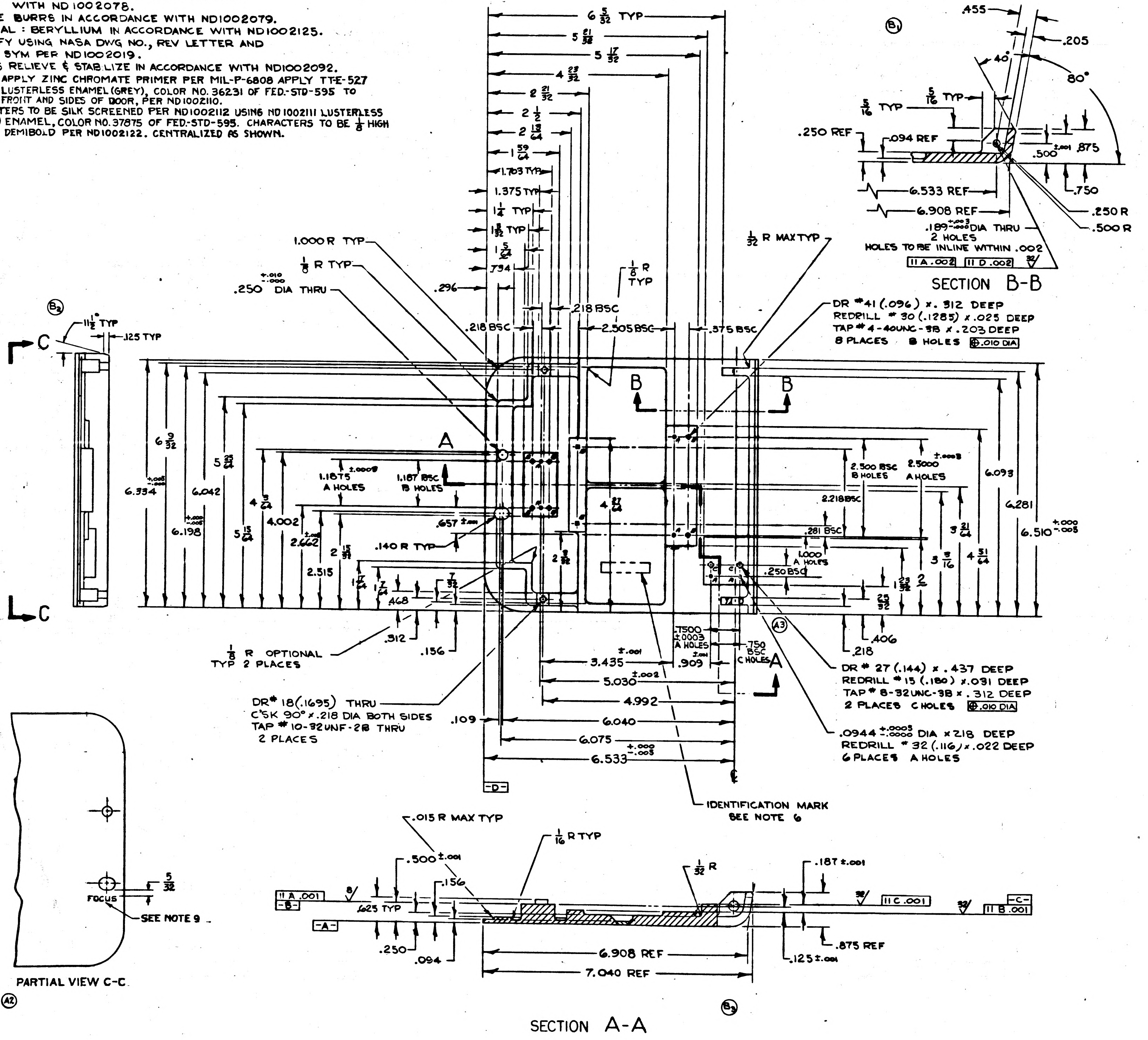
CODE IDENT NO.
SIZE E
NASA NUMBER 10114
SCALE 1:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

REVISIONS TDRR 02322				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A 3		REVISED PER TDRR NO. 03813	10 Oct 63	WK
B 3		REVISED PER TDRR NO. 08623	26 MAY 64	WK

1011442 B

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   - a. 125/ FINISH ALL OVER.
   - b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. MATERIAL : BERYLLIUM IN ACCORDANCE WITH ND1002125.
6. IDENTIFY USING NASA DWG NO., REV LETTER AND MFR'S SYM PER ND1002019.
7. STRESS RELIEVE & STABILIZE IN ACCORDANCE WITH ND1002092.
8. FINISH: APPLY ZINC CHROMATE PRIMER PER MIL-P-6808 APPLY TT-E-527 LUSTERLESS ENAMEL (GREY), COLOR NO. 36231 OF FED.-STD-595 TO FRONT AND SIDES OF DOOR, PER ND1002110.
9. CHARACTERS TO BE SILK SCREENED PER ND1002112 USING ND1002111 LUSTERLESS (WHITE) ENAMEL, COLOR NO. 37875 OF FED.-STD-595. CHARACTERS TO BE 1/8 HIGH FUTURA DEMIBOLD PER ND1002122. CENTRALIZED AS SHOWN.


SECTION B-B
.455
.205
40°
80°
5/16 TYP
.250 REF
.094 REF
.500 ±.001
.875
6.533 REF
6.908 REF
.750
.250 R
.500 R
.189 +.003 -.000 DIA THRU 2 HOLES
HOLES TO BE INLINE WITHIN .002
6 5/32 TYP
5 21/32
5 17/32
4 23/32
2 21/32
2 1/2
2 13/64
1 39/64
1.703 TYP
1.375 TYP
1 1/4 TYP
1 3/32 TYP
1 1/64
.734
.296
1.000 R TYP
1/8 R TYP
.250 +.010 -.000 DIA THRU
.218 BSC
2.505 BSC
.375 BSC
1/8 R TYP
1/32 R MAX TYP
DR #41 (.096) x .312 DEEP
REDRILL #30 (.1285) x .025 DEEP
TAP #4-40UNC-3B x .203 DEEP
8 PLACES B HOLES .010 DIA
1 1/2° TYP
.125 TYP
C
C
A
A
B
B
6 9/32
5 23/64
6.042
6.334
6.198
4 3/64
4.002
5 15/64
2.662
2 15/32
2.515
1.1875 ±.0008 A HOLES
1.187 BSC B HOLES
.657 ±.001
.140 R TYP
.468
.312
.156
2.500 BSC B HOLES
2.5000 ±.0008 A HOLES
2.218 BSC
.281 BSC
1.000 A HOLES
.250 BSC
6.093
6.281
6.510 +.000 -.005
3 21/64
3 3/16
4 51/64
1 23/32
2
25/32
.406
.218
.7500 ±.0003 A HOLES
.750 BSC C HOLES
3.435 ±.001
.909 ±.001
5.030 ±.002
4.992
6.040
6.075
6.533 +.000 -.005
.109
-D-
1/8 R OPTIONAL TYP 2 PLACES
DR #18 (.1695) THRU C'SK 90° x .218 DIA BOTH SIDES TAP #10-32UNF-2B THRU 2 PLACES
DR #27 (.144) x .437 DEEP
REDRILL #15 (.180) x .031 DEEP
TAP #8-32UNC-3B x .312 DEEP
2 PLACES C HOLES .010 DIA
.0944 +.0005 -.0000 DIA x .218 DEEP
REDRILL #32 (.116) x .022 DEEP
6 PLACES A HOLES
IDENTIFICATION MARK SEE NOTE 6
FOCUS
5/32
SEE NOTE 9
PARTIAL VIEW C-C
.015 R MAX TYP
1/16 R TYP
1/32 R
.500 ±.001
.156
.187 ±.001
.625 TYP
.250
.094
6.908 REF
7.040 REF
.875 REF
.125 ±.001
-A-
-B-
-C-
SECTION A-A

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	KOLLSMAN INSTRUMENT CORPORATION ELMHURST NEW YORK	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
		TOL ON: FRACTIONS ± 1/64; DECIMALS ± .005; ANGLES ± 0°30'	KIC PN 52387000130	TITLE DOOR, ACCESS
		DO NOT SCALE THIS DRAWING	DRAWN Wysocki DATE 7-17-63	
		MATERIAL SEE NOTE 5	CHECKED M. Fawcett 7-19-63	
			APPROVAL M. Wesner 7-30-63	
			APPROVAL E. Thomy 7-30-63	CODE IDENT NO. / SIZE E / NASA NUMBER 1011442
1011473	1011559	CONTRACT	NASA APPROVAL W. J. Rhine 7-31-63	
NEXT ASSY	USED ON		MIT APPROVAL L. Wolf 7/31/63	SCALE 1:1 WEIGHT CALC ACTUAL SHEET 1 OF 1
APPLICATION				

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

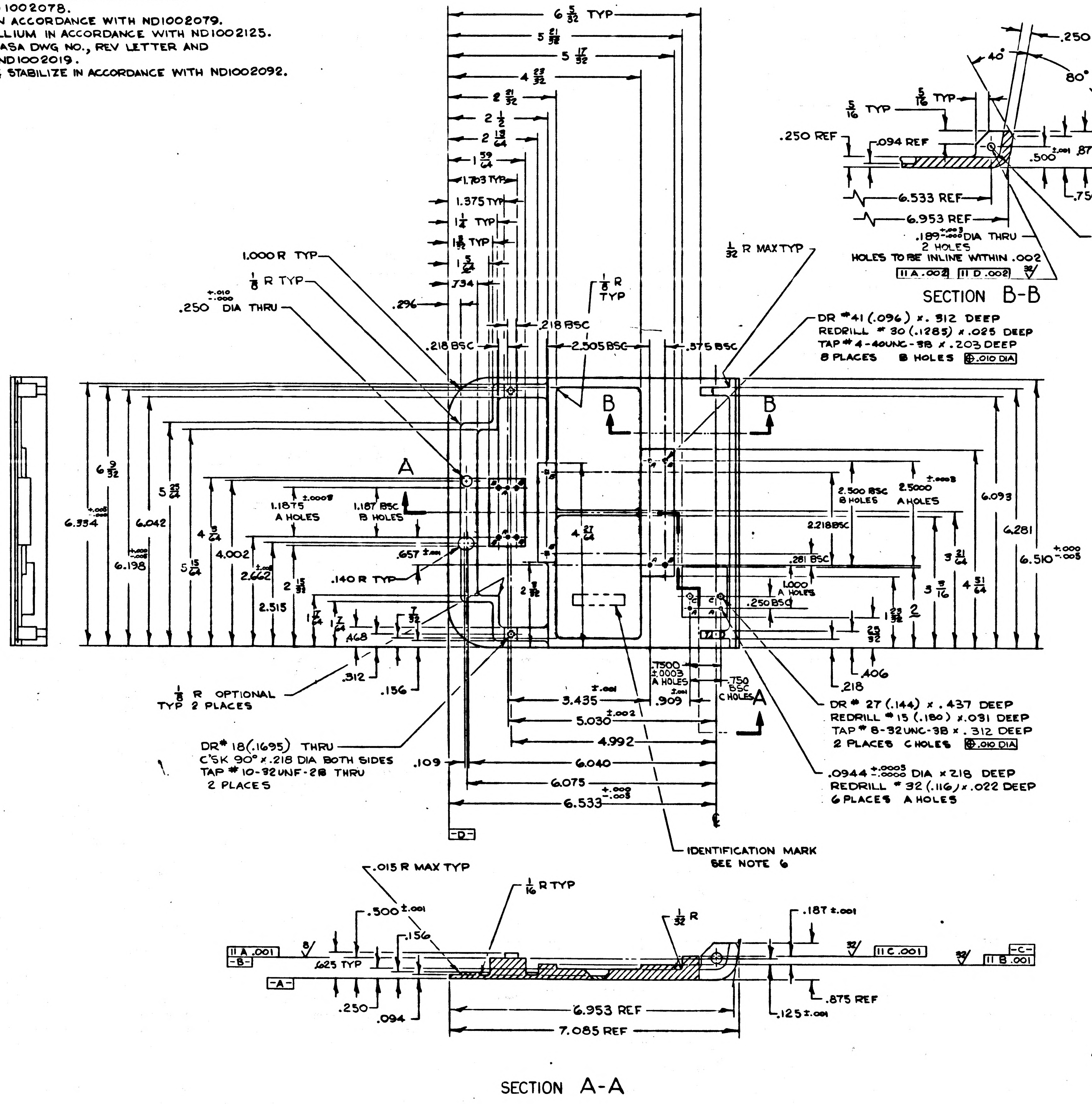
LIST OF PARTS AND MATERIALS

MASTER

REVISIONS TDRR 02322				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
    a. 125/ FINISH ALL OVER.
    b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. MATERIAL: BERYLLIUM IN ACCORDANCE WITH ND1002125.
6. IDENTIFY USING NASA DWG NO., REV LETTER AND MFR'S SYM PER ND1002019.
7. STRESS RELIEVE & STABILIZE IN ACCORDANCE WITH ND1002092.


6 5/32 TYP
5 21/32
5 17/32
4 23/32
2 21/32
2 1/2
2 13/64
1 39/64
1.703 TYP
1.375 TYP
1 1/4 TYP
1 3/32 TYP
1 5/64
.734
.296
.218 BSC
.218 BSC
2.505 BSC
.375 BSC
1/8 R TYP
1.000 R TYP
1/8 R TYP
.250 +.010 -.000 DIA THRU
1/32 R MAX TYP
DR #41 (.096) x .312 DEEP
REDRILL #30 (.1285) x .025 DEEP
TAP #4-40UNC-3B x .203 DEEP
8 PLACES B HOLES ⊕.010 DIA
A
B
B
6 9/32
6.354 +.000 -.005
5 25/64
6.042
6.198 +.000 -.005
4 3/64
4.002
5 15/64
2.662 ±.001
2 15/32
2.515
1.1875 ±.0008 A HOLES
1.187 BSC B HOLES
.657 ±.001
.140 R TYP
1 17/64
1 7/64
.468
7/32
2 3/32
4 27/64
.312
.156
1/8 R OPTIONAL TYP 2 PLACES
2.500 BSC B HOLES
2.5000 ±.0008 A HOLES
2.218 BSC
.281 BSC
1.000 A HOLES
.250 BSC
6.093
6.281
6.510 +.000 -.005
3 21/64
3 3/16
4 51/64
1 23/32
2
25/32
.406
.218
.500 ±.0003 A HOLES
.750 BSC C HOLES
.909 ±.001
3.435 ±.001
5.030 ±.002
4.992
6.040
6.075
6.533 +.000 -.003
.109
A
-D-
DR #18 (.1695) THRU
C'SK 90° x .218 DIA BOTH SIDES
TAP #10-32UNF-2B THRU
2 PLACES
DR #27 (.144) x .437 DEEP
REDRILL #15 (.180) x .031 DEEP
TAP #8-32UNC-3B x .312 DEEP
2 PLACES C HOLES ⊕.010 DIA
.0944 +.0005 -.0000 DIA x .218 DEEP
REDRILL #32 (.116) x .022 DEEP
6 PLACES A HOLES
IDENTIFICATION MARK SEE NOTE 6
.250
40°
80°
5/16 TYP
5/16 TYP
.250 REF
.094 REF
.500 ±.001
.875
.750
6.533 REF
6.953 REF
.189 +.003 -.000 DIA THRU 2 HOLES
HOLES TO BE INLINE WITHIN .002
∥ A .002
∥ D .002
32/
.500 R
SECTION B-B
.015 R MAX TYP
1/16 R TYP
.500 ±.001
.156
1/32 R
.187 ±.001
∥ A .001
-B-
8/
.625 TYP
-A-
32/
∥ C .001
32/
-C-
∥ B .001
.250
.094
6.953 REF
7.085 REF
.875 REF
.125 ±.001
SECTION A-A

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011473	1011559	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOL ON FRACTIONS ± 1/64 DECIMALS ±.005 ANGLES ±0°30' DO NOT SCALE THIS DRAWING	KOLLSMAN INSTRUMENT CORPORATION ELMHURST NEW YORK KIC PN 52387000130	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
NEXT ASSY	USED ON	MATERIAL SEE NOTE 5	DRAWN Wysocki DATE 7-17-63 CHECKED M. Fausell 7-19-63 APPROVAL M. Kerner 7-30-63 APPROVAL E. Thomp 7-30-63	TITLE DOOR, ACCESS
APPLICATION		CONTRACT	NASA APPROVAL W. G. Rhine 7-31-63 MIT APPROVAL 7-31-63	CODE IDENT NO.	SIZE E	NASA NUMBER 1011442 SCALE 1:1 WEIGHT CALC ACTUAL SHEET 1 OF 1

MASTER

1011442

1011443 A

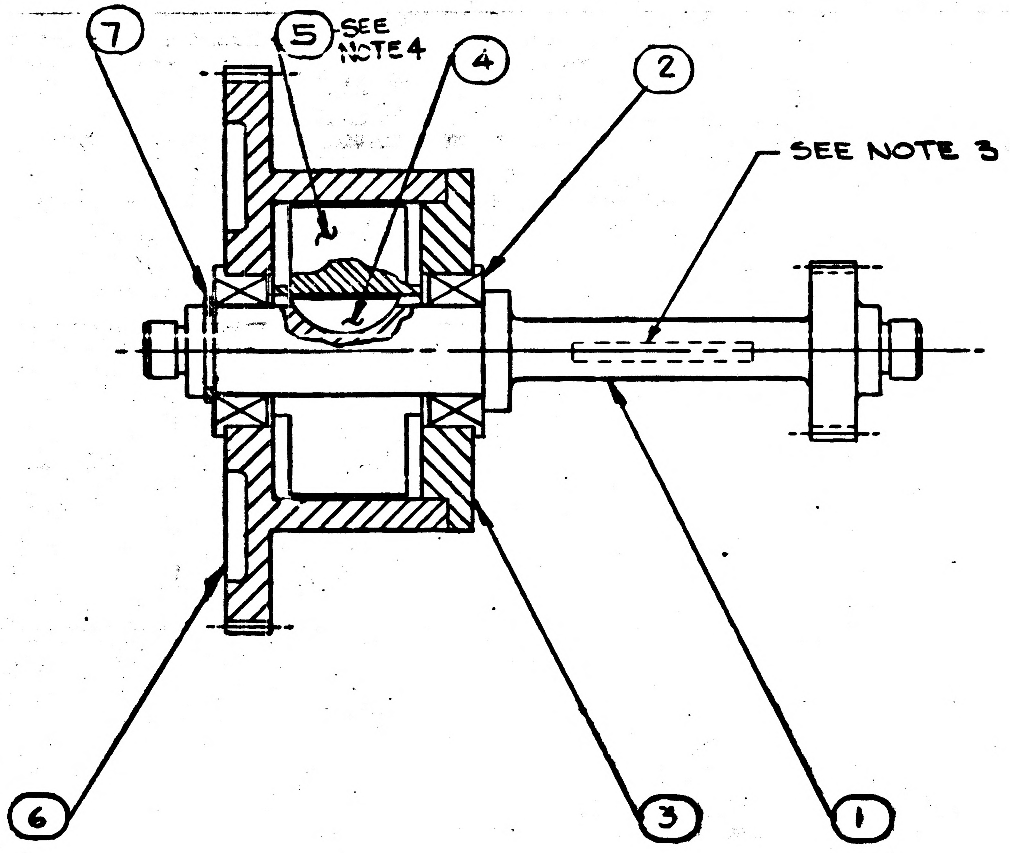
REVISIONS TDRR 01905				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	D-6	ADDED NOTE 4 TDRR NO 02276	7-26-63	WK 8/6/63

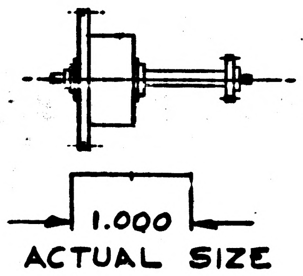
NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078
3. IDENTIFY USING NASA DWG NO. REVISION LETTER AND MANUFACTURES SYMBOL PER ND1002019
4. Ⓐ ASSEMBLE ⑤ TO SHAFT ① IN SUCH MANNER AS TO ACHIEVE DIRECTION OF ROTATION REQUIRED IN FINAL ASSEMBLY - DIRECTION OF ROTATION DETERMINED WHEN VIEWED FROM ITEM ⑥ END OF SHAFT

   1011443-1 - WITH GEAR SHAFT ① HELD STATIONARY, ITEM ⑥ SHALL ROTATE FREELY IN A COUNTER CLOCKWISE DIRECTION AND LOCK WHEN REVERSED

   1011443-2 - WITH GEAR SHAFT ① HELD STATIONARY, ITEM ⑥ SHALL ROTATE FREELY IN A CLOCKWISE DIRECTION AND LOCK WHEN REVERSED





MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
7	1		1011770	7445304 4001		RING, RETAINING			
6	1		1011448	33387000060		HOUSING, GEARED CLU[illegible]CH			
5	1		1011373	75011000401		CLUTCH			
4	1		MS35756-1	74472007001		KEY, WOODRUFF			
3	1		1011450	57387000100		CAP, BEARING HOUSING			
2	2		1011406	30021790120		BEARING, BALL, ANNULAR			
1	1		1011452	33387000090		GEARSHAFT			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011430	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	± ~	± ~

DO NOT SCALE THIS DRAWING
MATERIAL ~
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85387000060

DRAWN R. TYLE DATE 22 JUNE 63
CHECKED W. Farwell 6/27/63
APPROVAL M. Werner 7-1-63
APPROVAL E. Thomas 7-1-63
NASA APPROVAL W. J. Smith 7/3/63
MIT APPROVAL W Kupfer 8/6/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING & CLUTCH
ASSY OF

CODE IDENT NO.
SIZE C
NASA NUMBER 1011443
SCALE 4:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

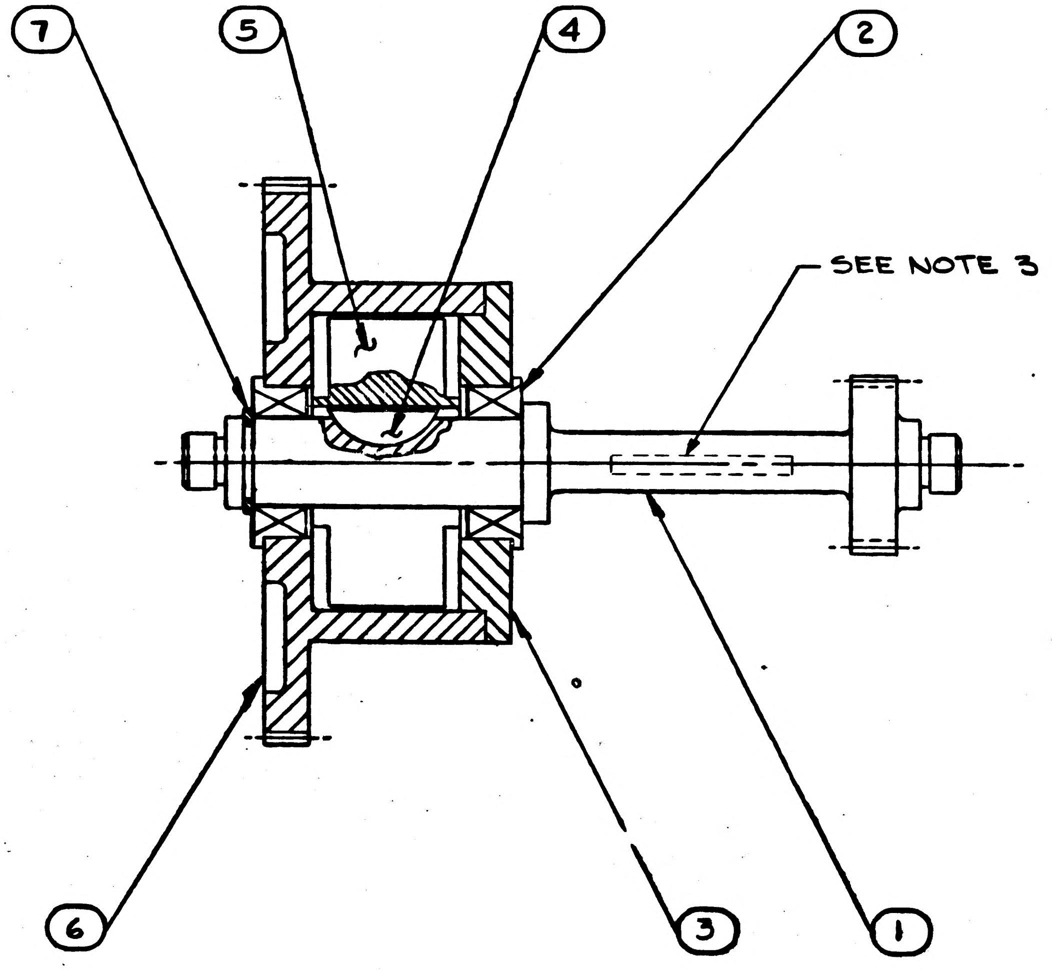
E-184

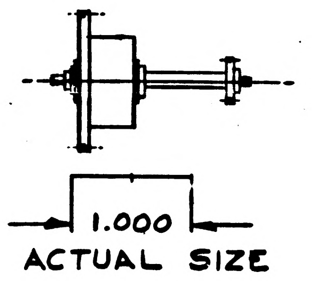
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011443

REVISIONS 7DRR 01905				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078
3. IDENTIFY USING NASA DWG NO. REVISION LETTER AND MANUFACTURES SYMBOL PER ND1002019





MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
7	1		1011770	7445304 4001	RING, RETAINING				
6	1		1011448	33387000060	HOUSING, GEARED CLUTCH				
5	1		1011373	75011000401	CLUTCH				
4	1		MS35756-1	74472007001	KEY, WOODRUFF				
3	1		1011450	57387000100	CAP, BEARING HOUSING				
2	2		1011406	30021790120	BEARING, BALL, ANNULAR				
1	1		1011452	33387000090	GEARSHAFT				

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011430	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	± ~	± ~

DO NOT SCALE THIS DRAWING
MATERIAL ~
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85387000060

DRAWN R. TYLS DATE 22 JUNE 63
CHECKED W. Fassell 6/27/63
APPROVAL M. Werner 7-1-63
APPROVAL E. Thomp 7-1-63
NASA APPROVAL W. J. Sa[illegible] 7/3/63
MIT APPROVAL W Kupfer 3/6/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING & CLUTCH
ASSY OF

CODE IDENT NO.
SIZE C
NASA NUMBER 1011443
SCALE 4:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

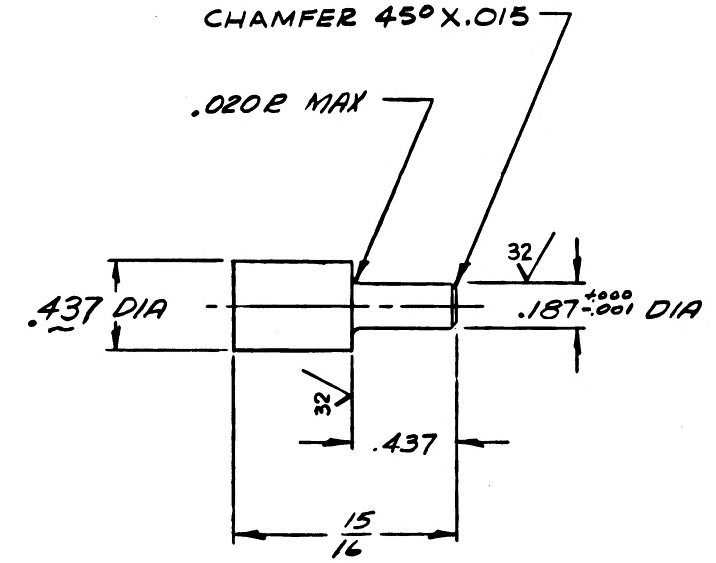
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

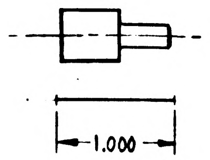
	1011445

REVISIONS TDRR 1639

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG. IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 125√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. MATERIAL: BERYLLIUM IN ACCORDANCE WITH ND1002125.
6. IDENTIFY USING NASA DWG. NO., REV. LETTER AND MFR'S. SYM PER ND 1002019.
7. STRESS RELIEVE IN ACCORDANCE WITH ND1002092.





ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011439	1011559
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57387000090

DRAWN E. TYLS DATE 10 JUNE '63
CHECKED 6/12/63
APPROVAL 6/15/63
APPROVAL E. Thomp 6/17/63
NASA APPROVAL 6/17/63
MIT APPROVAL 6/19/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PAD, MOUNTING

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011445
SCALE 2:1	WEIGHT CALC ACTUAL	SHEET 1 OF 1

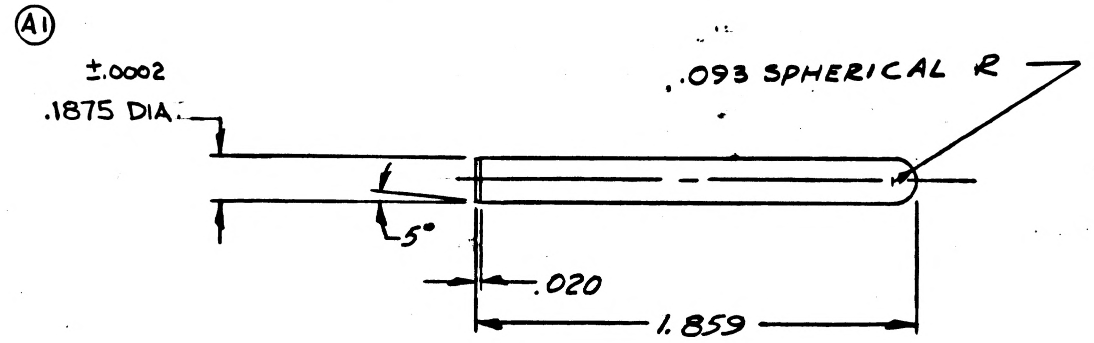
E-154

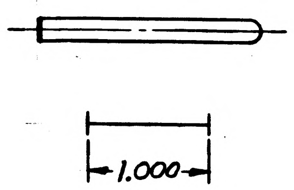
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011446 A

REVISIONS TDRR 1639				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		1).1875 ±.0002 DIA WAS .1885 ±.0002 2).011559 WAS .1011439 3). AISI #303 SPEC. DELETED TDRR 02013	7-16-63 7/17/63	

NOTES:
1. INTERPRET DWG. IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE NOTED:
   a. 125√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. PASSIVATE PER MIL-STD-171 (KPS.005I.200)
6. IDENTIFY USING NASA DWG. NO., REV. LETTER AND MFR'S. SYM. PER ND 1002019.





ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
011559	1011559

A2

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL (A3)
STAINLESS STEEL
FED. SPEC. QQ-S-763,
CLASS 303, COND. A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 39387000010

DRAWN E. TYLS DATE 10 JUNE '63
CHECKED 6/12/63
APPROVAL 6/15/63
APPROVAL E. [illegible] 6/17/63
NASA APPROVAL 6/17/63
MIT APPROVAL 6/19/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PIN, ALIGNMENT

CODE IDENT NO.
SIZE C
NASA NUMBER 1011446
SCALE 2:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

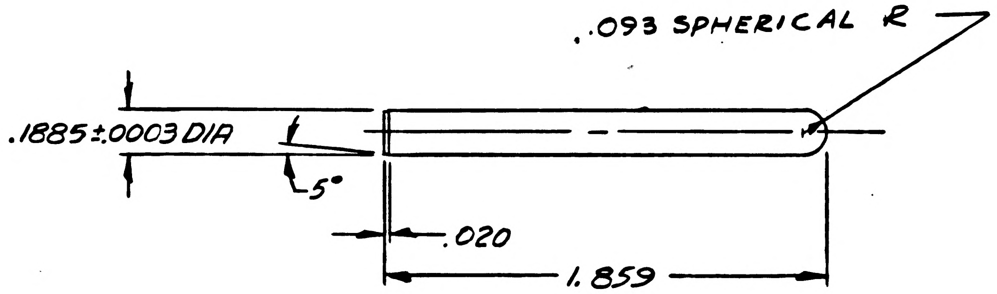
1011446

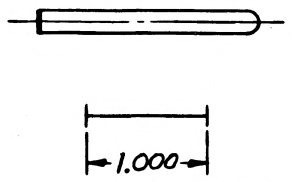
REVISIONS TDRR 1639

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG. IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE NOTED:
   a. .125√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. PASSIVATE PER MIL-STD-171 (KPS .005 I. 200)
6. IDENTIFY USING NASA DWG. NO., REV. LETTER AND MFR'S. SYM. PER ND 1002019.





ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011439	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ~ ; DECIMALS ± .005 ; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL: STAINLESS STEEL AISI 303 FED. SPEC. QQ-S-763, CLASS 303, COND. A
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 39387000010
DRAWN E. TYLS DATE 10 JUNE 63
CHECKED 6/12/63
APPROVAL 6/15/63
APPROVAL 6/17/63
NASA APPROVAL 6/14/63
MIT APPROVAL 6/19/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PIN, ALIGNMENT

CODE IDENT NO.
SIZE C
NASA NUMBER 1011446
SCALE 2:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

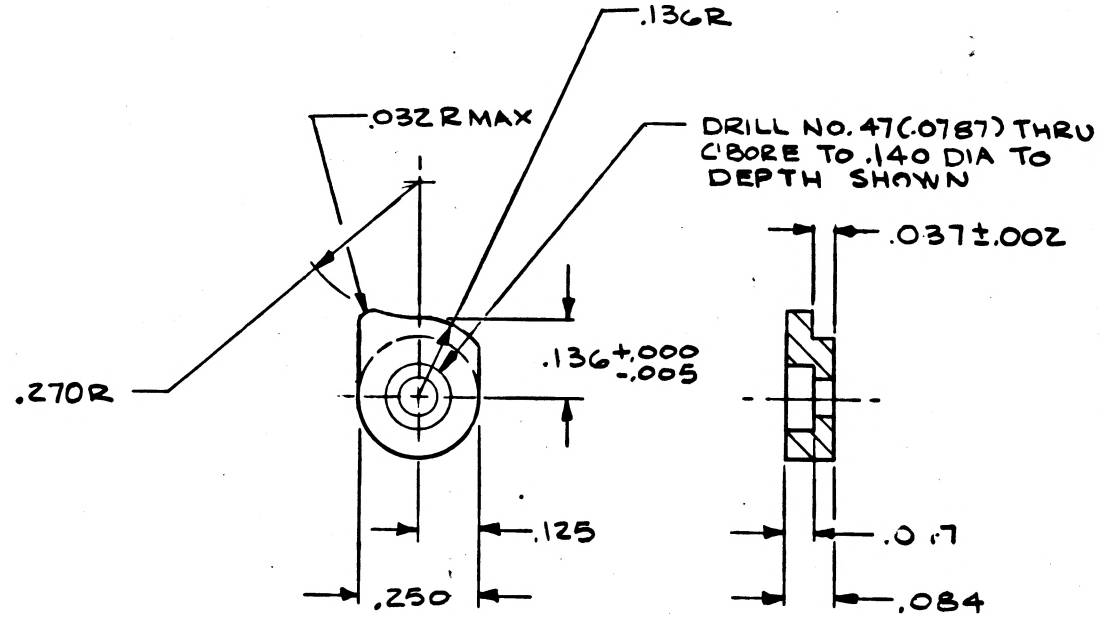
INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

1011446

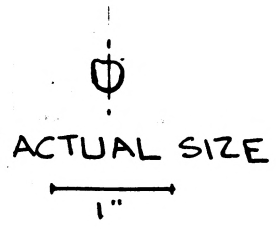
1011447

SYM	ZONE	REVISIONS TDRR 01905 DESCRIPTION	DATE	APPROVAL

NOTE:
1. INTERPRET DWG. IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078
3. UNLESS OTHERWISE SPECIFIED:
   a. $\sqrt{}^{125}$ FINISH ALL OVER
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. FINISH: PASSIVATE PER MIL-STD-171 (KPS-1005I.200)
6. IDENTIFY USING NASA DWG NO. REVISION LETTER & MANUFACTURES SYMBOL PER ND1002019.



MASTER


ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011430	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ; DECIMALS ±.005 ; ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL: STAINLESS STEEL A.I.S.I. 303 FED. SPEC. QQ-S-763 CLASS 303 COND. A
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52387000'40
DRAWN V. LOZITO DATE 6-11-63
CHECKED W. Witzky 6-17-63
APPROVAL M. Wagner 6-22-63
APPROVAL E. Dhong 6-28-63
NASA APPROVAL 7/3/63
MIT APPROVAL 3/63

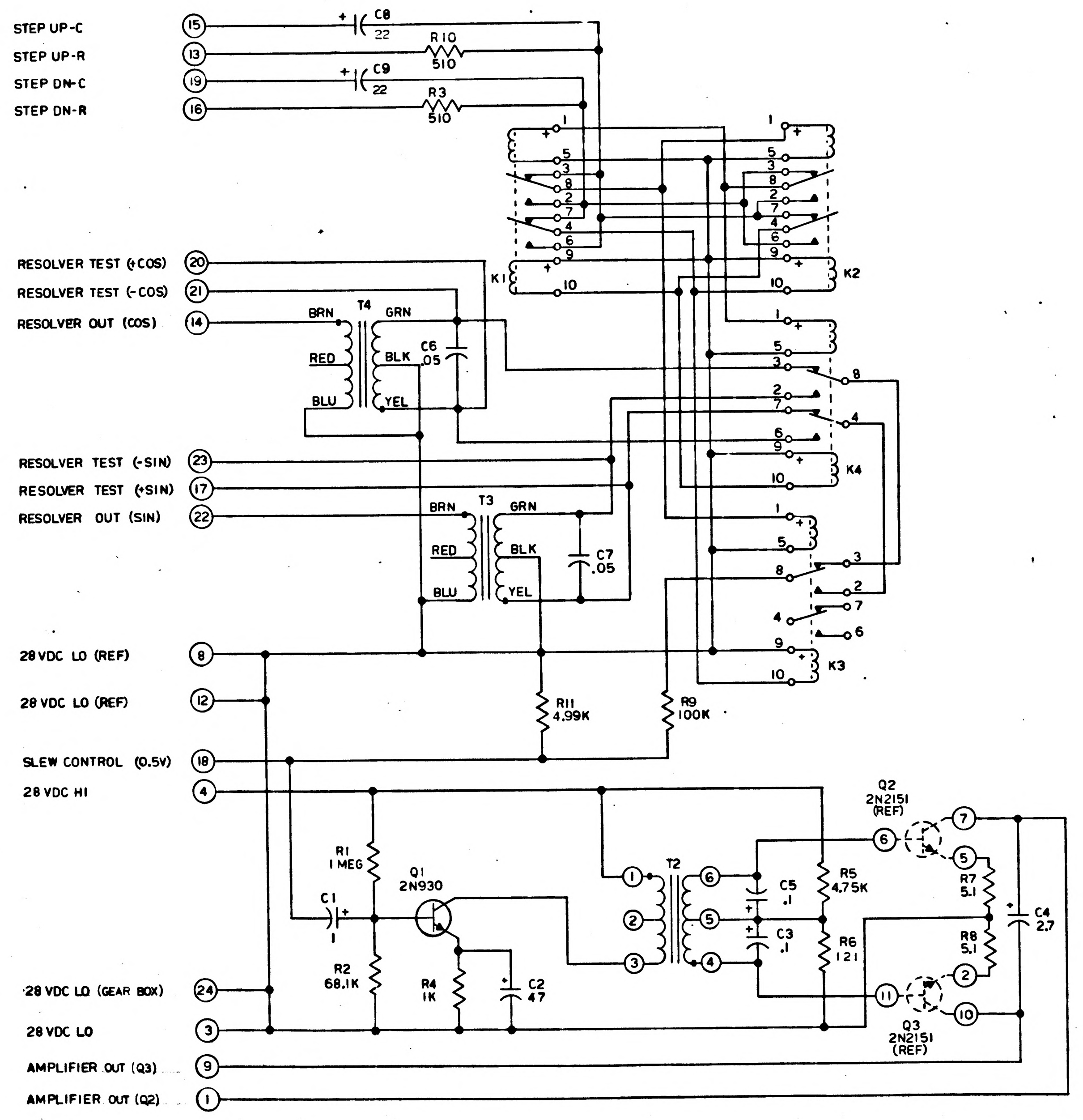
MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
CLAMP, MOUNTING

CODE IDENT NO. | SIZE C | NASA NUMBER 1011447
SCALE 4:1 | WEIGHT | CALC ACTUAL | SHEET 1 OF 1

INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

REVISIONS 028.9				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL


STEP UP-C
STEP UP-R
STEP DN-C
STEP DN-R
15
13
19
16
C8
22
R10
510
C9
22
R3
510
K1
K2
K3
K4
RESOLVER TEST (+COS)
RESOLVER TEST (-COS)
RESOLVER OUT (COS)
20
21
14
T4
BRN
RED
BLU
GRN
BLK
YEL
C6
.05
RESOLVER TEST (-SIN)
RESOLVER TEST (+SIN)
RESOLVER OUT (SIN)
23
17
22
T3
C7
.05
28 VDC LO (REF)
8
28 VDC LO (REF)
12
SLEW CONTROL (0.5V)
18
28 VDC HI
4
R11
4.99K
R9
100K
R1
1 MEG
C1
1
Q1
2N930
R2
68.1K
R4
1K
C2
47
T2
C5
.1
C3
.1
R5
4.75K
R6
121
Q2
2N2151
(REF)
Q3
2N2151
(REF)
R7
5.1
R8
5.1
C4
2.7
28 VDC LO (GEAR BOX)
24
28 VDC LO
3
AMPLIFIER OUT (Q3)
9
AMPLIFIER OUT (Q2)
1

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1010393-029	CAP	1 UF	10%	33VDC
C2	1006755-89		47 UF		35VDC
C3	1010393-017		.1 UF		33VDC
C4	1010393-034		2.7 UF		33VDC
C5	1010393-017		.1 UF		33VDC
C6	1010279-216		.05 UF		35VDC
C7	1010279-216		.05 UF		35VDC
C8	1006755-134		22 UF		50VDC
C9	1006755-134	↓	22 UF	↓	50VDC
K1	1006772-2	RELAY			
K2					
K3					
K4	↓	↓			
Q1	1010397-001	TSTR	2N930		
R1	1010363-827	RES	1 MEG	1%	1/4 W
R2	1010363-603		68.1K		1/4 W
R3	1010389-49		510		3 W
R4	1010363-251		1K		1/4 W
R5	1010363-381		4.75K		1/4 W
R6	1010363-75		121		1/4 W
R7	1010389-1		5.1		3 W
R8	1010389-1		5.1		3 W
R9	1010363-635		100K		1/4 W
R10	1010389-49		510		3 W
R11	1010363-385	↓	4.99K	↓	1/4 W
T2	1010291-4	XMFR (SP20)			
T3	1010324				
T4	1010324	↓			

REFERENCE:
1. MECH ASSEMBLY DRAWING 1011478
2. AMPL AND SW ASSY SCHEMATIC DIAGRAM 1011454
3. SYSTEM SCHEMATIC DIAGRAM 1011405

TRANSISTORS Q2 AND Q3 SHOWN FOR REFERENCE ONLY

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80387000020
DRAWN L MARGIOTTA DATE 6-5-63
CHECKED W. HENDRICKSON 6-28-63
APPROVAL 8-9-63
APPROVAL 8-15-63
NASA APPROVAL
MIT APPROVAL

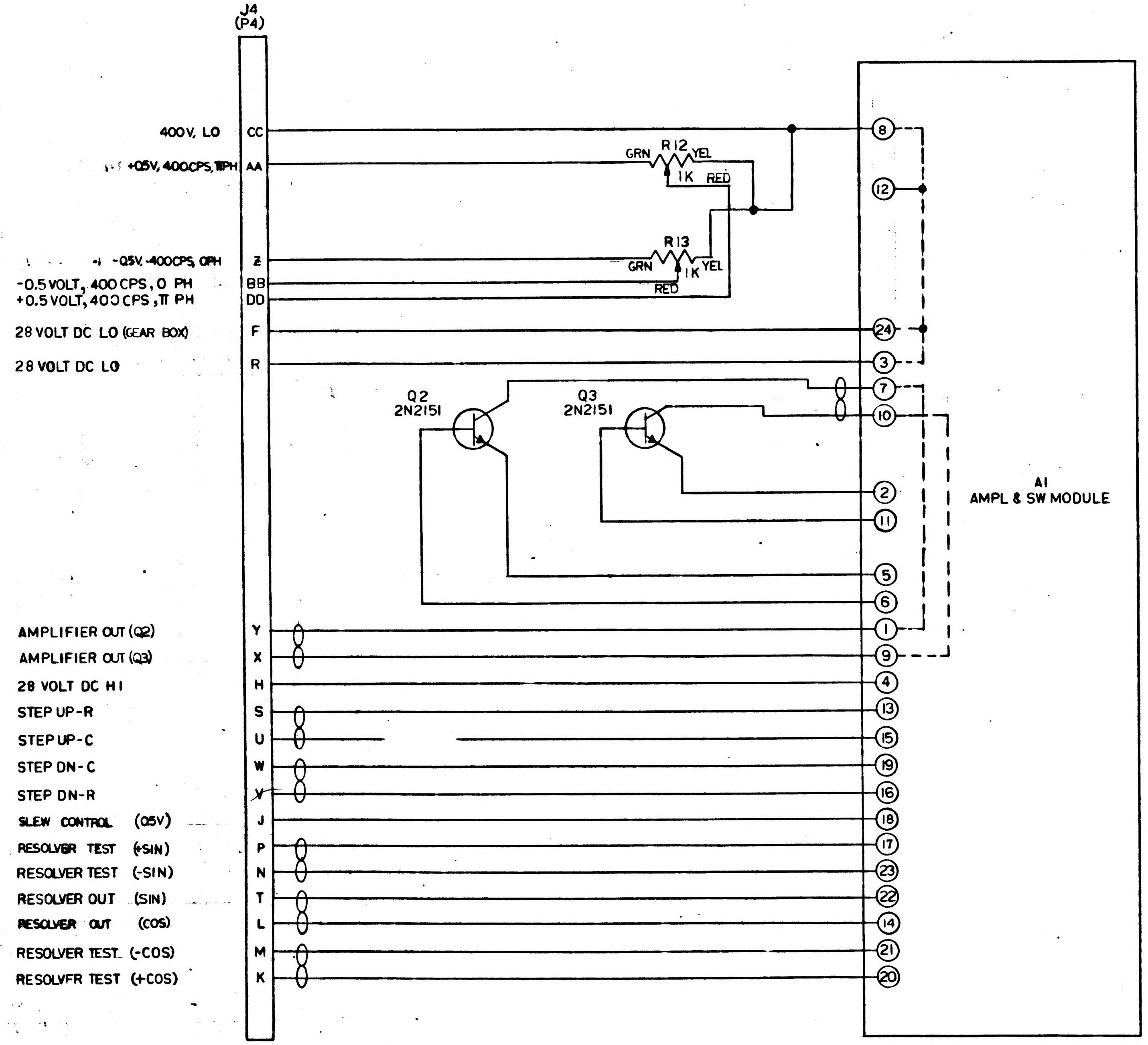
MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCHEMATIC DIAGRAM
AMPLIFIER AND SWITCH MODULE

CODE IDENT NO. SIZE E NASA NUMBER 1011453
SCALE NONE WEIGHT CALC ACTUAL SHEET 1 OF 1

MASTER

REVISIONS 02809				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A1		REVISED PER TDRR NO. 03581	3 Oct 63	WH


J4
(P4)
400V, LO
+0.5V, 400CPS, π PH
-0.5V, 400CPS, 0PH
-0.5 VOLT, 400 CPS, 0 PH
+0.5 VOLT, 400 CPS, π PH
28 VOLT DC LO (GEAR BOX)
28 VOLT DC LO
AMPLIFIER OUT (Q2)
AMPLIFIER OUT (Q3)
28 VOLT DC HI
STEP UP-R
STEP UP-C
STEP DN-C
STEP DN-R
SLEW CONTROL (0.5V)
RESOLVER TEST (+SIN)
RESOLVER TEST (-SIN)
RESOLVER OUT (SIN)
RESOLVER OUT (COS)
RESOLVER TEST (-COS)
RESOLVER TEST (+COS)
CC
AA
Z
BB
DD
F
R
Y
X
H
S
U
W
V
J
P
N
T
L
M
K
R12
GRN
YEL
1K
RED
R13
GRN
YEL
1K
RED
Q2
2N2151
Q3
2N2151
8
12
24
3
7
10
2
11
5
6
1
9
4
13
15
19
16
18
17
23
22
14
21
20
A1
AMPL & SW MODULE

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
A1	1011478	MODULE			
J4	1011499	CONN			
Q2	1010269-2	TSTR	2N2151		
Q3		TSTR	2N2151		
R12	1011498	RES, VAR	1K		
R13	1011498	RES, VAR	1K		

REFERENCE:
1 WIRING DIAGRAM DRAWING 1011480
2. MECH ASSEMBLY DRAWING 1011479
3. AMPL AND SW MODULE SCHEMATIC DIAGRAM 1011453
4 SYSTEM SCHEMATIC DIAGRAM 1011405

Q2 AND Q3 PURCHASE AS MATCHED PAIR
---- INDICATES INTERNAL CONNECTION

NOTES:
1. INTERPRET DRAWING WITH STANDARDS PRESCRIBED BY MIL-D-70327
2 UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL —//—
CONTRACT

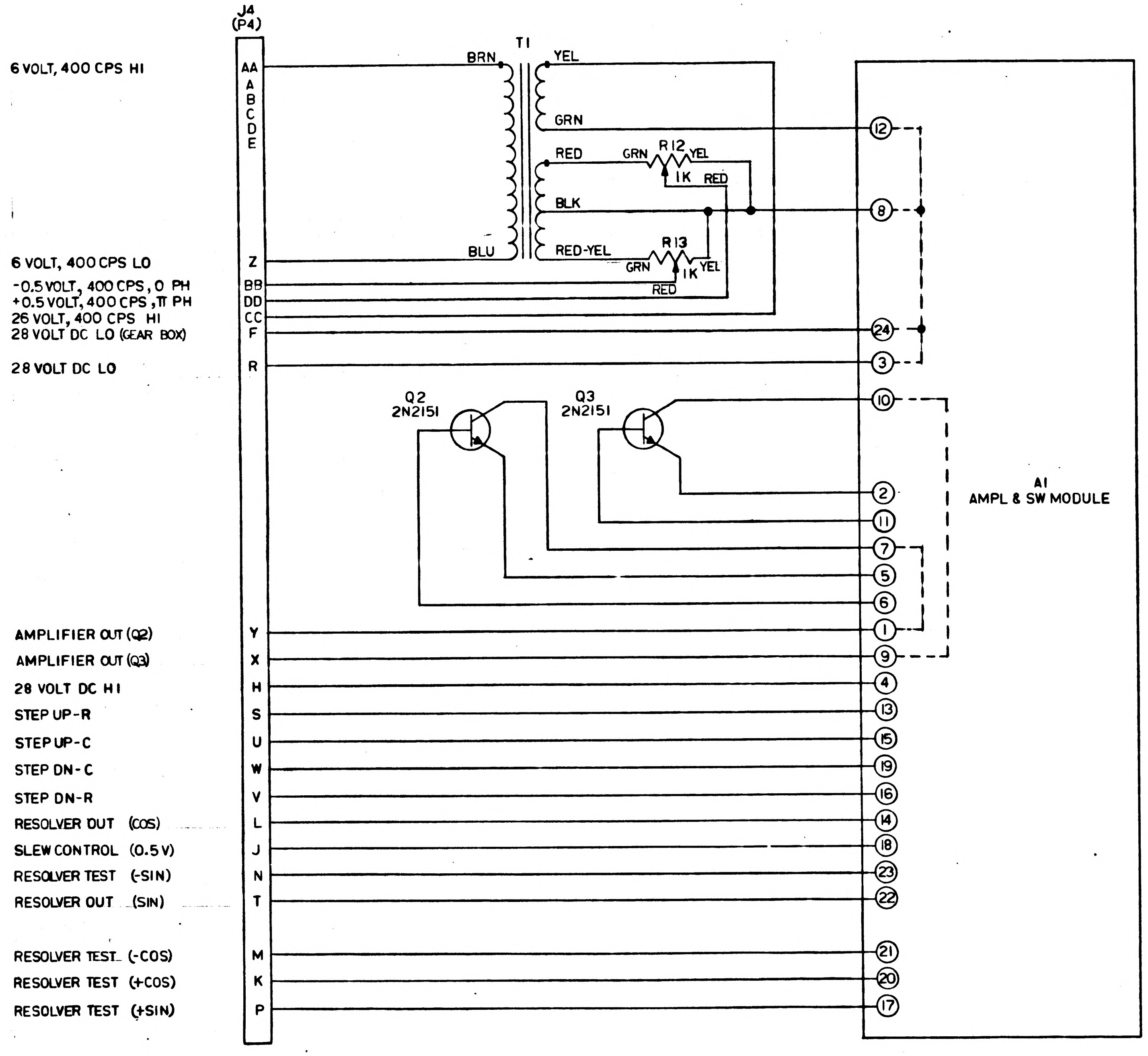
KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80387000030
DRAWN I MARGIOTTA DATE 6-13-63
CHECKED W. HENDRICKSON 6-20-63
APPROVAL 8-9-63
APPROVAL Elbert 8-15-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCHEMATIC DIAGRAM
AMPLIFIER AND SWITCH ASSEMBLY

CODE IDENT NO.
SIZE D
NASA NUMBER 1011454
SCALE NONE
WEIGHT CALC ACTUAL
SHEET 1 OF 1

REVISIONS 02809				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL



J4
(P4)
6 VOLT, 400 CPS HI
AA
A
B
C
D
E
6 VOLT, 400 CPS LO
Z
-0.5 VOLT, 400 CPS, 0 PH
BB
+0.5 VOLT, 400 CPS, π PH
DD
26 VOLT, 400 CPS HI
CC
28 VOLT DC LO (GEAR BOX)
F
28 VOLT DC LO
R
T1
BRN
YEL
GRN
RED
GRN
R12
YEL
1K
RED
BLK
BLU
RED-YEL
R13
GRN
YEL
1K
RED
Q2
2N2151
Q3
2N2151
A1
AMPL & SW MODULE
AMPLIFIER OUT (Q2)
Y
AMPLIFIER OUT (Q3)
X
28 VOLT DC HI
H
STEP UP-R
S
STEP UP-C
U
STEP DN-C
W
STEP DN-R
V
RESOLVER OUT (COS)
L
SLEW CONTROL (0.5 V)
J
RESOLVER TEST (-SIN)
N
RESOLVER OUT (SIN)
T
RESOLVER TEST (-COS)
M
RESOLVER TEST (+COS)
K
RESOLVER TEST (+SIN)
P
12
8
24
3
10
2
11
7
5
6
1
9
4
13
15
19
16
14
18
23
22
21
20
17

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
A1	1011478	MODULE			
J4	1011499	CONN			
Q2	1010269-2	TSTR	2N2151		
Q3		TSTR	2N2151		
R12	1011498	RES, VAR	1K		
R13	1011498	RES, VAR	1K		
T1	1011414	XMFR			

REFERENCE:
1 WIRING DIAGRAM DRAWING 1011480
2 MECH ASSEMBLY DRAWING 1011479
3 AMPL AND SW MODULE SCHEMATIC DIAGRAM 1011453
4 SYSTEM SCHEMATIC DIAGRAM 1011405

Q2 AND Q3 PURCHASE AS MATCHED PAIR
---- INDICATES INTERNAL CONNECTION

NOTES:
1. INTERPRET DRAWING WITH STANDARDS PRESCRIBED BY MIL-D-70327
2 UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80387000030
DRAWN L MARGIOTTA DATE 6-13-63
CHECKED W. HENDRICKSON 6-28-6
APPROVAL O.E. Conley 8-9-63
APPROVAL Elliott Wooden 8-15-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCHEMATIC DIAGRAM
AMPLIFIER AND SWITCH ASSEMBLY

CODE IDENT NO. SIZE D NASA NUMBER 1011454
SCALE NONE WEIGHT CALC ACTUAL SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011454

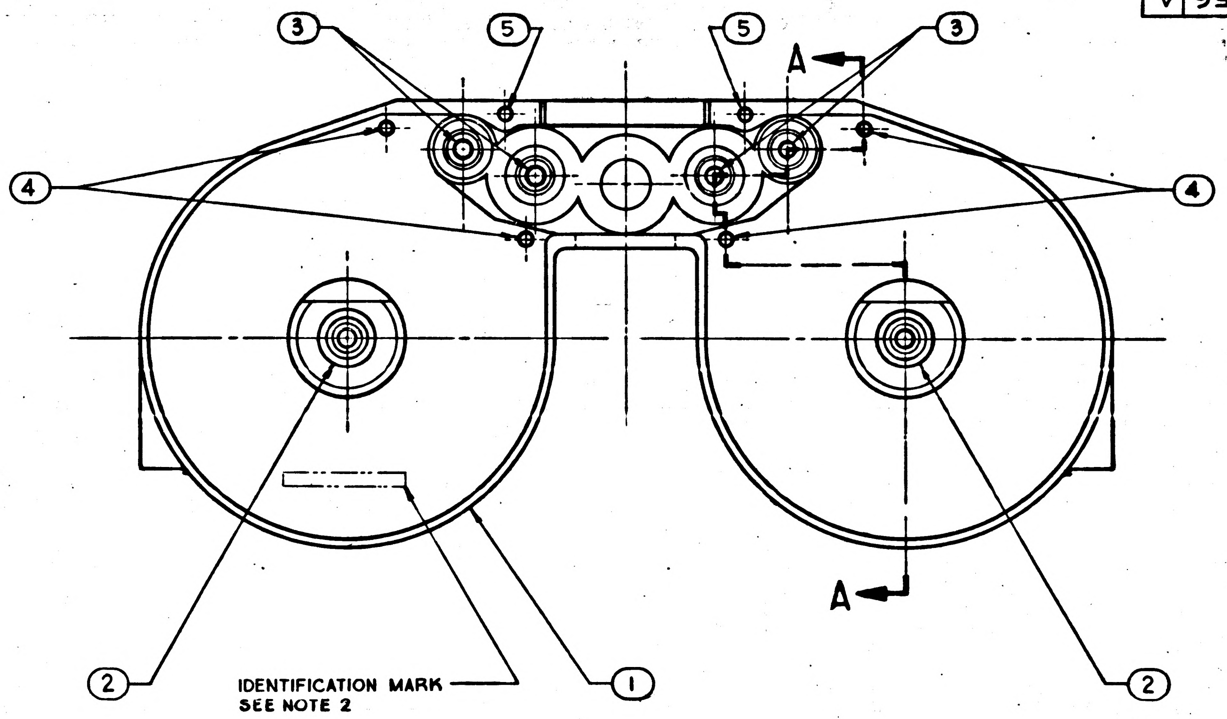
1011456 A

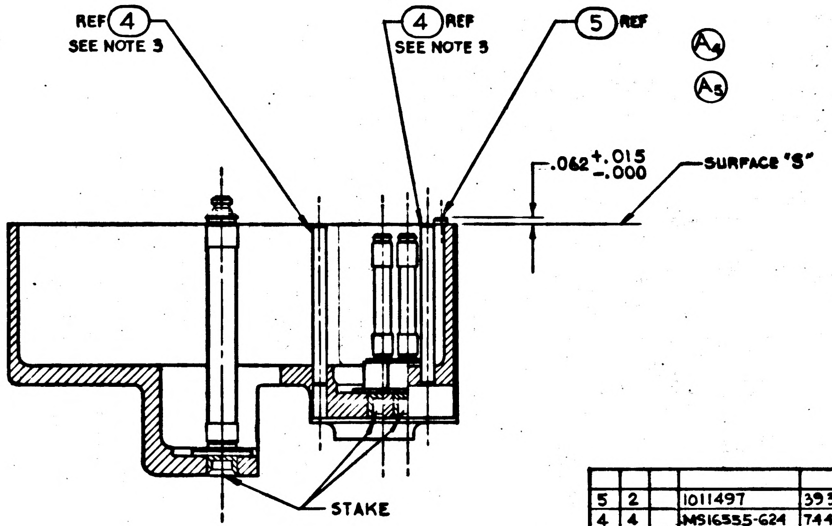
REVISIONS		TDRR 02277		
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A5		REVISED PER TDRR NO. 07144	31 MAR 64	WK

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURER'S SYMBOL PER ND1002019.
3. PRESS ④ INTO ① UNTIL TOP OF ④ IS FLUSH TO .005 UNDER FLUSH WITH SURFACE "S".

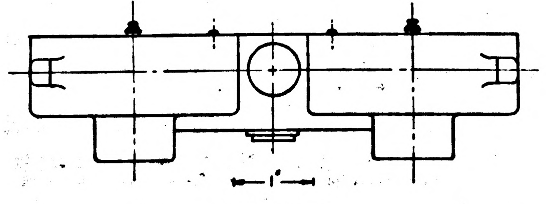
(A3)





SECTION A-A
ROTATED 90°

(A2)
(A1)



ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
5	2		1011497	39387000040		PIN, DOWEL MOD			
4	4		MS16555-624	74444030024		PIN, DOWEL			
3	4		1011399	57387000050		SHAFT, SPROCKET & ROLLER			
2	2		1011403	57387000110		SHAFT, SPOOL			
1	1		1011394	50387000010		HOUSING, MAGAZINE (MACHINING)			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011420	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± —	± —

DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85387000130

DRAWN J. JOHN DATE 7-9-63
CHECKED M. Fawell 7-9-63
APPROVAL M. Werner 7-22-63
APPROVAL
NASA APPROVAL 7/24/63
MIT APPROVAL 24 Jul 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, MAGAZINE
ASSY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011456
SCALE 2/1
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

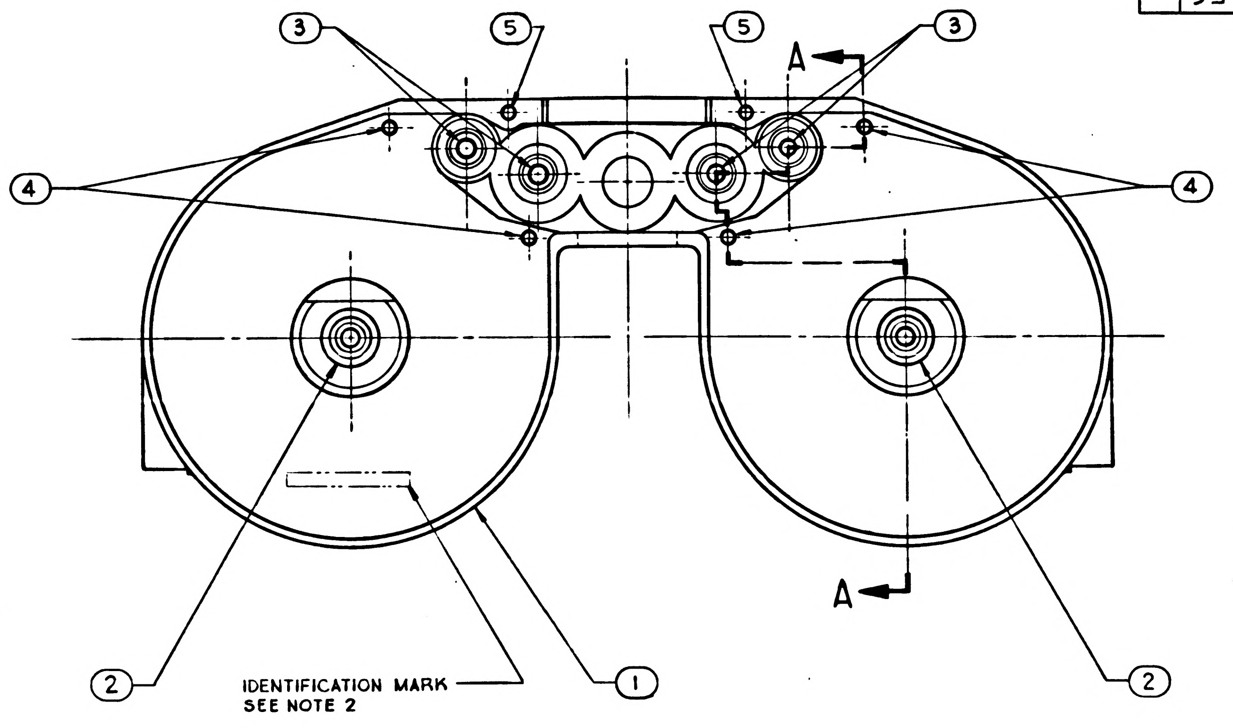
INCHES
0 1 2
PHOTOGRAPHIC SCALE UNIT

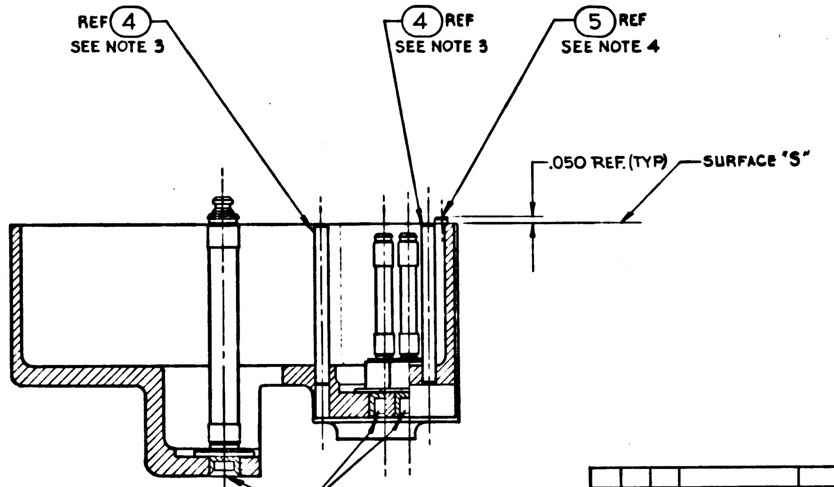
1011456

REVISIONS				TDRR 02271
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

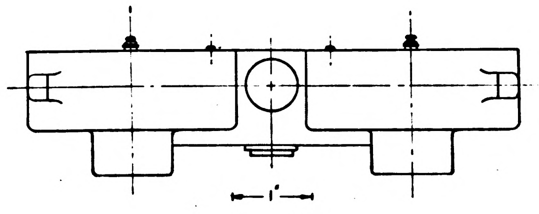
NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURER'S SYMBOL PER ND1002019.
3. PRESS ④ INTO ① UNTIL TOP OF ④ IS FLUSH TO .005 UNDER FLUSH WITH SURFACE "S".
4. PRESS ⑤ INTO ① UNTIL PIN BOTTOMS IN HOLE.





SECTION A-A
ROTATED 90°



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
5	2		1011497	39387000040		PIN, DOWEL MOD			
4	4		MS16555-624	74444030024		PIN, DOWEL			
3	4		1011399	57387000050		SHAFT, SPROCKET & ROLLER			
2	2		1011403	57387000110		SHAFT, SPOOL			
1	1		1011394	50387000010		HOUSING, CARTRIDGE (MACHINING)			

LIST OF PARTS AND MATERIALS

1011420	1011559
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± —	± —

DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85387000130
DRAWN J. JOHN DATE 7-9-63
CHECKED M Fawell 7-9-63
APPROVAL M. Werner 7-22-63
APPROVAL
NASA APPROVAL 7/29/63
MIT APPROVAL 24 ~~/~~ 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, CARTRIDGE
ASSY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011456
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

E-186

1011456

1011457 A

REVISIONS TDRR 01905

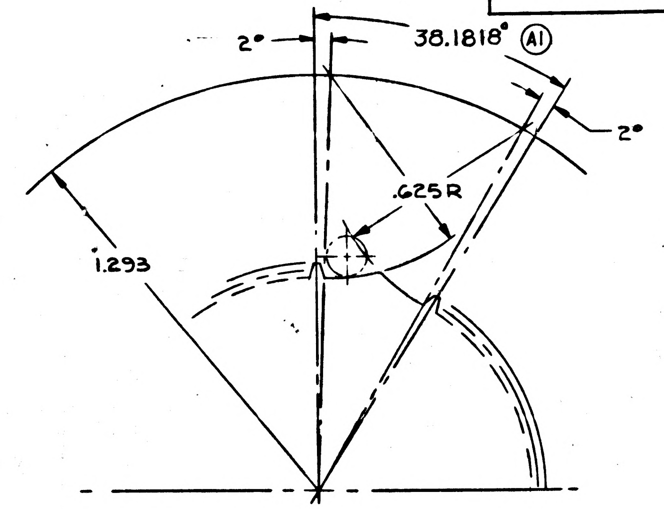
SYM	ZONE	DESCRIPTION	DATE	APPRO.
A3		REVISED PER TDRR NO. 04367	3Dec63	WK

SPUR GEAR DATA

NO OF TEETH	66
DIAMETRAL PITCH	48
PRESSURE ANGLE	20°
PITCH DIAMETER	1.3750
OUTSIDE DIAMETER	$1.4166^{+.0000}_{-.0030}$
AGMA CLASS	PREC. 1D
GEAR TEETH FINISH	32✓

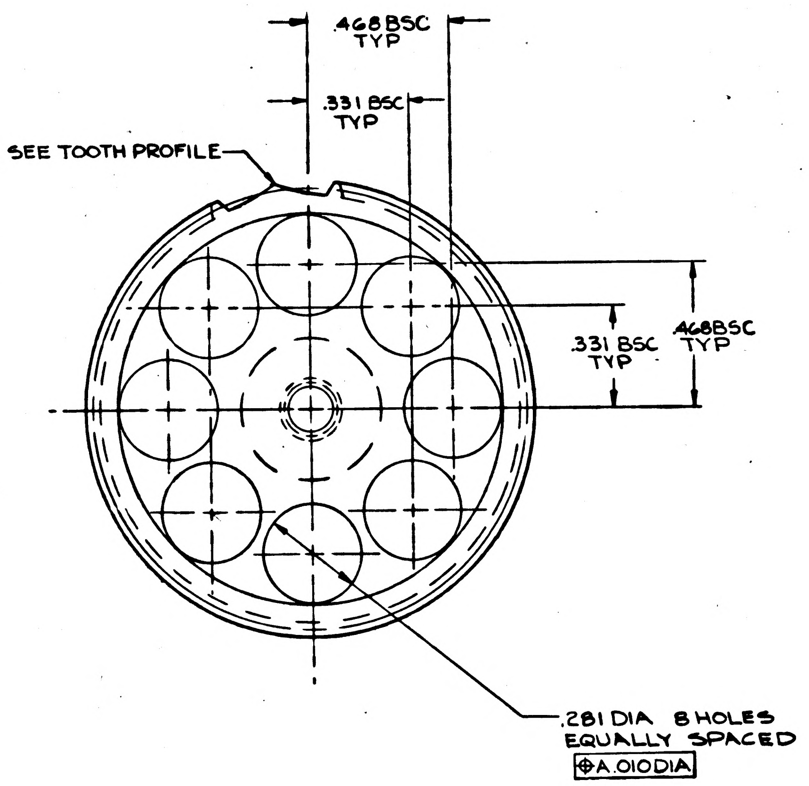
INTERNAL SPLINE DATA (INVOLUTE)

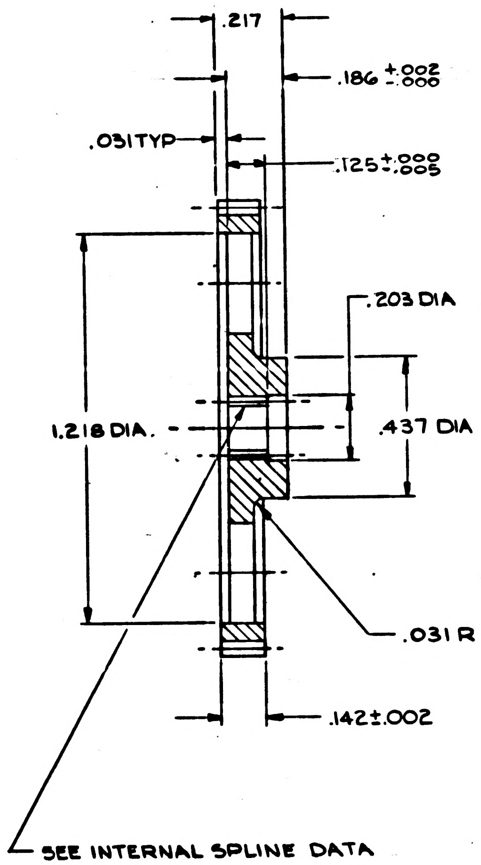
AM. ST'D FLAT ROOT SIDE FIT	CLASS 2
NO OF TEETH	8
PITCH	48/96
PRESSURE ANGLE	30°
PITCH DIAMETER (REF)	.1667
MAJOR DIAMETER	$.1875^{+.0030}_{-.0000}$
MINOR DIAMETER	$.1458^{+.0030}_{-.0000}$
CIRC. SPACE WIDTH (A2)	$.0330^{+.0002}_{-.0000}$
FINISH	32✓


2°
38.1818° (A1)
2°
.625 R
1.293

SHAPED GEAR- CUT 60 TEETH ON 66T BLANK... CUTTER P.D. 1.000 MAX.

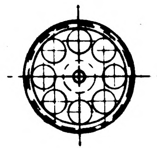
TOOTH PROFILE


.468 BSC TYP
.331 BSC TYP
SEE TOOTH PROFILE
.331 BSC TYP
.468 BSC TYP
.281 DIA 8 HOLES EQUALLY SPACED
⌖ A .010 DIA


.217
.186 +.002 -.000
.031 TYP
.125 +.000 -.005
.203 DIA
1.218 DIA.
.437 DIA
.031 R
.142±.002
SEE INTERNAL SPLINE DATA

6. IDENTIFY USING NASA DWG. NO REVISION LETTER & MANUFACTERS SYMBOL PER ND1002019
5. FINISH: PASSIVATE PER MIL-STD-171 (KPS-10051.200)
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
3. UNLESS OTHERWISE SPECIFIED:
   - a 125✓ FINISH ALL OVER
   - b BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
1 INTERPERT DWG IN ACCORDANCE WITH MIL-D-70327

NOTES:



ACTUAL SIZE

(A3)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011430	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	±	±.005	±

DO NOT SCALE THIS DRAWING

MATERIAL CORROSION RESISTING STEEL FED. SPEC. QQ-S-763 CLASS 303, COND. A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK

KIC PN 33387000100

DRAWN J. Lozito DATE 6-12-63
CHECKED W. Witzky 6-20-63
APPROVAL M. Wumm 7-1-63
APPROVAL E. Wang 7-1-63
NASA APPROVAL 7/3/63
MIT APPROVAL Al Kapfer 3/4/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE GEAR, SPUR (SPECIAL)

CODE IDENT NO.	SIZE	NASA NUMBER
	D	1011457

SCALE 4:1 WEIGHT CALC ACTUAL SHEET 1 OF 1

1011457

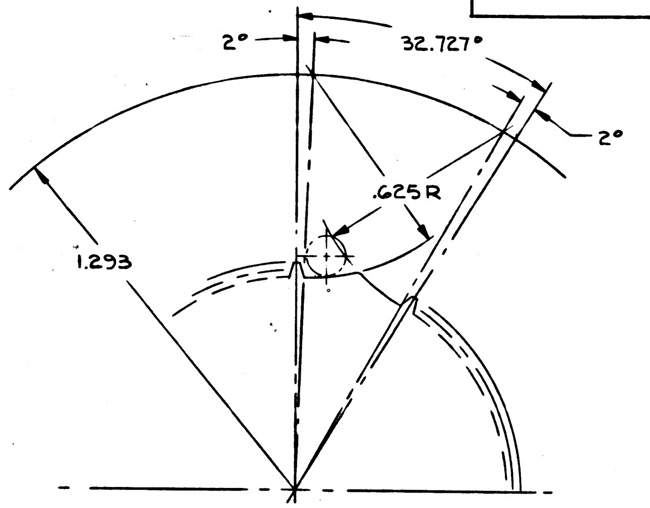
REVISIONS TDER 0 '0				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

SPUR GEAR DATA

NO OF TEETH	66
DIAMETRAL PITCH	48
PRESSURE ANGLE	20°
PITCH DIAMETER	1.3750
OUTSIDE DIAMETER	$1.4166^{+.0000}_{-.0030}$
AGMA CLASS	PREC. 1D
GEAR TEETH FINISH	$\overset{32}{\surd}$

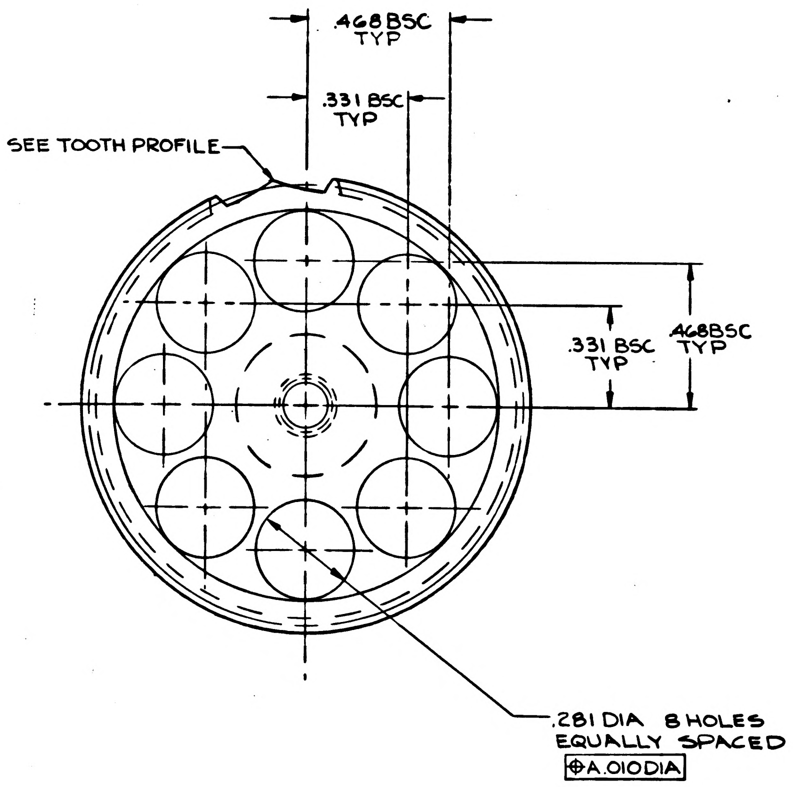
INTERNAL SPLINE DATA (INVOLUTE)

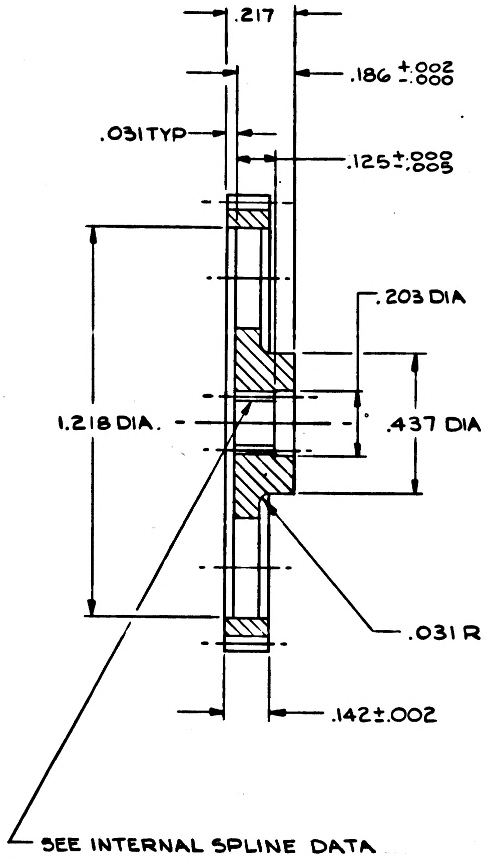
AM. ST'D FLAT ROOT SIDE FIT	CLASS 2
NO OF TEETH	8
PITCH	48/96
PRESSURE ANGLE	30°
PITCH DIAMETER (REF)	.1667
MAJOR DIAMETER	$.1875^{+.0030}_{-.0000}$
MINOR DIAMETER	$.1458^{+.0030}_{-.0000}$
CIRC. TOOTH THICKNESS	$.0330^{+.0002}_{-.0000}$
FINISH	$\overset{32}{\surd}$

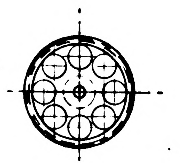

2°
32.727°
2°
.625 R
1.293

SHAPED GEAR - CUT 60 TEETH ON 66T BLANK . CUTTER P.D. 1.000 MAX.

TOOTH PROFILE


.468 BSC TYP
.331 BSC TYP
SEE TOOTH PROFILE
.331 BSC TYP
.468 BSC TYP
.281 DIA 8 HOLES EQUALLY SPACED
⊕ A .010 DIA


.217
.186 +.002 -.000
.031 TYP
.125 +.000 -.005
.203 DIA
1.218 DIA.
.437 DIA
.031 R
.142±.002
SEE INTERNAL SPLINE DATA



ACTUAL SIZE

6. IDENTIFY USING NASA DWG. NO REVISION LETTER & MANUFACTERS SYMBOL PER ND1002019
5. FINISH: PASSIVATE PER MIL-STD-171 (KPS-10051.200)
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
3. UNLESS OTHERWISE SPECIFIED:
   a $\overset{125}{\surd}$ FINISH ALL OVER
   b BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
1 INTERPERT DWG IN ACCORDANCE WITH MIL-D-70327

NOTES:

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011430	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	±	±.005	±

DO NOT SCALE THIS DRAWING

MATERIAL
STAINLESS STEEL
A.I.S.I 303
FED. SPEC. QQ-S-763
CLASS 303, COND A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 33387000100

DRAWN J. Lozito DATE 6-12-63
CHECKED W. Witzky 6-20-63
APPROVAL M. Warner 7-1-63
APPROVAL E. Thomp 7-1-63
NASA APPROVAL 7/3/63
MIT APPROVAL 3/4/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
GEAR, SPUR
(SPECIAL)

CODE IDENT NO.	SIZE	NASA NUMBER
	D	1011457

SCALE 4:1 WEIGHT CALC ACTUAL SHEET OF

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

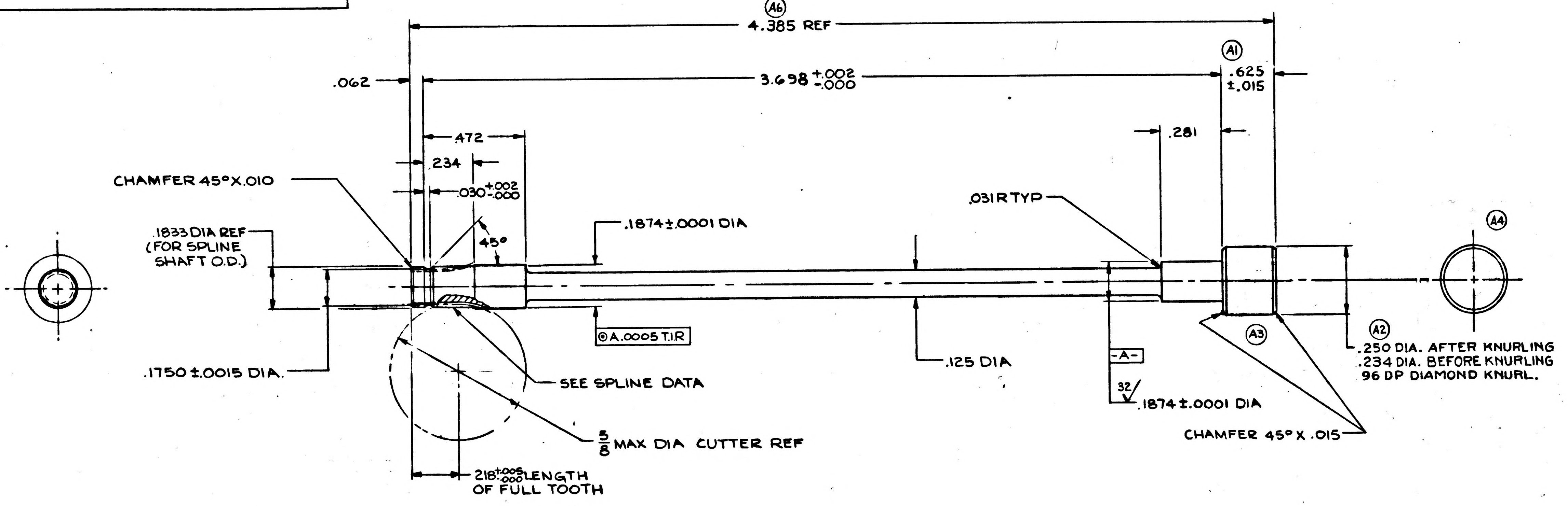
EXTERNAL SPLINE DATA (INVOLUTE)

AM. ST'D FLAT ROOT SIDE -	CLASS 2
NO. OF TEETH	8
PITCH	48/96
PRESSURE ANGLE	30°
PITCH DIAMETER (REF)	.1667
MAJOR DIAMETER	$.1833^{+.0000}_{-.0040}$ SEE DWG
MINOR DIAMETER	$.1417^{+.000}_{-.004}$
CIRC. TOOTH THICKNESS	$.03272^{+.0000}_{-.0002}$
FINISH	32√

1011458 A

REVISIONS TDRR 1905

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A 6		REVISED PER TDRR NO. 03369	9/25/63	



Ⓐ6
4.385 REF
Ⓐ1
.062
$3.698^{+.002}_{-.000}$
.625 ±.015
.472
.234
.281
CHAMFER 45°X.010
$.030^{+.002}_{-.000}$
.031R TYP
45°
.1833 DIA REF (FOR SPLINE SHAFT O.D.)
.1874±.0001 DIA
Ⓐ4
◎A.0005 T.I.R
Ⓐ3
Ⓐ2
.250 DIA. AFTER KNURLING
.234 DIA. BEFORE KNURLING
96 DP DIAMOND KNURL.
.1750±.0015 DIA.
SEE SPLINE DATA
.125 DIA
-A-
32√ .1874±.0001 DIA
CHAMFER 45°X.015
5/8 MAX DIA CUTTER REF
$218^{+.005}_{-.000}$ LENGTH OF FULL TOOTH

ACTUAL SIZE

6 IDENTIFY USING NASA DWG NO REVISION LETTER & MANUFACTERS SYMBOL PER ND1002019
5 FINISH: PASSIVATE PER MIL-STD-171 (KRS-1005I.200)
4 REMOVE BURRS IN ACCORDANCE WITH ND1002079
3 UNLESS OTHERWISE SPECIFIED:
  a. 125√ FINISH ALL OVER
  b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078
2 GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078
1 INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
NOTES:

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

Ⓐ5 LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011430	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	±	±.005	±1°

DO NOT SCALE THIS DRAWING

MATERIAL CORROSION RESISTANT STEEL FED. SPEC QQ-S-763 CLASS 303 COND A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57387000120
DRAWN J. Lozito DATE 6-16-63
CHECKED W. Witzky 6-20-63
APPROVAL M. Werner 7-1-63
APPROVAL E. Morey 7-1-63
NASA APPROVAL 7/3/63
MIT APPROVAL 7/16/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SHAFT, FOCUSING
MANUAL

CODE IDENT NO.	SIZE	NASA NUMBER
	D	1011458

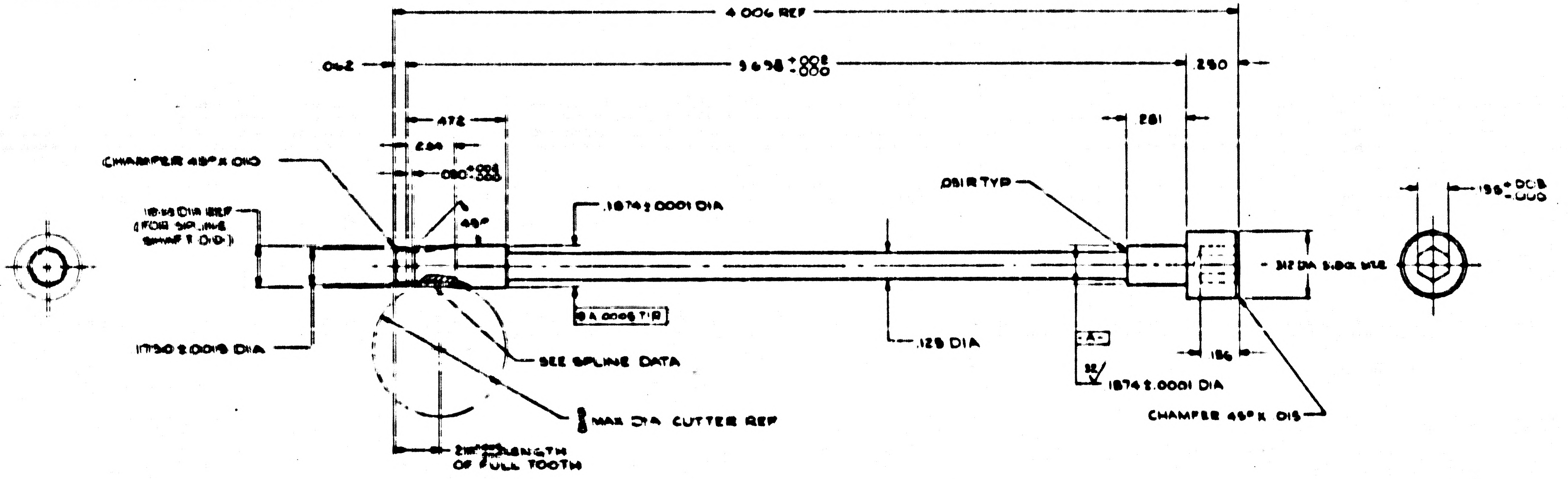
SCALE 4:1 WEIGHT CALC ACTUAL SHEET 1 OF 1

INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

1011458

EXTERNAL SPLINE DATA (INVOLUTE)

[illegible] FLAT [illegible] SIDE -	CLASS 2
NO. OF TEETH	9
PITCH	48/96
PRESSURE ANGLE	30°
PITCH DIAMETER [illegible] D	.1667
MAJOR DIAMETER	.1859 +.0000 -.00[illegible] SEE DWG
MINOR DIAMETER	.1417 [illegible]
[illegible] TOOTH THICKNESS	.0327 [illegible]
[illegible]	RE/



4.006 REF
.062
3.698 +.008 -.000
.250
.472
.281
.230
.090 +.005 -.000
CHAMFER 45° X .010
.031 R TYP
.196 +.005 -.000
.1875 DIA REF (FOR SPLINE SHAFT O.D.)
45°
.1874 ±.0001 DIA
.312 DIA 5.00 [illegible]
A .0005 TIR
.125 DIA
A
32/
.1874 ±.0001 DIA
.156
CHAMFER 45° X .015
.1730 ±.0015 DIA
SEE SPLINE DATA
MAX DIA CUTTER REF
.219 LENGTH OF FULL TOOTH

ACTUAL SIZE

1. IDENTIFY USING NASA DWG NO REVISION LETTER & MANUFACTURERS SYMBOL PER ND1002019
2. FINISH: PASSIVATE PER MIL-STD-171 ([illegible]1003 1.200)
3. REMOVE BURRS IN ACCORDANCE WITH ND1002079
4. UNLESS OTHERWISE SPECIFIED:
   - a. 125/ FINISH ALL OVER
   - b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078
5. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002076
6. INSPECT DWG IN ACCORDANCE WITH MIL-D-70327
7. [illegible]

LIST OF PARTS AND MATERIALS

ITEM NO	QTY REQD	SYM	GOVERNMENT/NASA NO	BOLLOMAN PART NO	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

NEXT ASSY	USED ON
1011430	1011599

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONAL ± DECIMAL ±.005 ANGLE ±1°
DO NOT SCALE THIS DRAWING
MATERIAL STAINLESS STEEL AISI 303 FED SPEC QQ-S-763 CLASS 303 COND A
CONTRACT

BOLLOMAN INSTRUMENT CORPORATION
PN 0130700012 0
DRAWN [illegible]
CHECKED [illegible]
APPROVAL [illegible]
APPROVAL [illegible]
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

TITLE
SHAFT FOCUSING MANUAL

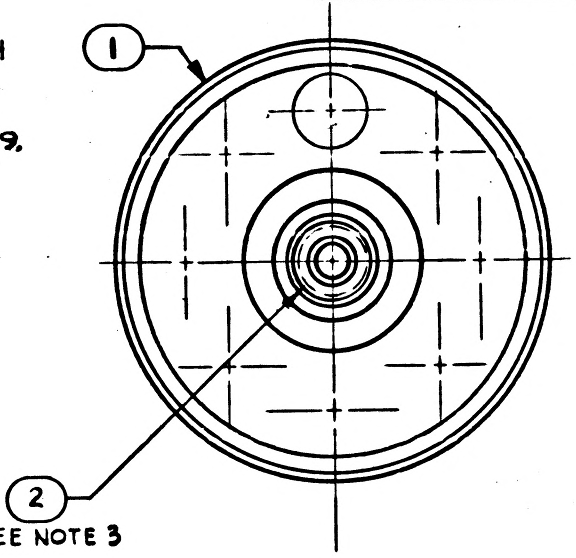
CODE IDENT NO | SIZE D | NASA NUMBER 1011458
SCALE 4/1 | WEIGHT | SHEET 1 OF 1

INCHES
PHOTOGRAPHIC SCALE ONLY

1011459-A

REVISIONS TDRR 01905			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR NO. 02446	8-8-63	WK

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA DWG NO., REV LETTER AND MFR'S SYM PER ND1002019.
3. INSTALL ITEM 2 .010 TO .030 BELOW SURFACE.

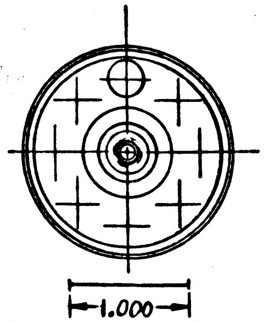


SEE NOTE 3

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	1		NAS1394-CA4			INSERT, THREADED, SELF-LOCKING			
1	1		1011382	57387000010		KNOB, SCREEN ADJUSTMENT			

LIST OF PARTS AND MATERIALS



ACTUAL SIZE

NEXT ASSY	USED ON
1011559	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± —

DO NOT SCALE THIS DRAWING

MATERIAL —

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK

KIC PN 85387000080

DRAWN J. JOHN DATE 6-26-63
CHECKED McFarrell 6-26-63
APPROVAL M. Werner 7-1-63
APPROVAL E. Thomp 7-1-63
NASA APPROVAL [illegible] 7/3/63
MIT APPROVAL WK [illegible] 3/[illegible]/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
KNOB AND INSERT - ASSY OF

CODE IDENT NO.
SIZE B
NASA NUMBER 1011459
SCALE 2:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

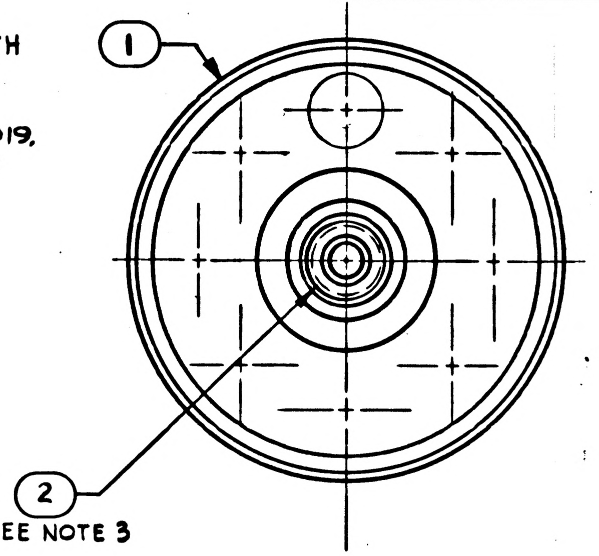
E-153

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011459

REVISIONS 7DRR 01905			
SYM	DESCRIPTION	DATE	APPROVAL

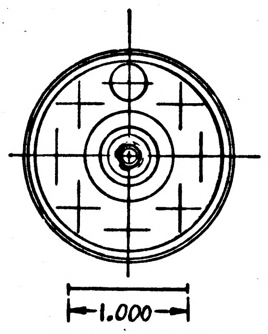
NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA DWG NO., REV LETTER AND MFR'S SYM PER ND1002019.
3. INSTALL ITEM 2 .010 TO .030 BELOW SURFACE.



MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	1		1000136-2			INSERT, THREADED, SELF-LOCKING			
1	1		1011382	57387000010		KNOB, SCREEN ADJUSTMENT			

LIST OF PARTS AND MATERIALS



ACTUAL SIZE

1011559	1011559
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± .005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85387000080

DRAWN J. JOHN DATE 6-26-63
CHECKED McFarrell 6-26-63
APPROVAL M. Werner 7-1-63
APPROVAL E. Dho 7-1-63
NASA APPROVAL 7/3/63
MIT APPROVAL 3/6/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
KNOB AND INSERT - ASSY OF

CODE IDENT NO. | SIZE B | NASA NUMBER 1011459
SCALE 2:1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

E-153

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTES:

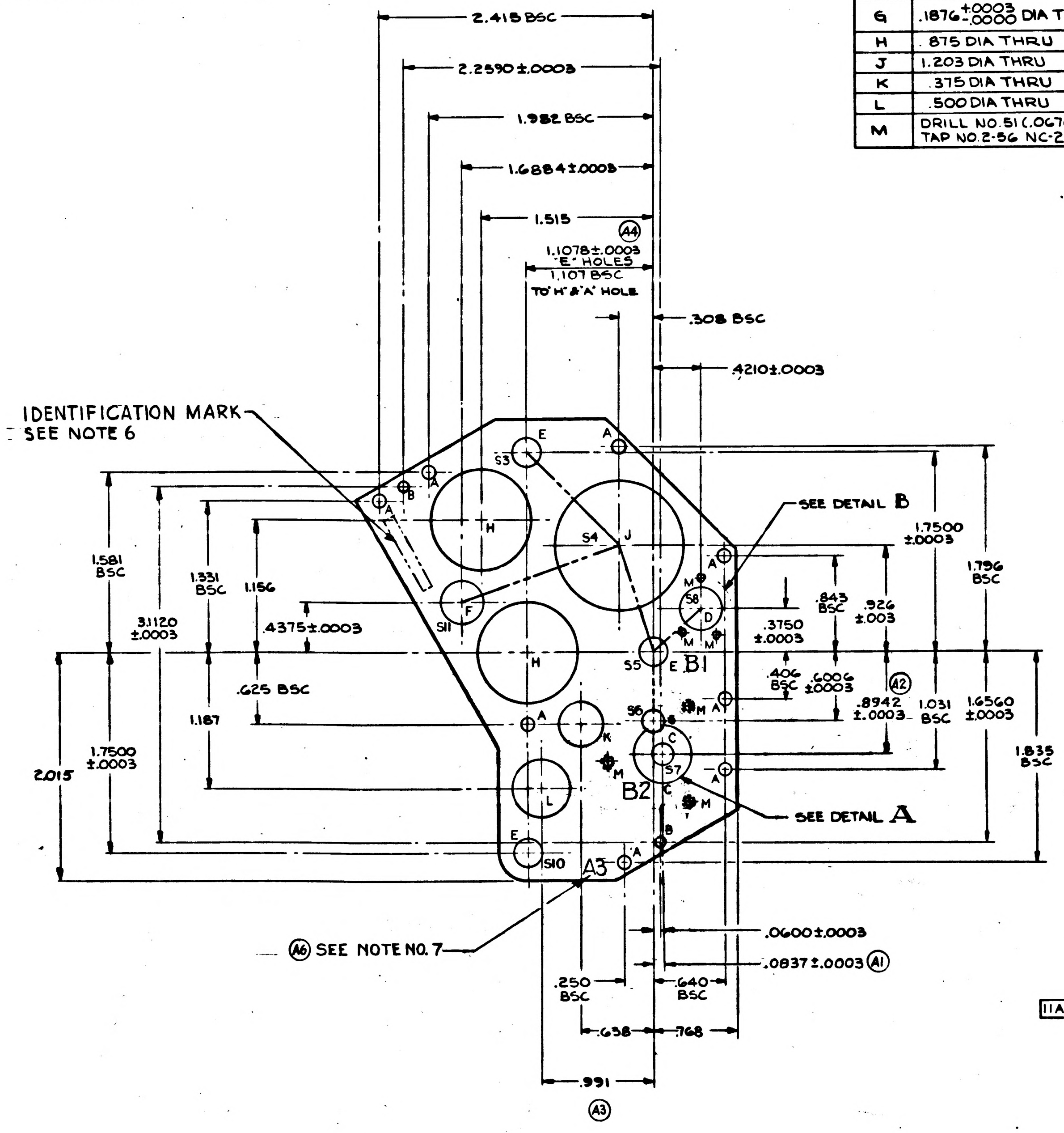
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078
3. UNLESS OTHERWISE SPECIFIED :—
   a) $\overset{125}{\surd}$ FINISH ALL OVER
   b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. FINISH:
   BLACK SULFURIC ANODIZE PER MIL-A-8625, TYPE II (KPS-1005A.201).
6. IDENTIFY USING NASA DWG NO REVISION LETTER & MANUFACTURERS SYMBOL PER ND1002019
7. (A5) MARK CHARACTERS A3, B1 & B2 $^{.14}_{.10}$ HIGH PER ND1002019 AT LOCATIONS SHOWN.

HOLE DATA		
HOLE	DESCRIPTION	QTY
A	DRILL NO 36 (.1065) THRU DIA	8
B	$.0944^{+.0005}_{-.0000}$ DIA THRU $\overset{32}{\surd}$	2
C	DRILL NO. 12 (.1890) THRU C'BORE $.5003^{+.0005}_{-.0000}$ DIA TO DEPTH SHOWN	1
D	$.3753^{+.0005}_{-.0000}$ DIA THRU $\overset{32}{\surd}$	1
E	$.2501^{+.0003}_{-.0000}$ DIA THRU $\overset{32}{\surd}$	3
F	$.3751^{+.0003}_{-.0000}$ DIA THRU $\overset{32}{\surd}$	1
G	$.1876^{+.0003}_{-.0000}$ DIA THRU $\overset{32}{\surd}$	1
H	.875 DIA THRU	2
J	1.203 DIA THRU	1
K	.375 DIA THRU	1
L	.500 DIA THRU	1
M	DRILL NO. 51 (.0670) THRU TAP NO. 2-56 NC-2 THRU	6

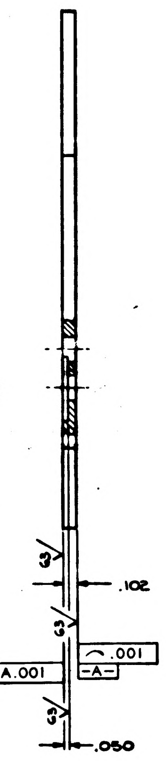
⊕ .004 DIA

A	1011461

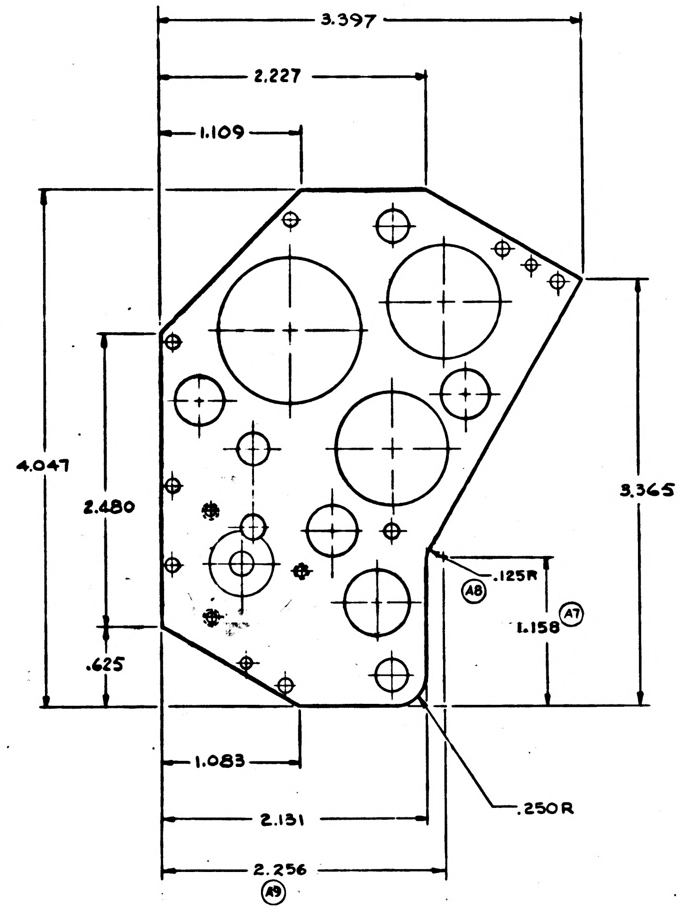
REVISIONS TDRR 0605				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A 9		REVISED PER TDRR NO. 03816	10 Oct 63	WK



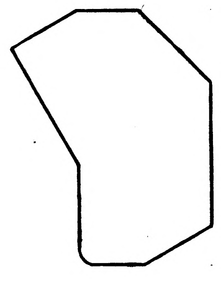
2.415 BSC
2.2590 ± .0003
1.982 BSC
1.6884 ± .0003
1.515
(A4)
1.1078 ± .0003 "E" HOLES
1.107 BSC TO "H" & "A" HOLE
.308 BSC
.4210 ± .0003
IDENTIFICATION MARK SEE NOTE 6
SEE DETAIL B
SEE DETAIL A
1.581 BSC
1.331 BSC
1.156
3.1120 ±.0003
.4375 ± .0003
.625 BSC
1.187
1.7500 ±.0003
2.015
1.7500 ±.0003
1.796 BSC
.843 BSC
.926 ±.003
.3750 ±.0003
.406 BSC
.6006 ±.0003
(A2)
.8942 ±.0003
1.031 BSC
1.6560 ±.0003
1.835 BSC
S3
S4
S5
S6
S7
S8
S10
S11
B1
B2
A3
(A6) SEE NOTE NO. 7
.0600 ± .0003
.0837 ± .0003 (A1)
.250 BSC
.640 BSC
.638
.768
.991
(A3)



3°
63
.102
11A.001
⌒ .001 -A-
63
.050



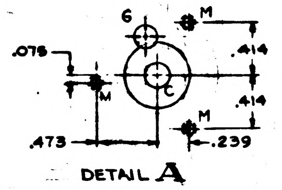
3.397
2.227
1.109
4.047
2.480
.625
3.365
.125R
(A8)
1.158
(A7)
1.083
.250R
2.131
2.256
(A9)



ACTUAL SIZE

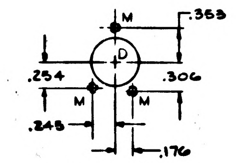
CENTERS	C.D. CHECKING DIM.
S3 - S4	1.1477
S4 - S5	.9765
S5 - S8	.5638
S5 - S6	.6006
S6 - S7	.3055
S4 - S11	1.4642

NOTE:
C.D. (CHECKING DIMENSIONS) ARE REF.
GEAR TRAINS ARE INDICATED AS SHOWN ————



G
M
C
M
M
.078
.414
.414
.473
.239

DETAIL A



M
D
M
M
.353
.254
.306
.245
.176

DETAIL B

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011430	1011559
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± | DECIMALS ± .005 | ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL: ALUMINUM ALLOY 2024-T3 FED SPEC QQ-A-355 TEMPER T3
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52387000150
DRAWN V. LOBITO DATE 6-21-63
CHECKED W. Wenky 6-26-63
APPROVAL M. Wynne 7-1-63
APPROVAL E. Dhong 7/1/63
NASA APPROVAL 7/3/63
MIT APPROVAL 3 July 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PLATE, BEARING

CODE IDENT NO.
SIZE E
NASA NUMBER 1011461
SCALE 2:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
PHOTOGRAPHIC SCALE ONLY

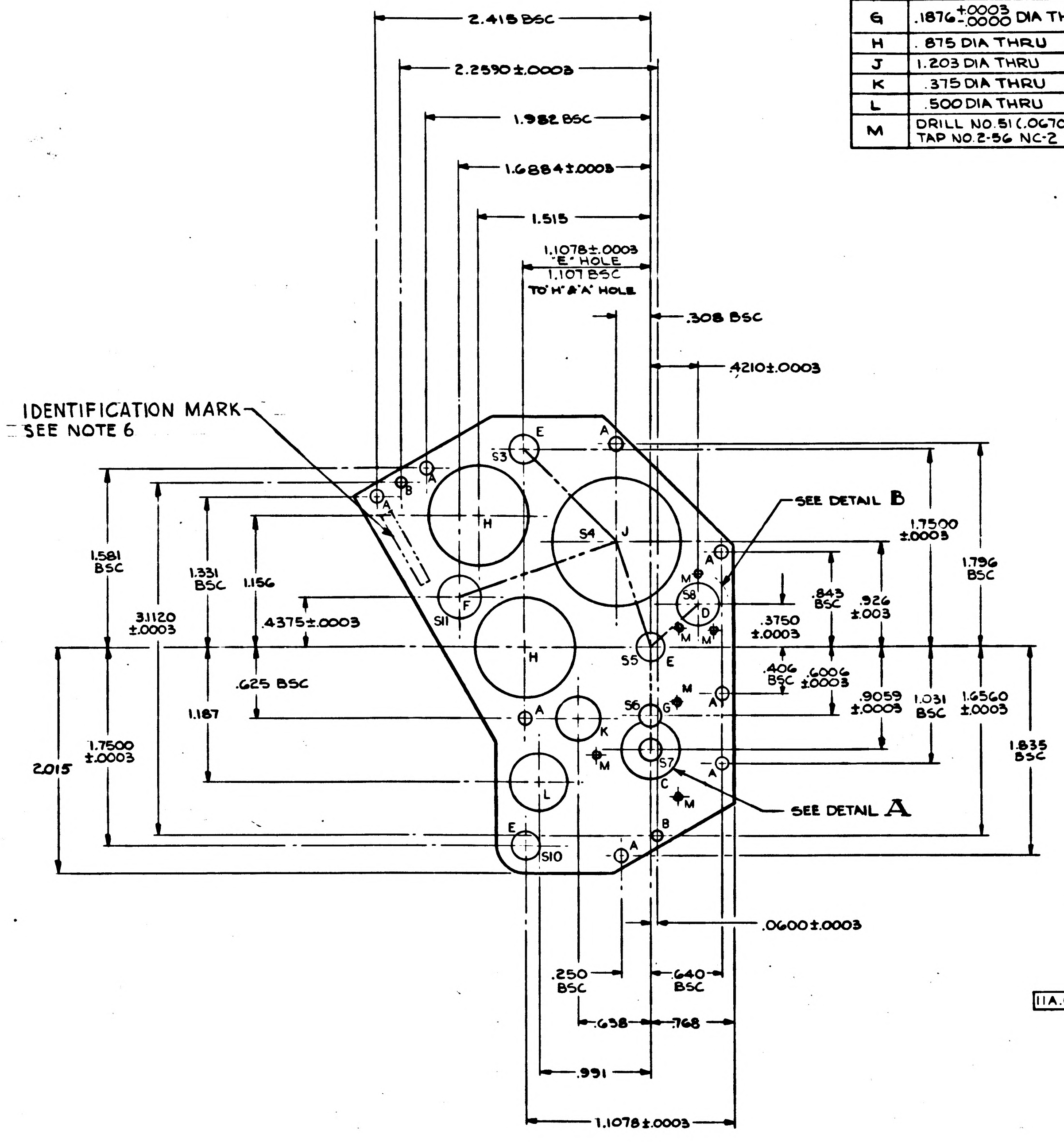
REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

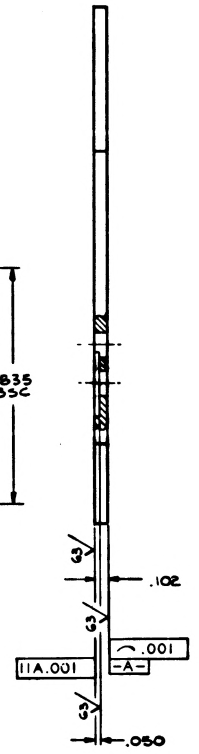
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078
3. UNLESS OTHERWISE SPECIFIED :—
   a) 125/√ FINISH ALL OVER
   b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. FINISH:
   BLACK SULFURIC ANODIZE PER MIL-A-8625, TYPE II (KPS-1005A.201).
6. IDENTIFY USING NASA DWG NO REVISION LETTER & MANUFACTURES SYMBOL PER ND1002019

HOLE DATA		
HOLE	DESCRIPTION	QTY
A	DRILL NO 36 (.1065) THRU DIA	8
B	.0944 $^{+.0005}_{-.0000}$ DIA THRU 32/√	2
C	DRILL NO. 12 (.1890) THRU C'BORE .5003 $^{+.0005}_{-.0000}$ DIA TO DEPTH SHOWN	1
D	.3753 $^{+.0005}_{-.0000}$ DIA THRU 32/√	1
E	.2501 $^{+.0003}_{-.0000}$ DIA THRU 32/√	3
F	.3751 $^{+.0003}_{-.0000}$ DIA THRU 32/√	1
G	.1876 $^{+.0003}_{-.0000}$ DIA THRU 32/√	1
H	.875 DIA THRU	2
J	1.203 DIA THRU	1
K	.375 DIA THRU	1
L	.500 DIA THRU	1
M	DRILL NO.51 (.0670) THRU TAP NO.2-56 NC-2 THRU	6

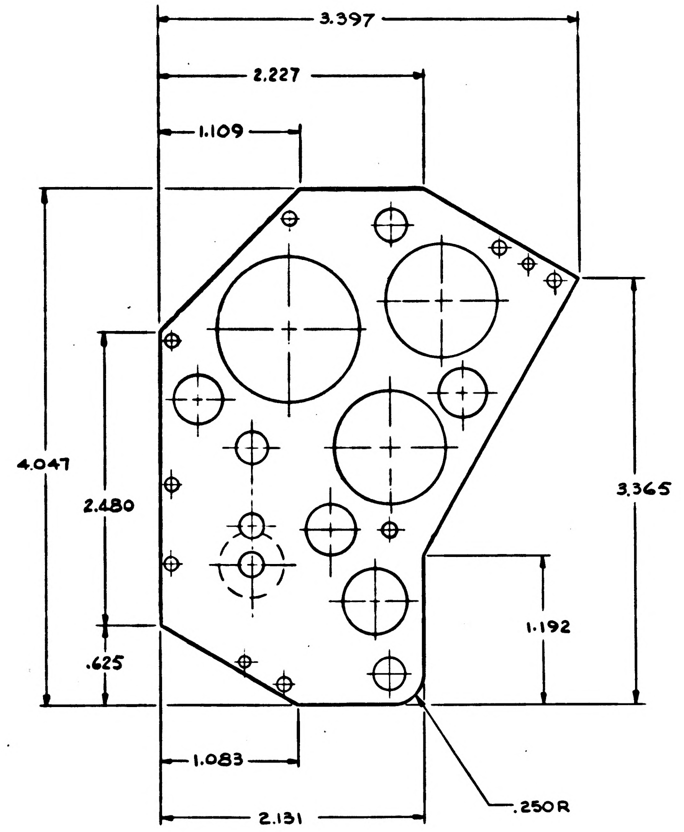
⊕ .004 DIA



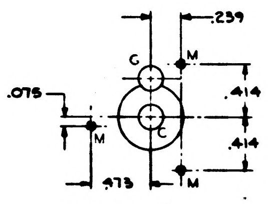
IDENTIFICATION MARK
SEE NOTE 6
2.415 BSC
2.2590±.0003
1.982 BSC
1.6884±.0003
1.515
1.1078±.0003 "E" HOLE
1.107 BSC TO "H" & "A" HOLE
.308 BSC
.4210±.0003
SEE DETAIL B
SEE DETAIL A
1.7500 ±.0003
1.796 BSC
.843 BSC
.926 ±.003
.3750 ±.0003
.406 BSC
.6006 ±.0003
.9059 ±.0003
1.031 BSC
1.6560 ±.0003
1.835 BSC
1.581 BSC
1.331 BSC
1.156
3.1120 ±.0003
.4375±.0003
.625 BSC
1.187
1.7500 ±.0003
2.015
.0600±.0003
.250 BSC
.640 BSC
.638
.768
.991
1.1078±.0003
S3 S4 S5 S6 S7 S8 S10 S11
A B C D E F G H J K L M



.102
.001
-A-
A .001
.050
63

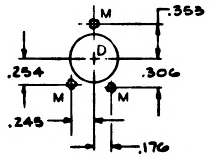


3.397
2.227
1.109
4.047
2.480
.625
3.365
1.192
1.083
2.131
.250R



.239
.075
.414
.414
.473
G
M
C

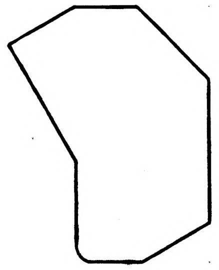
DETAIL A



.353
.254
.306
.245
.176
M
D

DETAIL B

CENTERS	C.D. CHECKING DIM.
S3 - S4	1.1477
S4 - S5	.9765
S5 - S8	.5638
S5 - S6	.6006
S6 - S7	.3053



ACTUAL SIZE

NOTE:
C.D. (CHECKING DIMENSIONS) ARE REF.
GEAR TRAINS ARE INDICATED AS SHOWN ----

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011430	1011559
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ; DECIMALS ± .005 ; ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL ALUMINUM ALLOY 2024-T3 FED SPEC QQ-A-355 TEMPER T3
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION ELMHURST NEW YORK
KIC PN 52387000150
DRAWN V. Lozito DATE 6-21-63
CHECKED W. Witzky 6-24-63
APPROVAL M. Wegman 7-1-63
APPROVAL E. Thomas 7-1-63
NASA APPROVAL 7/3/63
MIT APPROVAL 3 July 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE PLATE, BEARING

CODE IDENT NO. | SIZE E | NASA NUMBER 1011461
SCALE 2:1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

1011461

MASTER

INCHES
PHOTOGRAPHIC SCALE ONLY

A	1011467

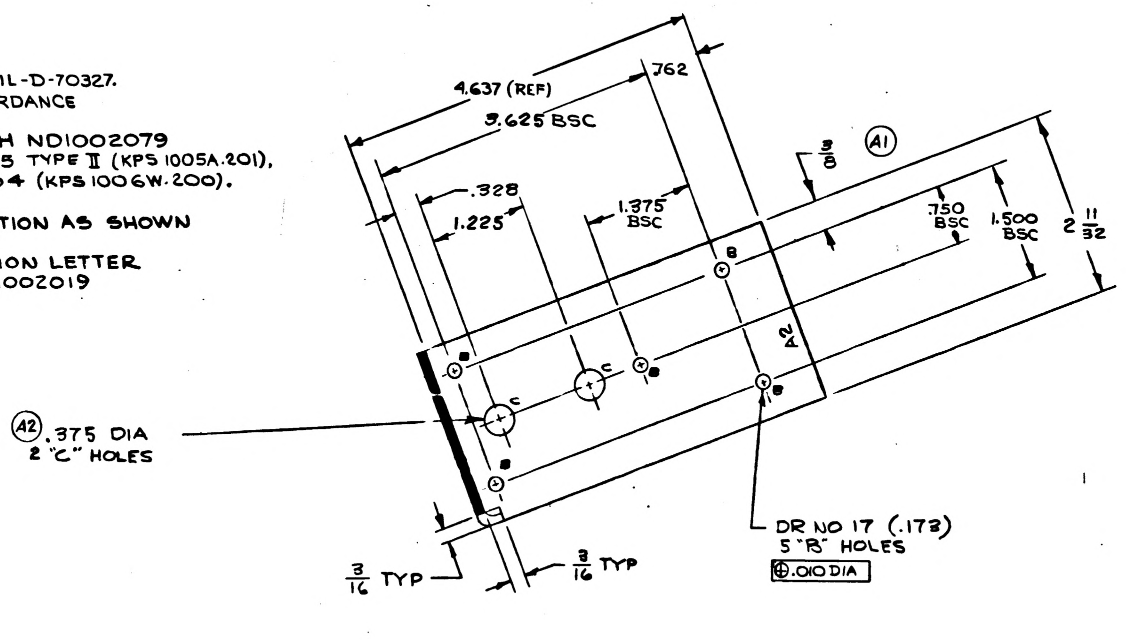
REVISIONS 03146

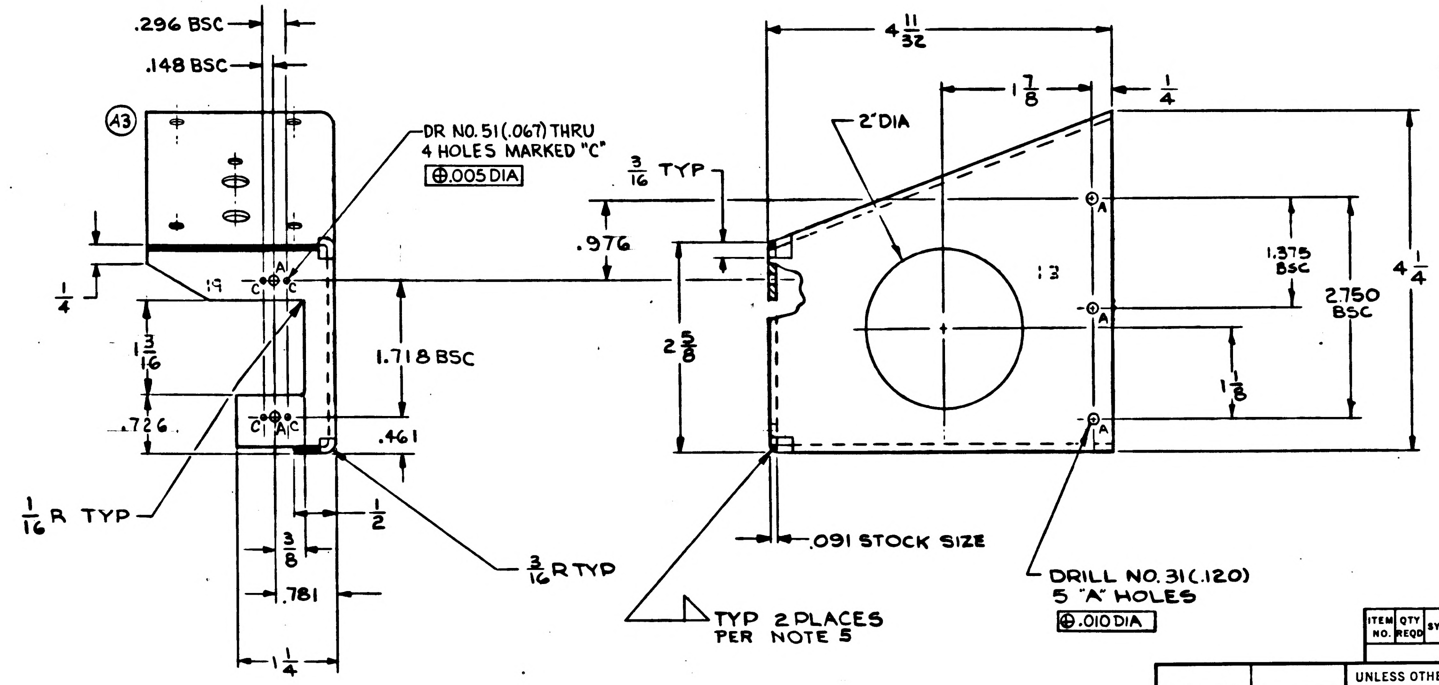
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A 3		REVISED PER TDRR NO. 03808	10 Oct 63	WK

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. REMOVE BURRS IN ACCORDANCE WITH ND1002079
4. FINISH: ANODIZE BLACK PER MIL-A-8625 TYPE II (KPS 1005A.201).
5. WELD IN ACCORDANCE WITH MIL-W-8604 (KPS 1006W.200).

6. STAMP ELECTRICAL REFERENCE DESIGNATION AS SHOWN PER ND1002019
7. IDENTIFY USING NASA DWG. NO REVISION LETTER AND MANUFACTURER'S SYMBOL PER ND1002019


4.637 (REF)
.762
3.625 BSC
.328
1.225
1.375 BSC
3/8
A1
.750 BSC
1.500 BSC
2 11/32
B
C
A2
A2 .375 DIA 2 "C" HOLES
DR NO 17 (.173) 5 "B" HOLES
⊕ .010 DIA
3/16 TYP
3/16 TYP


.296 BSC
.148 BSC
A3
DR NO. 51 (.067) THRU 4 HOLES MARKED "C"
⊕ .005 DIA
1/4
19
C A C
1 3/16
.726
1.718 BSC
.461
1/16 R TYP
3/8
1/2
.781
3/16 R TYP
1 1/4
4 11/32
1 7/8
1/4
2" DIA
3/16 TYP
.976
13
A
1.375 BSC
2.750 BSC
4 1/4
2 5/8
1 1/8
.091 STOCK SIZE
DRILL NO. 31 (.120) 5 "A" HOLES
⊕ .010 DIA
TYP 2 PLACES PER NOTE 5

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011538	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	±.005	±.1°

DO NOT SCALE THIS DRAWING

MATERIAL
ALUMINUM ALLOY
5052-H32
FED. SPEC QQ-A-318
TEMPER H32

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 5938700 0050

DRAWN V. LOZITO DATE 7-7-63
CHECKED M. Tamell 7-23-63
APPROVAL M. Werner 7-6-63
APPROVAL E. Thorup 9-16-63
NASA APPROVAL Jack Barnard
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BRACKET, CONNECTOR

CODE IDENT NO.
SIZE D
NASA NUMBER 1011467
SCALE 1/1
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

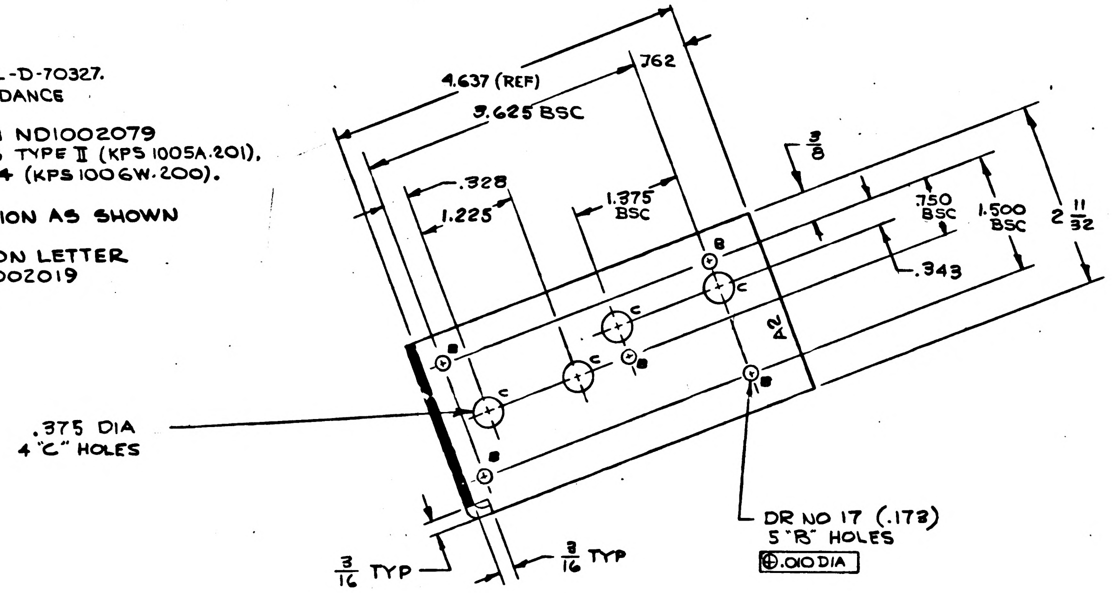
1011467

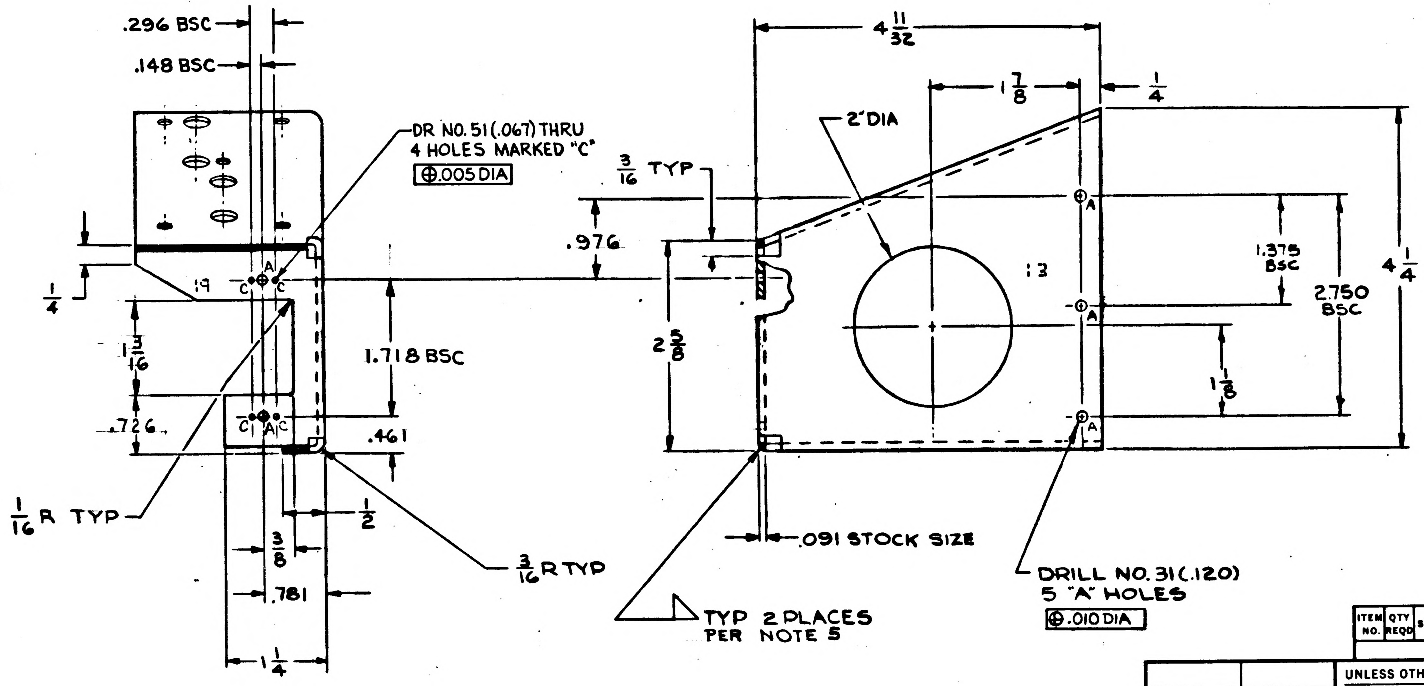
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REVISIONS

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. REMOVE BURRS IN ACCORDANCE WITH ND1002079
4. FINISH: ANODIZE BLACK PER MIL-A-8625 TYPE II (KPS 1005A.201).
5. WELD IN ACCORDANCE WITH MIL-W-8604 (KPS 1006W.200).
6. STAMP ELECTRICAL REFERENCE DESIGNATION AS SHOWN PER ND1002019
7. IDENTIFY USING NASA DWG. NO REVISION LETTER AND MANUFACTURER'S SYMBOL PER ND1002019


4.637 (REF)
.762
3.625 BSC
.328
1.225
1.375 BSC
3/8
.750 BSC
1.500 BSC
2 11/32
.343
A2
.375 DIA 4 "C" HOLES
3/16 TYP
3/16 TYP
DR NO 17 (.173) 5 "B" HOLES
⊕.010 DIA


.296 BSC
.148 BSC
DR NO. 51 (.067) THRU 4 HOLES MARKED "C"
⊕.005 DIA
1/4
J9
1 3/16
1.718 BSC
.726
.461
1/16 R TYP
1/2
3/8
3/16 R TYP
.781
1 1/4
4 11/32
1 7/8
1/4
2" DIA
3/16 TYP
.976
J3
1.375 BSC
2.750 BSC
4 1/4
2 5/8
1 1/8
.091 STOCK SIZE
DRILL NO. 31 (.120) 5 "A" HOLES
⊕.010 DIA
TYP 2 PLACES PER NOTE 5

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011538	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	±.005	±.1°

DO NOT SCALE THIS DRAWING

MATERIAL
ALUMINUM ALLOY
5052-H32
FED SPEC QQ-A-318
TEMPER H32

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 5938700 0050

DRAWN V. LOZITO DATE 7-7-63
CHECKED M Farrell 7-22-63
APPROVAL M. Werner 9-6-63
APPROVAL E. Thorup 9-16-63
NASA APPROVAL Jack Barnard
MIT APPROVAL 9/17/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BRACKET, CONNECTOR

CODE IDENT NO.	SIZE	NASA NUMBER
	D	1011467

SCALE 1/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

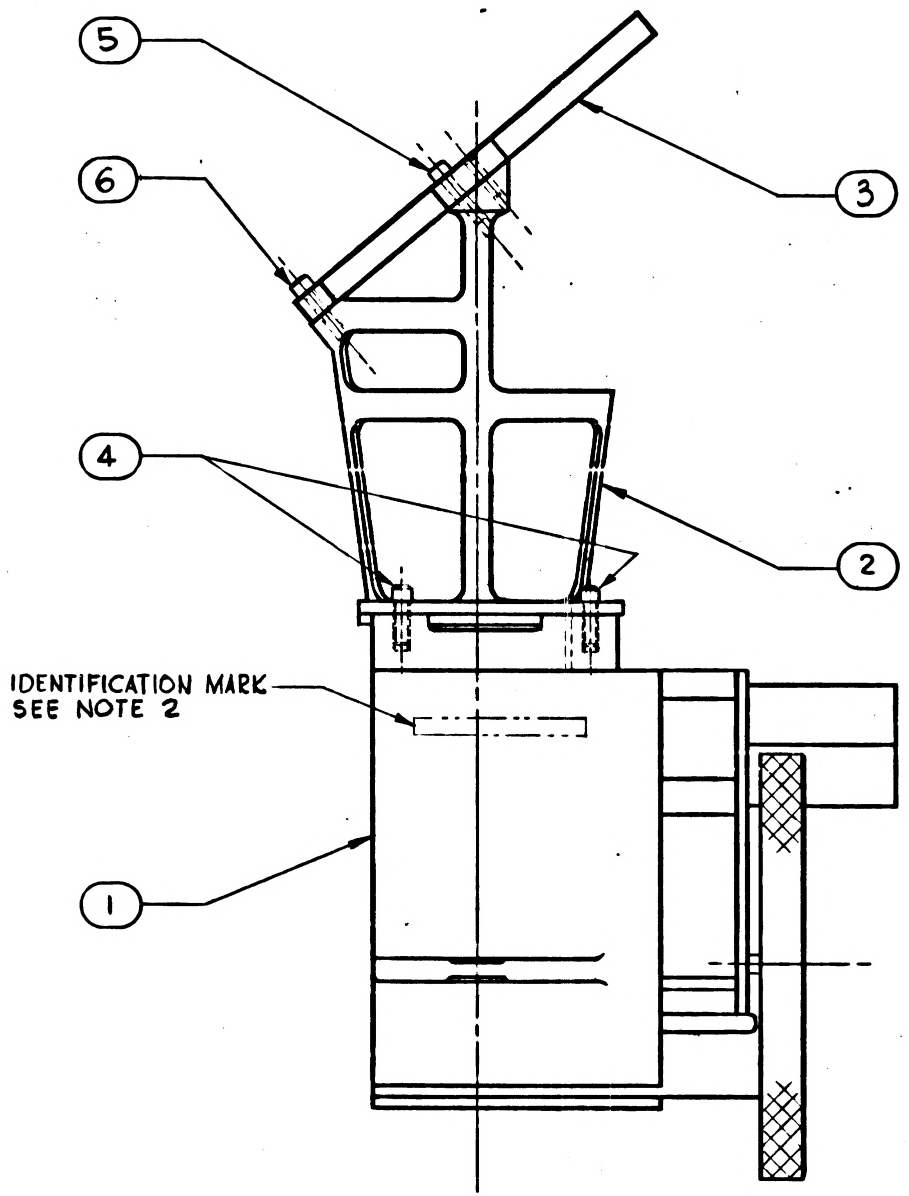
1011467

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011468 A

REVISIONS TDRR 02279				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A 1		REVISED PER TDRR NO. 03800	12/19/63	WK

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA DWG NO., REV LETTER AND MFR'S SYMBOL PER ND1002019.



(A1)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
6	1		1011625-32	74455151032		SCREW, CAP, HEX SOCKET HEAD			
5	2		NAS1352C04LL8	74455157015	89944	SCREW, CAP, HEX SOCKET HEAD			
4	3		NAS1352C04LL6	74455157014	83944	SCREW, CAP, HEX SOCKET HEAD			
3	1		1011361	58387000020		MIRROR, SMALL			
2	1		1011470	85387000100		SUPPORT, MIRROR, ASSY OF			
1	1		1011430	87387000030		GEAR BOX ASSY			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011559	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ — -	+ — -	+ — -

DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 87387000060
DRAWN J. JOHN DATE 6-28-63
CHECKED M. Fawcett 7-1-63
APPROVAL M. Werner 7-17-63
APPROVAL
NASA APPROVAL 7/24/63
MIT APPROVAL W. Kaufa 24 July 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
GEAR BOX & MIRROR
ASSY OF

CODE IDENT NO.
SIZE C
NASA NUMBER 1011468
SCALE 1:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

E-184

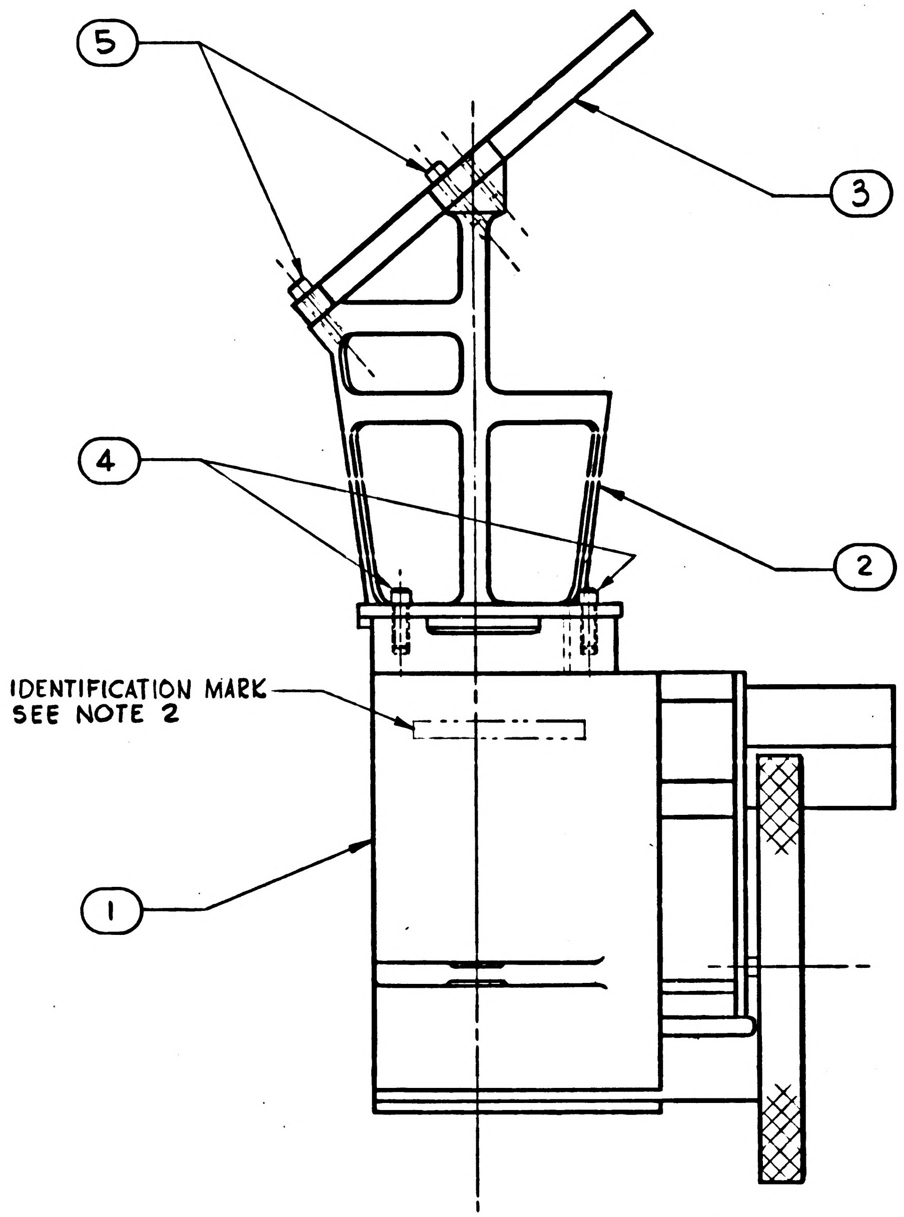
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011468

REVISIONS TDRR 02279				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA DWG NO., REV LETTER AND MFR'S SYMBOL PER ND1002019.



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
5	3		NAS1352C04LL8	7445515 7015	89944	SCREW, CAP, HEX SOCKET HEAD			
4	3		NAS1352C04LL6	74455157014	89944	SCREW, CAP, HEX SOCKET HEAD			
3	1		1011361	58387000020		MIRF.OR, SMALL			
2	1		1011470	85387000100		SUPPORT, MIRROR, ASSY OF			
1	1		1011430	87387000030		GEAR BOX ASSY			

LIST OF PARTS AND MATERIALS

APPLICATION	
NEXT ASSY	USED ON
1011559	1011559

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ — −	+ — −	+ — −

DO NOT SCALE THIS DRAWING

MATERIAL —

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 87387000060

DRAWN J. JOHN DATE 6-28-63
CHECKED M. Fauvell 7-1-63
APPROVAL M. Werner 7-17-63
APPROVAL
NASA APPROVAL 7/24/63
MIT APPROVAL 24 Jul 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
GEAR BOX & MIRROR
ASSY OF

CODE IDENT NO.
SIZE C
NASA NUMBER 1011468
SCALE 1:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011468

E-154

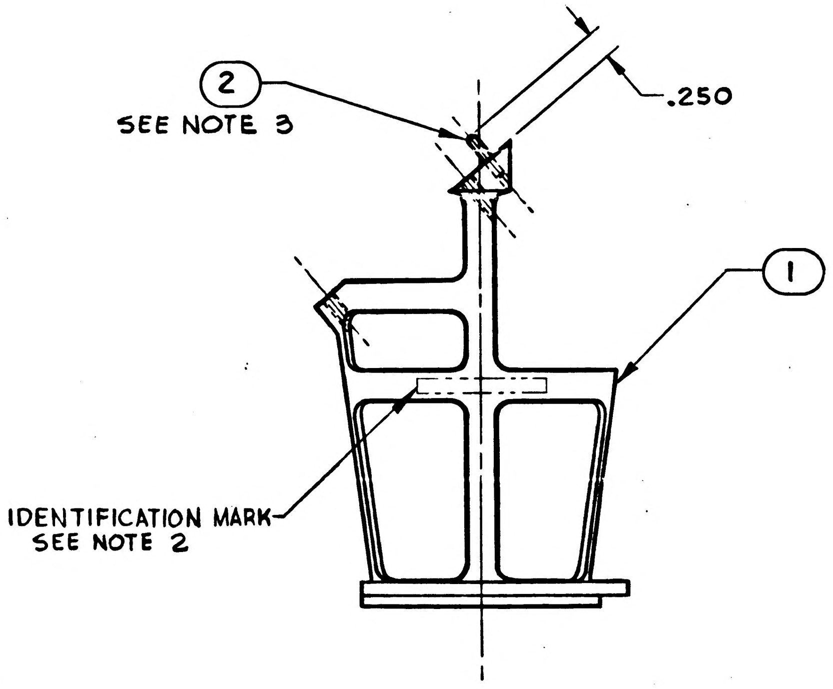
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011470

REVISIONS TDRR 02279				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA DWG NO., REV LETTER AND MFR'S SYMBOL PER ND1002019.
3. PRESS ② INTO ① TO DIM. SHOWN, 2 PLACES.



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	2		MS16555-605	73 00210 5048		PIN, DOWEL			
1	1		1011428	52387000100		SUPPORT, MIRROR SMALL			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011468	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± —

DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85387000100
DRAWN J. JOHN DATE 6/27/63
CHECKED M Fauvell 7-3/63
APPROVAL M. Werner 7-22-63
APPROVAL
NASA APPROVAL 7/24/63
MIT APPROVAL W Kupfer 24 July 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SUPPORT, MIRROR
ASSY OF

CODE IDENT NO.
SIZE C
NASA NUMBER 1011470
SCALE 1:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

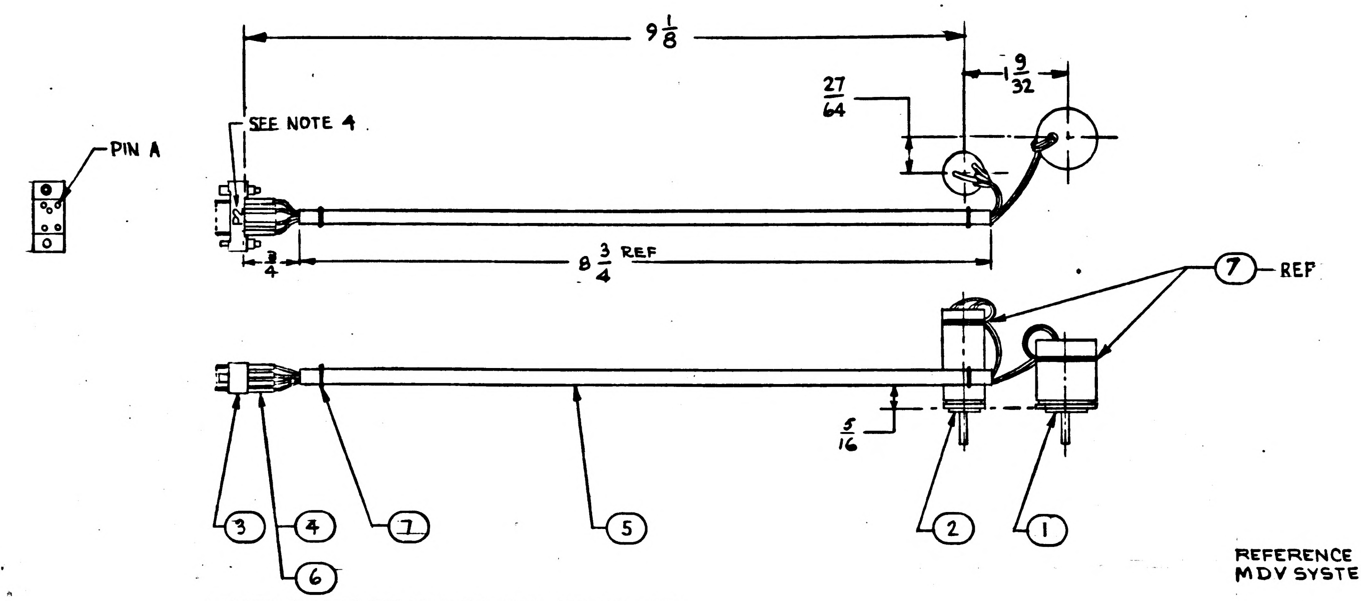
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011471

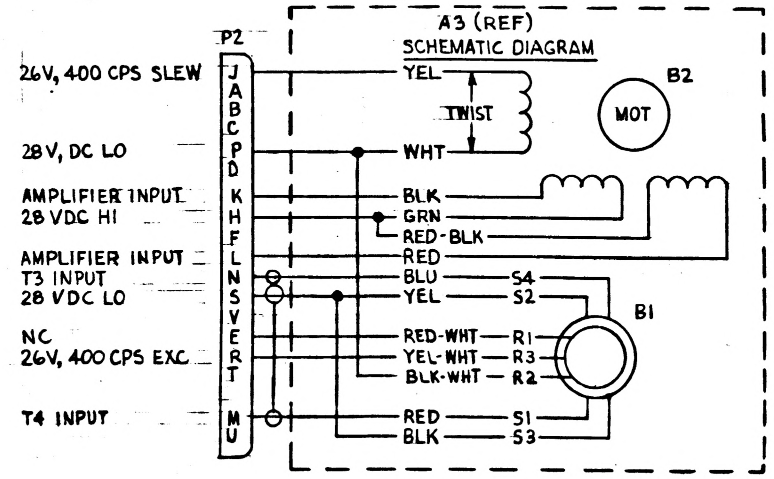
REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. SOLDER IN ACCORDANCE WITH MSFC-PROC-158, USING SN60WAP 02 SOLDER PER QQ-S-571.
3. IDENTIFY USING NASA DRAWING NO. REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019
4. STAMP ELECTRICAL REFERENCE DESIGNATION AS SHOWN PER ND 1002019
5. TWISTED CONDUCTORS TO CONSIST OF FOUR (4) FULL TURNS PER INCH MINIMUM.

WIRING LEGEND		
FROM COMPONENT	TO COMPONENT	SEE NOTE 5
B2-YEL	P2-J	8
↑ WHT	↑ P	
BLK	K	
GRN	H	
↓ RED-BLK	H	
B2 RED	L	
B1-BLU	N	8 8
↑ YEL	S	
RED	M	
BLK-WHT	P	
YEL-WHT	R	
↓ RED-WHT	↓ E	
B1-BLK	P2-S	


9 1/8
1 9/32
27/64
SEE NOTE 4
PIN A
3/4
8 3/4 REF
7 REF
5/16
3
4
6
7
5
2
1

REFERENCE
MDV SYSTEM WIRING SCHEMATIC DWG 1011405


A3 (REF)
SCHEMATIC DIAGRAM
P2
26V, 400 CPS SLEW
28V, DC LO
AMPLIFIER INPUT
28 VDC HI
AMPLIFIER INPUT
T3 INPUT
28 VDC LO
NC
26V, 400 CPS EXC
T4 INPUT
J A B C P D K H F L N S V E R T M U
YEL
TWIST
WHT
BLK
GRN
RED-BLK
RED
BLU S4
YEL S2
RED-WHT R1
YEL-WHT R3
BLK-WHT R2
RED S1
BLK S3
B2
MOT
B1

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
7	AR		1011753	60035142001		TAPE, LACING			
6	1 1/2"		1006776-13	60025155013		INSULATION, SLEEVING	1/2" LG		
5	8 3/4"		1006776-7	60025155007		INSULATION, SLEEVING			
4	3 1/2"		1006776-20	60025155020		INSULATION, SLEEVING	1/2" LG		
3	1		1011410	68502018601		CONN, PLUG			
2	1		1011371	75002010201		RESOLVER (B1)			
1	1		1011379	7500101001		MOTOR (B2)			

LIST OF PARTS AND MATERIALS

1011430	1011559
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± 1/16 DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85387000180
DRAWN J. MARGIOTTA DATE 7-17-63
CHECKED W. HENDRICKSON 7-20-63
APPROVAL M. Werner 9-10-63
APPROVAL
NASA APPROVAL Jack Barnard
MIT APPROVAL L. Hazel 9/17/0

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

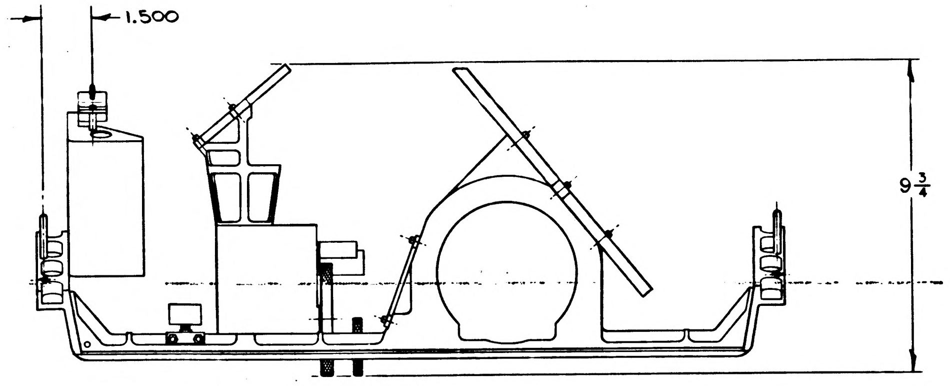
TITLE
MOTOR, RESOLVER AND CONNECTOR
ASSY OF

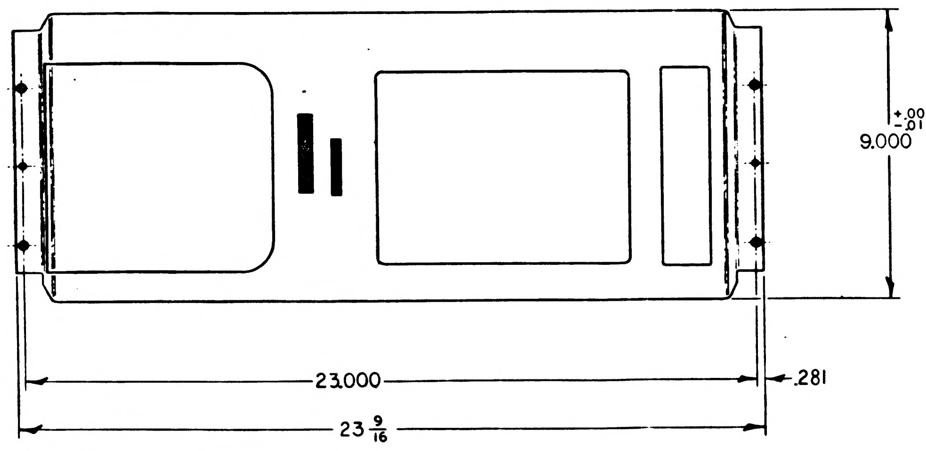
CODE IDENT NO.
SIZE D
NASA NUMBER 1011471
SCALE 1:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

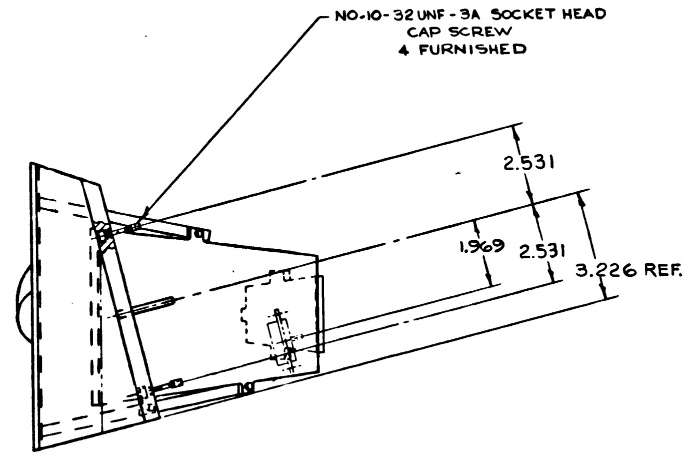
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.


1.500
$9\frac{3}{4}$


9.000 $^{+.000}_{-.015}$
23.000
.281
$23\frac{9}{16}$


NO-10-32 UNF-3A SOCKET HEAD CAP SCREW 4 FURNISHED
2.531
1.969
2.531
3.226 REF.

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	
TOL ON: FRACTIONS ± 1/64; DECIMALS ± .005; ANGLES ± 1°	
DO NOT SCALE THIS DRAWING	
MATERIAL	—
CONTRACT	
NEXT ASSY / USED ON	APPLICATION
KOLLSMAN INSTRUMENT CORPORATION ELMHURST NEW YORK	
KIC PN	A38700000000
DRAWN	Wysocki DATE
CHECKED	
APPROVAL	M. Werner 7-25-63
APPROVAL	
NASA APPROVAL	
MIT APPROVAL	26 July 63
MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
TITLE	MAP & DATA VIEWER OUTLINE DRAWING
CODE IDENT NO.	
SIZE	E
NASA NUMBER	1011472
SCALE	1 : 2
WEIGHT	CALC ACTUAL
SHEET	1 OF 1

1011472

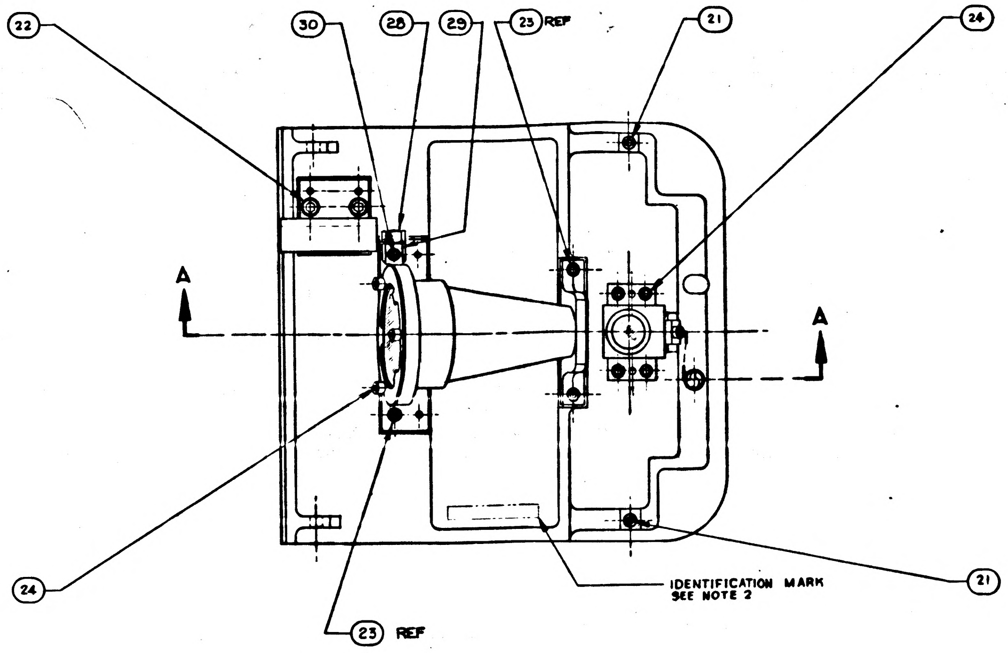
INCHES
PHOTOGRAPHIC SCALE ONLY

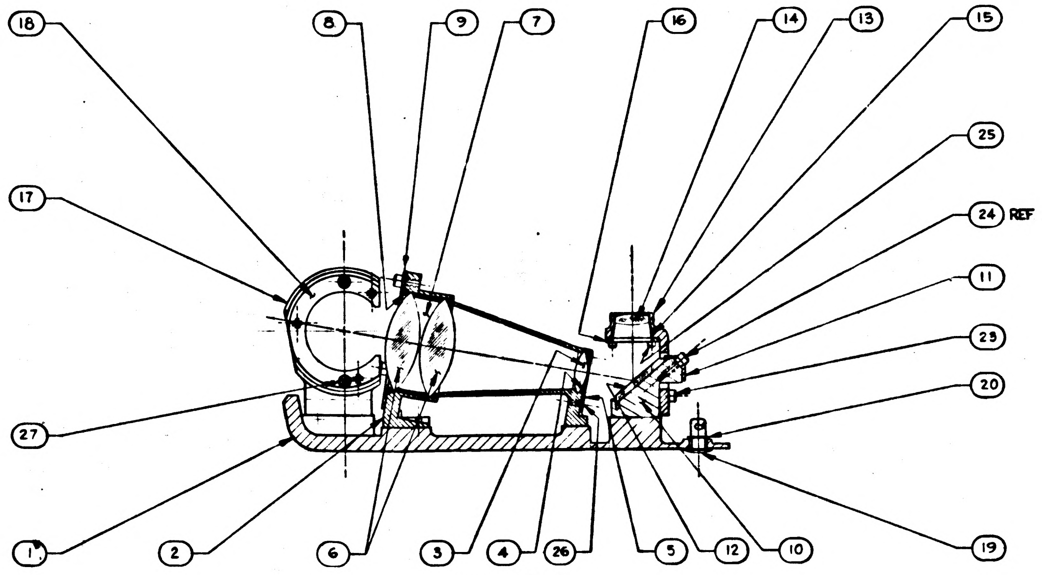
1011473	A			

REVISIONS 02344

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR NO. 05021		

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MFR'S SYMBOL PER ND1002019.
3. ASSEMBLE AND TEST IN ACCORDANCE WITH ATP 10 11473





SECTION A-A

* PURCHASED PART- REFER TO SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
30	1		NAS1352C04LL6	74455157014		SCREW, CAP HEX SOC HD SELF-LOCKING			
29	1	*	1011918-1			WASHER, CABLE CLAMP			
28	1	*	1000220-2			CLAMP, CABLE			
27	2		NAS1352C02LL6	74455157 7007		SCREW, CAP, HEXAGON SOCKET HEAD			
26	3		NAS1189C02P4L	7445515 5002		SCREW, FLAT HEAD			
25	4		NAS1352C02LL4	74455157 7006		SCREW, CAP, HEXAGON SOCKET HEAD			
24	8		NAS1352C04LL4	74455157 7013		SCREW, CAP, HEXAGON SOCKET HEAD			
23	5		1011625-28	74455151028		SCREW, CAP, HEX SOC HD SELF-LOCKING			
22	2		NAS1352C08LL8	74455157 7027		SCREW, CAP, HEXAGON SOCKET HEAD			
21	2	*	1011288-3	7447189 7003		PLUNGER, QUICK RELEASE			
20	1	*	1011432	74453037001		RING, RETAINING			
19	1	*	1011431	74422014001		FASTENER, STUD			
18	1		1011513	46387000080		RING, INSULATION			
17	1		1011523	85387000150		BRACKET, LAMP ASSY OF			
16	1		1011511	52387000190		RETAINER, LENS			
15	1		1011522	57387000150		SPACER, LENS			
14	1		1011503	28387000020		LENS, POSITIVE			
13	1		1011516	85387000170		BRACKET, LENS ASSY OF			
12	1		1011433	28387000010		MIRROR			
11	1		1011440	54387000010		CLAMP, MIRROR			
10	1		1011515	85387000160		SUPPORT, MIRROR ASSY OF			
9	1		1011507	56387000270		CLAMP RING			
8	1		1011508	45387000010		SPACER, LENS			
7	1		1011520	45387000020		SPACER, LENS			
6	2		1011504	28387000030		LENS, POSITIVE			
5	1		1011521	56387000050		RETAINER, LENS			
4	1		1011509	45387000030		SPACER, LENS			
3	1		1011505	28387000040		LENS, POSITIVE			
2	1		1011514	85387000190		HOUSING, LENS ASSY OF			
1	1		1011442	52387000130		DOOR, ACCESS			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011559	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 87387000070

DRAWN J. JOHN DATE 7-26-63
CHECKED MMW 9-23-63
APPROVAL M. Werner 9-23-63
APPROVAL
NASA APPROVAL
MIT APPROVAL 7/26/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
DOOR, ACCESS ASSY

CODE IDENT NO.
SIZE E
NASA NUMBER 1011473
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF

MASTER

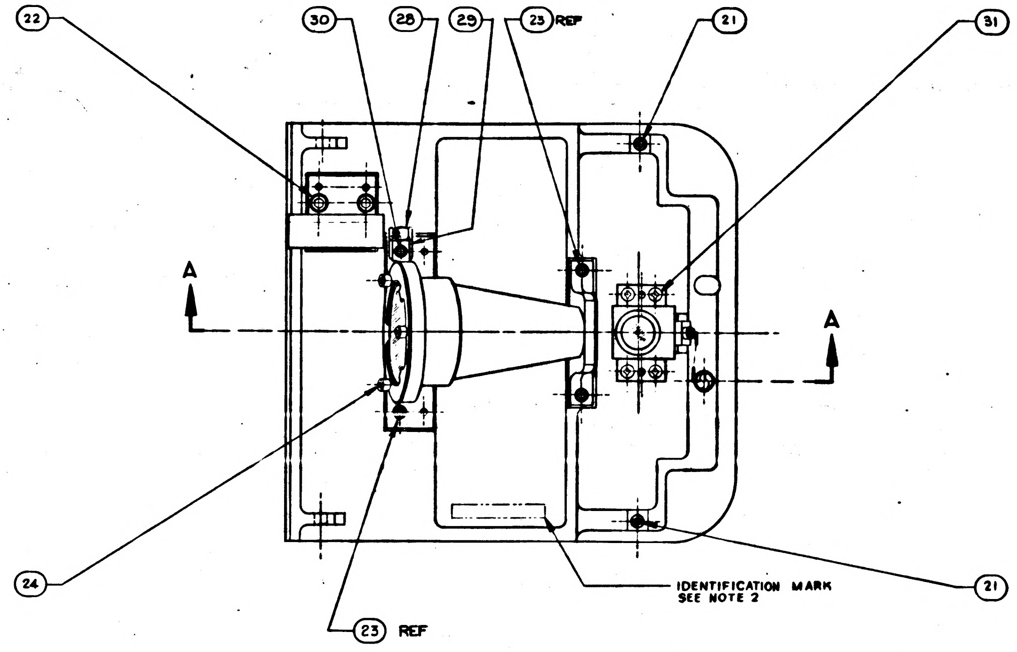
B	1011473

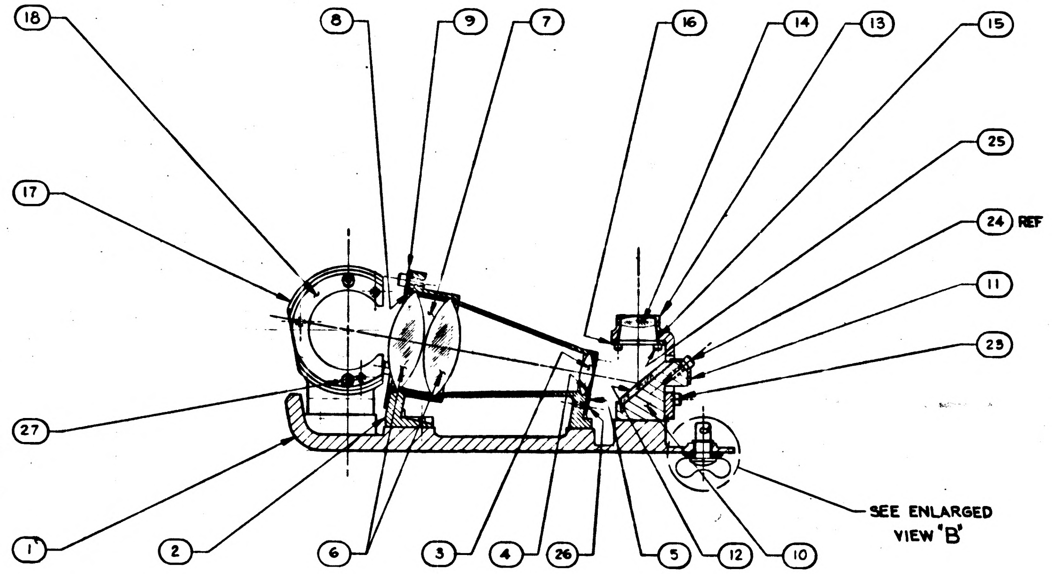
NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MFR'S SYMBOL PER ND1002019.

(B1)

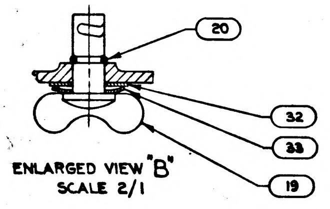
REVISIONS 02344

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR NO. 05021		
B5		REVISED PER TDRR NO. 08590	26 MAY 64	





SECTION A-A



ENLARGED VIEW "B" SCALE 2/1

* PURCHASED PART- REFER TO SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
(B5)	33	1		1011545	56387000040		WASHER, SPRING			
	32	1		1011544-2	79387000002		WASHER, SLIP			
	31	4		NAS1189C0P4L	74455135008		SCREW, SELF LOCKING 100° FLAT HD			
	30	1		NAS1352C04LL6	74455157014		SCREW, CAP HEX SOC HD SELF-LOCKING			
(A)	29	1	*	1011918-1			WASHER, CABLE CLAMP			
	28	1	*	1000220-2			CLAMP, CABLE			
	27	2		NAS1352C02LL6	74455157 7007		SCREW, CAP, HEXAGON SOCKET HEAD			
	26	3		NAS1189C02P4L	7445515 5002		SCREW, FLAT HEAD			
	25	4		NAS1352C02LL4	74455157 7006		SCREW, CAP, HEXAGON SOCKET HEAD			
(B2)	24	4		NAS1352C04LL4	74455157 7013		SCREW, CAP, HEXAGON SOCKET HEAD			
	23	5	*	1011665-28	74455151028		SCREW, CAP, HEX SOC HD SELF-LOCKING			
(B4)	22	2		NAS1352C08LL8	74455157 7027		SCREW, CAP, HEXAGON SOCKET HEAD			
	21	2	*	1011288-3	74471397003		PLUNGER, QUICK RELEASE			
	20	1	*	1011432	74453037001		RING, RETAINING			
(B3)	19	1	*	1011543	74422015001		STUD, FASTENER WING HD			
	18	1		1011513	46387000080		RING, INSULATION			
	17	1		1011523	85387000150		BRACKET, LAMP ASSY OF			
	16	1		1011511	52387000190		RETAINER, LENS			
	15	1		1011522	57387000150		SPACER, LENS			
	14	1		1011503	28387000020		LENS, POSITIVE			
	13	1		1011516	85387000170		BRACKET, LENS ASSY OF			
	12	1		1011433	28387000010		MIRROR			
	11	1		1011440	54387000010		CLAMP, MIRROR			
	10	1		1011515	85387000160		SUPPORT, MIRROR ASSY OF			
	9	1		1011507	56387000270		CLAMP, RING			
	8	1		1011508	45387000010		SPACER, LENS			
	7	1		1011520	45387000020		SPACER, LENS			
	6	2		1011504	28387000030		LENS, POSITIVE			
	5	1		1011521	56387000050		RETAINER, LENS			
	4	1		1011509	45387000030		SPACER, LENS			
	3	1		1011505	28387000040		LENS, POSITIVE			
	2	1		1011514	85387000190		HOUSING, LENS ASSY OF			
	1	1		1011442	52387000150		DOOR, ACCESS			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011559	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 87387000070

DRAWN J. JOHN DATE 7-26-63
CHECKED MMW 9-23-63
APPROVAL M. Werner 9-23-63
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
DOOR, ACCESS ASSY

CODE IDENT NO.
SIZE E
NASA NUMBER 1011473
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

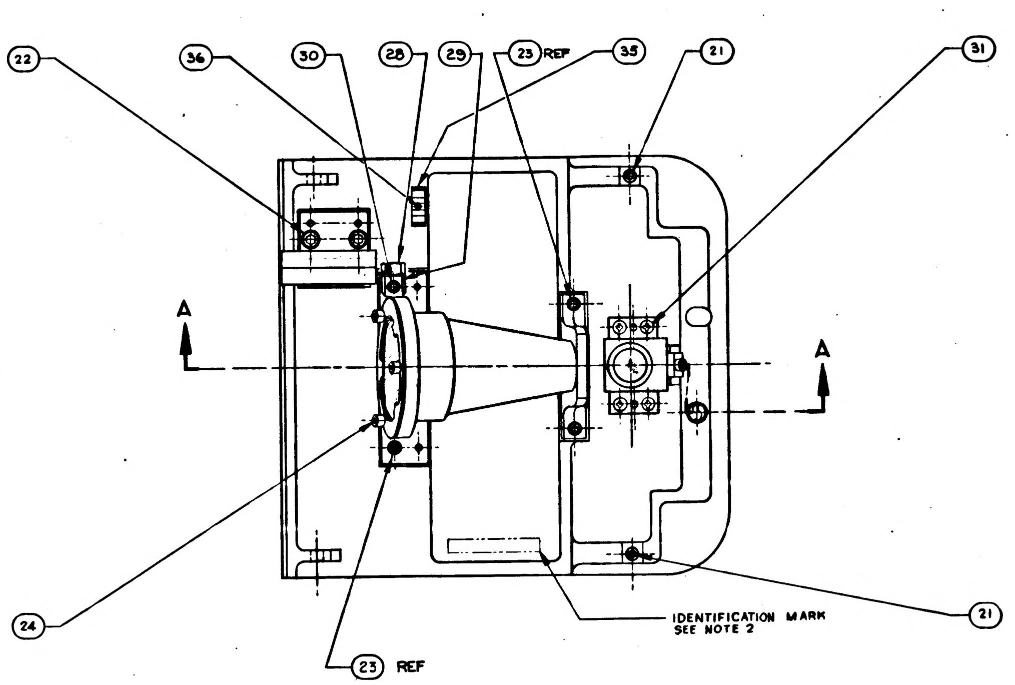
MASTER

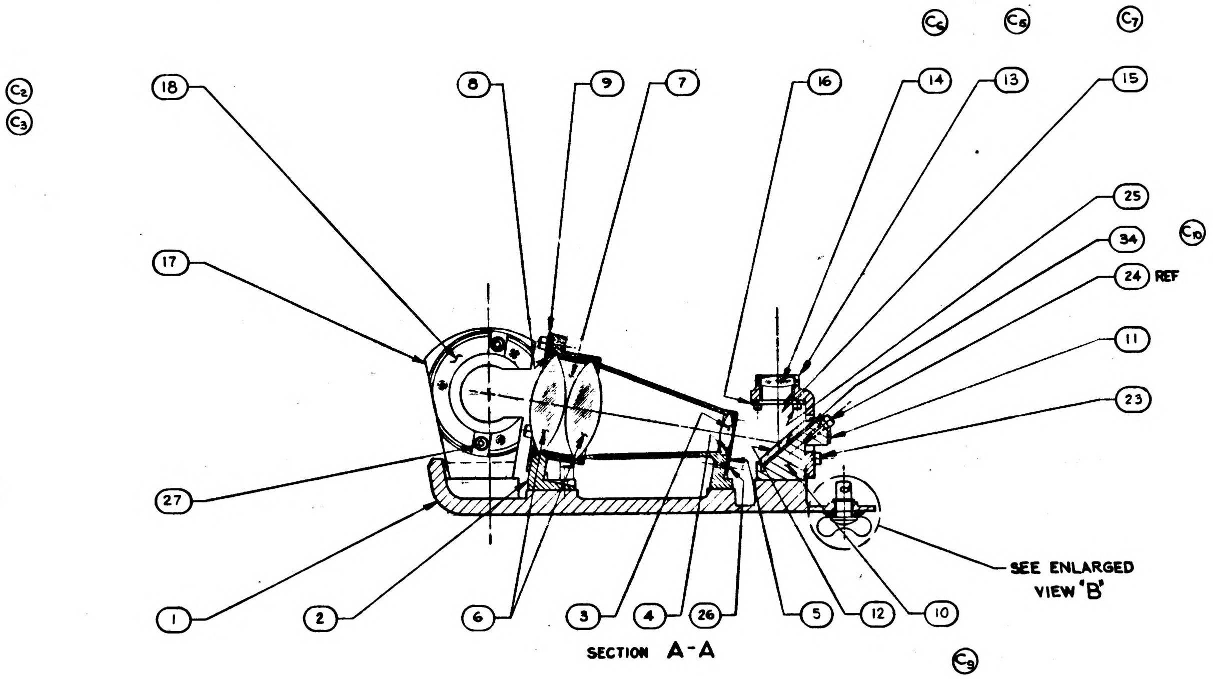
1011473 D

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MFR'S SYMBOL PER ND1002019.

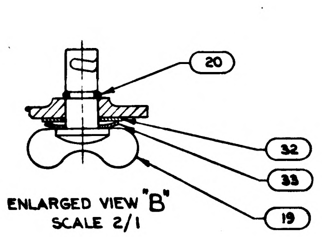
REVISIONS 02344

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR NO. 05021	12/10/63	
B5		REVISED PER TDRR NO. 08590	26 MAY 64	WK
C11		REVISED PER TDRR NO. 10495	30 JUNE 64	WK
D3		REVISED PER TDRR NO. 10487	30 JUNE 64	WK





SECTION A-A



ENLARGED VIEW "B"
SCALE 2/1

* PURCHASED PART- REFER TO SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
D1	36	1		NAS1352C02LL3			SCREW, CAP HD, HEX SOCKET			
	35	1		1011551			CLIP, SPRING			
C8	34	1		1012172	57387000200		SPACER			
	33	1		1011545	56387000040		WASHER, SPRING			
B5	32	1		1011544-2	79387000002		WASHER, SLIP			
	31	4		NAS1189C0P4L	74455155008		SCREW, SELF LOCKING 100° FLAT HD			
	30	1		NAS1352C04LL6	74455157014		SCREW, CAP HEX SOC HD SELF-LOCKING			
A	29	1	*	1011918-1			WASHER, CABLE CLAMP			
	28	1	*	1000220-2			CLAMP, CABLE			
	27	2		NAS1352C02LL8	74455157008		SCREW, CAP, HEXAGON SOCKET HEAD			
	26	3		NAS1189C02P4L	7445515 5002		SCREW, FLAT HEAD			
	25	4		NAS1352C02LL4	74455157 7006		SCREW, CAP, HEXAGON SOCKET HEAD			
B2	24	4		NAS1352C04LL4	74455157 7013		SCREW, CAP, HEXAGON SOCKET HEAD			
	23	5	*	1011665-28	74455151028		SCREW, CAP, HEX SOC HD SELF-LOCKING			
B4	22	2		NAS1352C08LL8	74455157 7027		SCREW, CAP, HEXAGON SOCKET HEAD			
	21	2	*	1011288-3	74471139 7003		PLUNGER, QUICK RELEASE			
	20	1	*	1011432	74453037001		RING, RETAINING			
B3	19	1	*	1011543	74422015001		STUD, FASTENER WING HD			
	18	1		1012175	46387000090		RING, INSULATION			
C1	17	1		1012174	85387000230		BRACKET, LAMP ASSY OF			
	16	1		1011511	52387000190		RETAINER, LENS			
C4	15	1		1012173	57387000210		SPACER, LENS			
	14	1		1012169	28387000050		LENS, POSITIVE			
	13	1		1012176	85387000240		BRACKET, LENS ASSY OF			
	12	1		1011433	28387000010		MIRROR			
	11	1		1011440	54387000010		CLAMP, MIRROR			
	10	1		1011515	85387000160		SUPPORT, MIRROR ASSY OF			
	9	1		1011507	56387000270		CLAMP, RING			
	8	1		1011508	45387000010		SPACER, LENS			
	7	1		1011520	45387000020		SPACER, LENS			
	6	2		1011504	28387000030		LENS, POSITIVE			
	5	1		1011521	56387000050		RETAINER, LENS			
	4	1		1011509	45387000030		SPACER, LENS			
	3	1		1011505	28387000040		LENS, POSITIVE			
	2	1		1011514	85387000190		HOUSING, LENS ASSY OF			
D2	1	1		1011552			DOOR AND PAD ASSY			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
~~1012136~~	~~1012136~~
1011559	1011559

APPLICATION

C11

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION ELMHURST NEW YORK
KIC PN 87387000070
DRAWN J. JOHN DATE 7-24-63
CHECKED MMW 9-23-63
APPROVAL 9-23-63
APPROVAL
NASA APPROVAL 7/24/63
MIT APPROVAL 7/26/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
DOOR, ACCESS ASSY

CODE IDENT NO.
SIZE E
NASA NUMBER 1011473
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

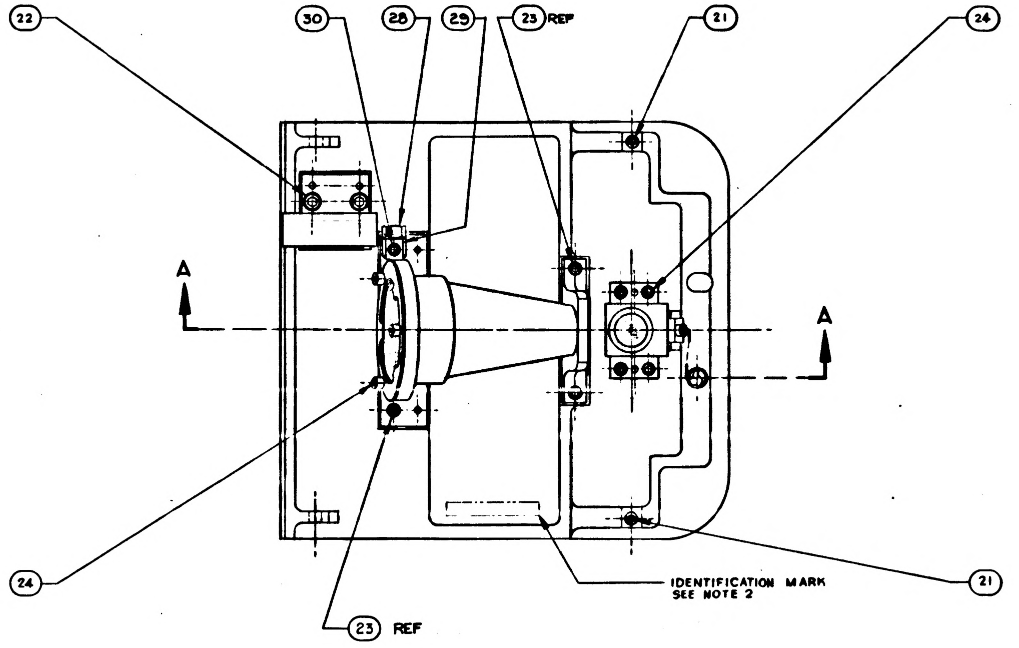
MASTER

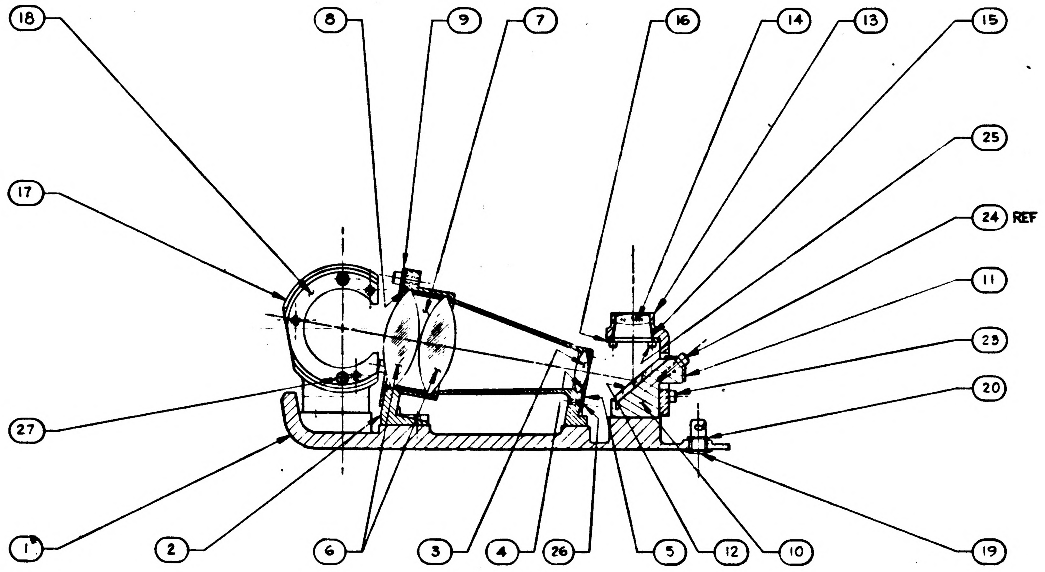
1011473

SYM	ZONE	REVISIONS DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MFR'S SYMBOL PER ND1002019.
3. ASSEMBLE AND TEST IN ACCORDANCE WITH ATP 10 11473





SECTION A-A

* PURCHASED PART- REFER TO SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
	30	1		NAS1352C04LL6	74455157014		SCREW, CAP HEX SOC HD SELF-LOCKING			
*	29	1		1000223			WASHER, CABLE CLAMP			
*	28	1		1000220-2			CLAMP, CABLE			
	27	2		NAS1352C02LL6	74455157 7007		SCREW, CAP, HEXAGON SOCKET HEAD			
	26	3		NAS1189C02P4L	7445515 5002		SCREW, FLAT HEAD			
	25	4		NAS1352C02LL4	74455157 7006		SCREW, CAP, HEXAGON SOCKET HEAD			
	24	8		NAS1352C04LL4	74455157 7013		SCREW, CAP, HEXAGON SOCKET HEAD			
	23	5		1011625-28	74455151028		SCREW, CAP, HEX SOC HD SELF-LOCKING			
	22	2		NAS1352C08LL8	74455157 7027		SCREW, CAP, HEXAGON SOCKET HEAD			
*	21	2		1011288-3	7447139 7003		PLUNGER, QUICK RELEASE			
*	20	1		1011432	74453037001		RING, RETAINING			
*	19	1		1011431	74422014001		FASTENER, STUD			
	18	1		1011513	46387000080		RING, INSULATION			
	17	1		1011523	85387000150		BRACKET, LAMP ASSY OF			
	16	1		1011511	52387000190		RETAINER, LENS			
	15	1		1011522	57387000150		SPACER, LENS			
	14	1		1011503	28387000020		LENS, POSITIVE			
	13	1		1011516	85387000170		BRACKET, LENS ASSY OF			
	12	1		1011433	28387000010		MIRROR			
	11	1		1011440	54387000010		CLAMP, MIRROR			
	10	1		1011515	85387000160		SUPPORT, MIRROR ASSY OF			
	9	1		1011507	56387000270		CLAMP, RING			
	8	1		1011508	45387000010		SPACER, LENS			
	7	1		1011520	4[illegible]387000020		SPACER, LENS			
	6	2		1011504	28387000030		LENS, POSITIVE			
	5	1		1011521	56[illegible]87000050		RETAINER, LENS			
	4	1		1011509	45387000030		SPACER, LENS			
	3	1		1011505	28387000040		LENS, POSITIVE			
	2	1		1011514	85387000190		HOUSING, LENS ASSY OF			
	1	1		1011442	52387000130		DOOR, ACCESS			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011559	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± —	± —

DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 87387000070
DRAWN J. JOHN DATE 7-24-63
CHECKED MMW 9-23-63
APPROVAL M. Werner 9-23-63
APPROVAL
NASA APPROVAL 7/4/63
MIT APPROVAL 7/26/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
DOOR, ACCESS ASSY

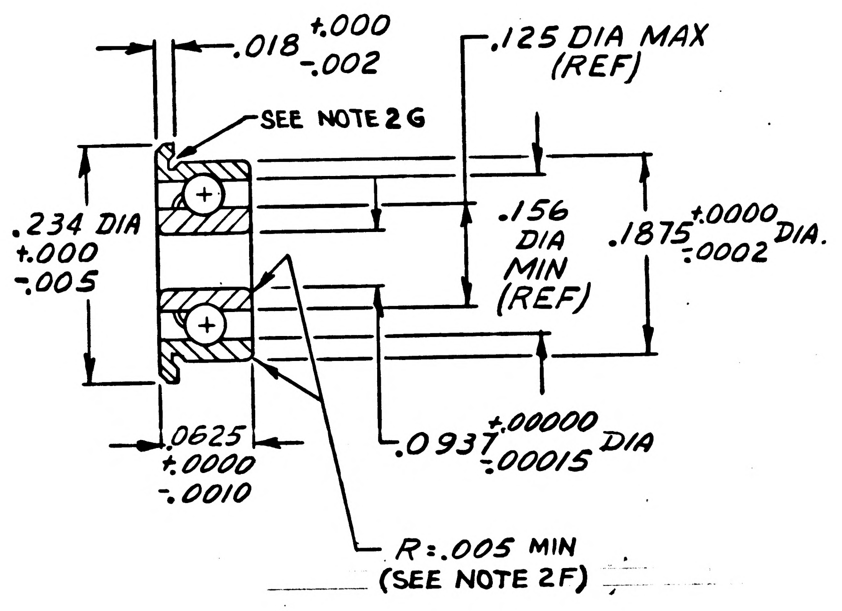
CODE IDENT NO.
SIZE E
NASA NUMBER 1011473
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011473

1011474

REVISIONS 02560			
SYM	DESCRIPTION	DATE	APPROVAL

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.



REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND1015404, CLASS 2.
   - C. PARTS SHALL BE INDIVIDUALLY PACKED IN SEPARATE HEAT-SEALED POLYETHYLENE BAGS AND SHIPPED PER MIL-B-197C LEVEL C.
2. INSPECTION AND ACCEPTANCE:
   - A. PACKAGE AND SHIPPING CONTAINER SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER, AND MANUFACTURER'S IDENTIFICATION PER MIL-STD-129.
   - B. DIMENSIONS AS SHOWN.
   - C. RADIAL PLAY .0003 TO .0005
   - D. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.
   - E. LUBRICATE PER ND 1002077.
   - F. R = MAX RADIUS ON SHAFT OR HOUSING THAT BEARING CORNER WILL CLEAR.
   - G. MAX. .005 FILLET RADIUS INSTEAD OF UNDERCUT ON INSIDE FLANGE FACE IS PERMISSIBLE.
3. DESIGN REQUIREMENTS:
   - A. DEEP GROVE, CONRAD TYPE.
   - B. MATERIALS:
     1. BALLS AND RINGS - CORROSION RESISTANT STEEL, FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITIONS A, RC 56 (MIN) AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151 METHOD 243.
     2. RETAINER - CORROSION RESISTANT STEEL FED SPEC QQ-S-763 CLASS 410
   - C. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

1011474

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

KIC PN 30021790060

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 3B
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN C. SCRICCO DATE 6-26-63
CHECKED BOHMAN 6-27-63
APPROVAL F. Ruselman 8/12/63
APPROVAL E. Thorup 8-12-63
NASA APPROVAL W. J. Rhine 8-14-63
MIT APPROVAL W. Kupfer 14 Aug 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BEARING, BALL, ANNULAR
(METALLIC RETAINER, FLANGED,
UNSHIELDED)
(SPECIFICATION CONTROL DRAWING)

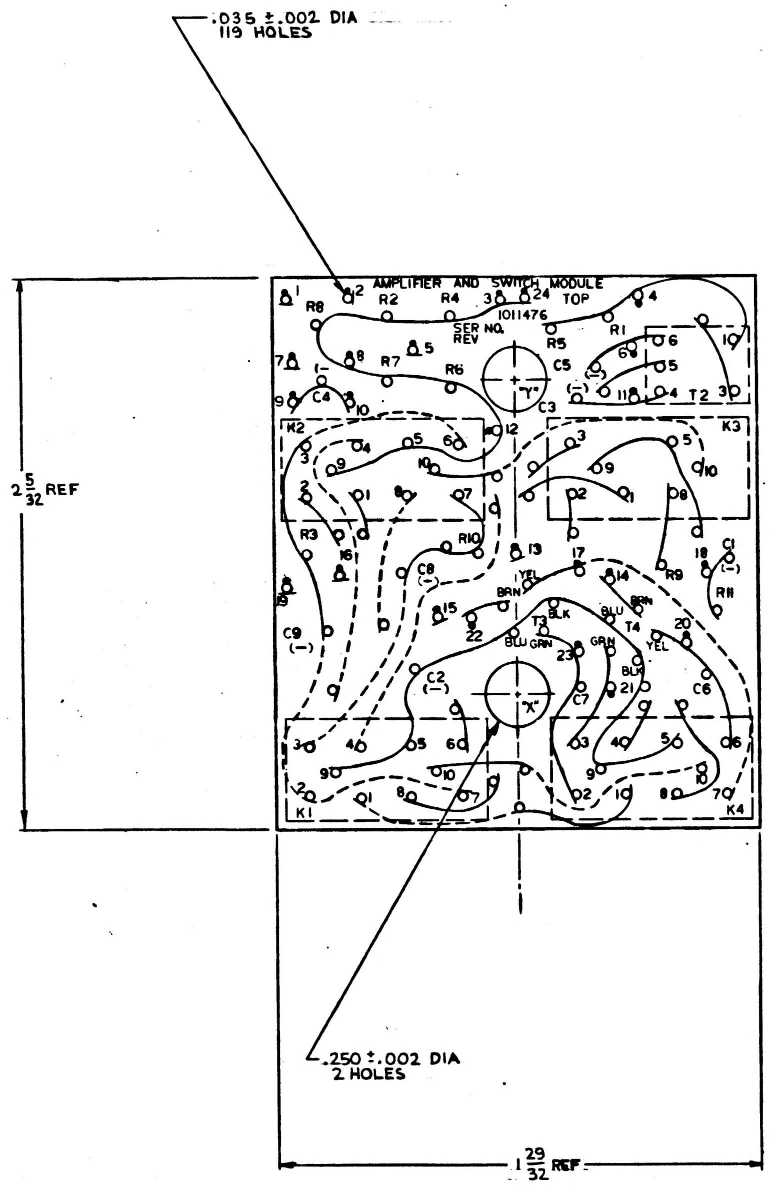
CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011474
SCALE
WT
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

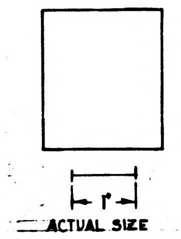
1011476 A

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS 03051				
A		REVISED PER TDRR NO. 05235	12/17/63	

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. PREPARE BOARD FOR PHOTOGRAPHY PER ND1002133.
3. MATERIAL: .006 TO .008 THICK PLASTIC SHEET SENSITIZED AND DIMENSIONALLY STABLE PER FED SPEC L-F-340, TYPE IB CLASS 2 STYLE IA
4. A MINIMUM OF .750 EXCESS MATERIAL TO BE LEFT ON ALL EDGES.
5. DASHED LINE INDICATES SLEEVING.


.035 ± .002 DIA
119 HOLES
AMPLIFIER AND SWITCH MODULE
TOP
1011476
SER NO.
REV
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
C1 (–)
C2 (–)
C3
C4
C5
C6
C7
C8 (–)
C9 (–)
K1
K2
K3
K4
T2
T3
T4
"Y"
"X"
YEL
BRN
BLK
BLU
GRN
$2\frac{5}{32}$ REF
.250 ± .002 DIA
2 HOLES
$1\frac{29}{32}$ REF

REFERENCE:
DWG NO. 1011528 PHOTOGRAPHIC MASTER.


1"
ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011486	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± 1/64 DECIMALS ± .005 ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE 3
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 46387000040
DRAWN J. MARGIOTTA DATE 7-9-63
CHECKED 7-17-63
APPROVAL 8-26-63
APPROVAL 8-30-63
NASA APPROVAL
MIT APPROVAL 10 Aug 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
WIRING BOARD, TOP
AMP. & SWITCHING MODULE

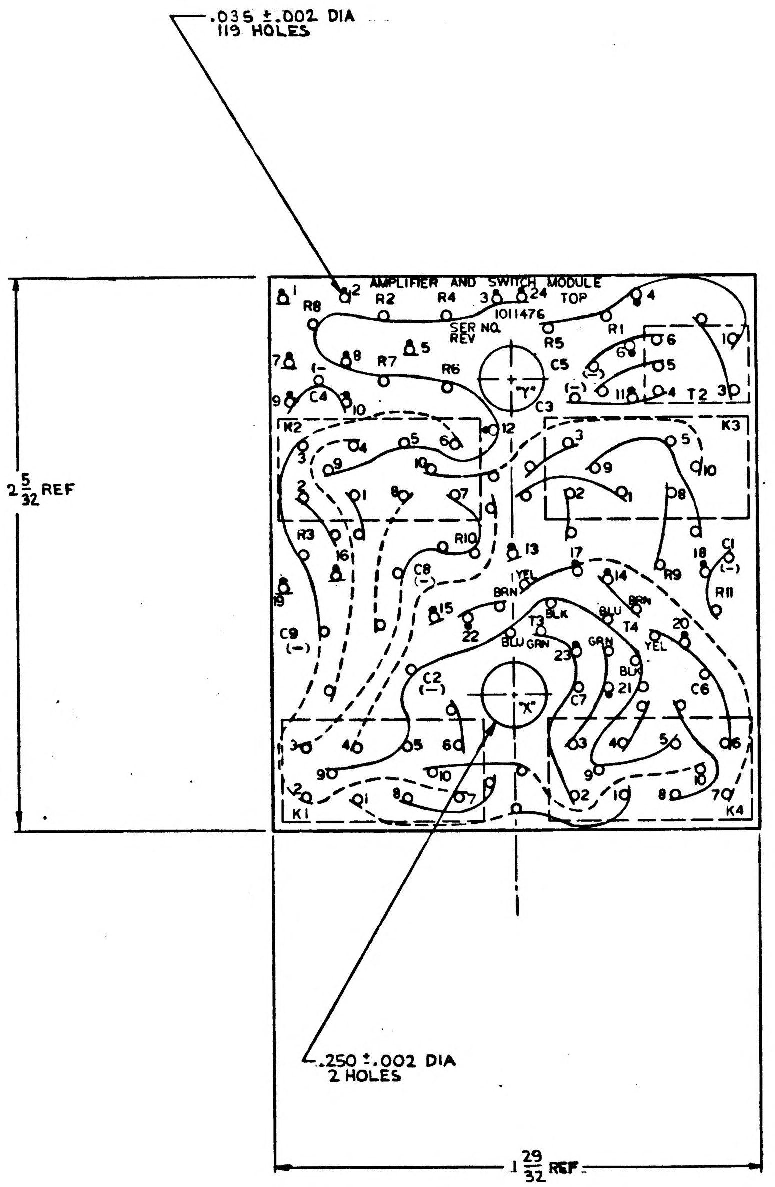
CODE IDENT NO.
SIZE E
NASA NUMBER 1011476
SCALE 4:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
PHOTOGRAPHIC SCALE ONLY

1011476

REVISIONS 03051				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. PREPARE BOARD FOR PHOTOGRAPHY PER ND1002133.
3. MATERIAL: .006 TO .008 THICK PLASTIC SHEET SENSITIZED AND DIMENSIONALLY STABLE PER L-F-340, TYPE IB CLASS 2 STYLE IA.
4. A MINIMUM OF .750 EXCESS MATERIAL TO BE LEFT ON ALL EDGES.
5. DASHED LINE INDICATES SLEEVING.


.035 ± .002 DIA
119 HOLES
AMPLIFIER AND SWITCH MODULE
TOP
1011476
SER NO.
REV
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
C1
C2
C3
C4
C5
C6
C7
C8
C9
(−)
"Y"
"X"
K1
K2
K3
K4
T2
T3
T4
YEL
BRN
BLK
BLU
GRN
$2\frac{5}{32}$ REF
.250 ± .002 DIA
2 HOLES
$1\frac{29}{32}$ REF

REFERENCE:
DWG NO. 1011528 PHOTOGRAPHIC MASTER.

1"
ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	
TOL ON	FRACTIONS ± 1/64 DECIMALS ± .005 ANGLES ± ½
DO NOT SCALE THIS DRAWING	
MATERIAL	SEE NOTE 3
CONTRACT	
KOLLSMAN INSTRUMENT CORPORATION ELMHURST NEW YORK	KIC PN 46387000040
DRAWN	J. MARGIOTTA DATE 7-9-63
CHECKED	7-17-63
APPROVAL	M. Wegner 8-2-63
APPROVAL	8-30-63
NASA APPROVAL	2/4/64
MIT APPROVAL	W Kupfer 10/Aug/63
MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
TITLE	WIRING BOARD, TOP AMP & SWITCHING MODULE
CODE IDENT NO.	
SIZE	E
NASA NUMBER	1011476
SCALE	4:1
WEIGHT	CALC ACTUAL
SHEET	1 OF 1

NEXT ASSY	USED ON
1011486	1011559
APPLICATION	

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

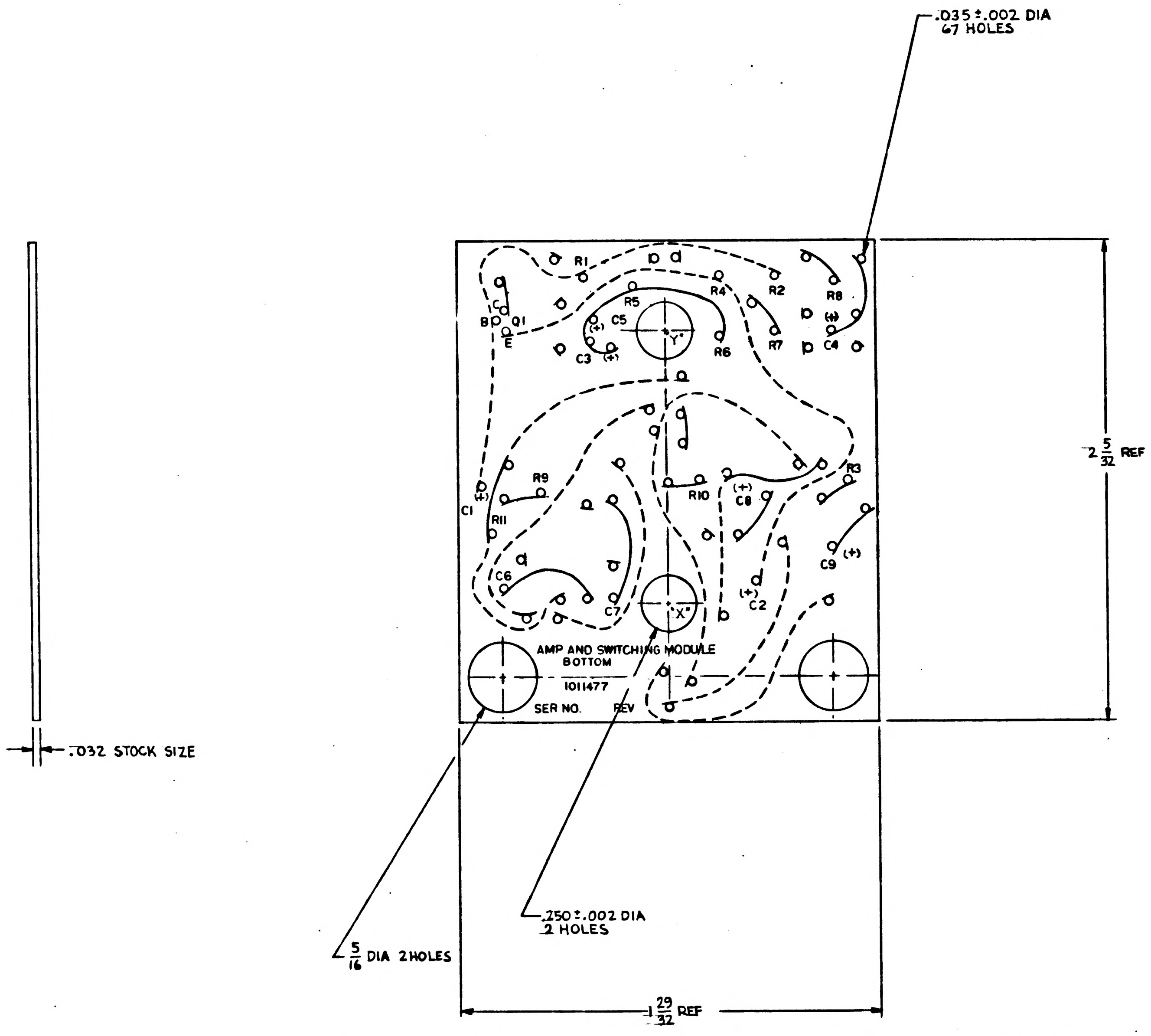
1011476

1011477

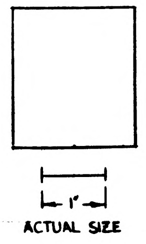
REVISIONS 03051

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. TRANSFER HOLE LOCATIONS AND CIRCUIT PATHS BY SILK SCREEN PROCESS PER ND 1002112
3. MATERIAL: PLASTIC LAMINATED, THERMO SETTING, EPOXY RESIN, GLASS FIBER BASE, HIGH TEMP TYPE PER MIL-P-18177 TYPE GEB.
4. A MINIMUM OF .750 EXCESS MATERIAL TO BE LEFT ON ALL EDGES
5. DASHED LINE INDICATES SLEEVING.


.035 ± .002 DIA
67 HOLES
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
C1
C2
C3
C4
C5
C6
C7
C8
C9
Q1
B
C
E
(+)
Y
X
AMP AND SWITCHING MODULE
BOTTOM
1011477
SER NO.
REV
2 5/32 REF
.032 STOCK SIZE
5/16 DIA 2 HOLES
.250 ± .002 DIA
2 HOLES
1 29/32 REF

REFERENCE:
DWG NO. 1011529 FOR PHOTOGRAPHIC MASTER.


1"
ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011486	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ± .005; ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL: SEE NOTE 3
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 46387000050
DRAWN J. MARGIOTTA DATE 7-10-63
CHECKED 7-17-63
APPROVAL M. Warner 8-6-63
APPROVAL 8-30-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
WIRING BOARD, BOTTOM
AMP AND SWITCHING MODULE

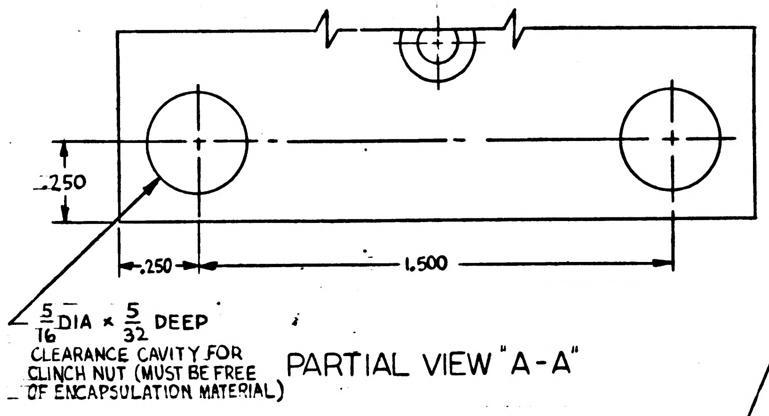
CODE IDENT NO.
SIZE E
NASA NUMBER 1011477
SCALE 4:1
WEIGHT CALC ACTUAL
SHEET OF

1011477

1011478 A

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. INSIDE DIAMETER AND FACE (BOTH ENDS) OF SPACER SLEEVE TO BE FREE OF ENCAPSULATION.
3. REFERENCE: SCHEMATIC DWG NO. 1011453.
4. IDENTIFY USING NASA DRAWING NO. REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND1002019.
(A1) 5. ENCAPSULATE MODULE PER ND 1002106

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A_2		UPGRADED TO CLASS "A" WITH CHANGES PER TDRR NO. 03365	7/26/	

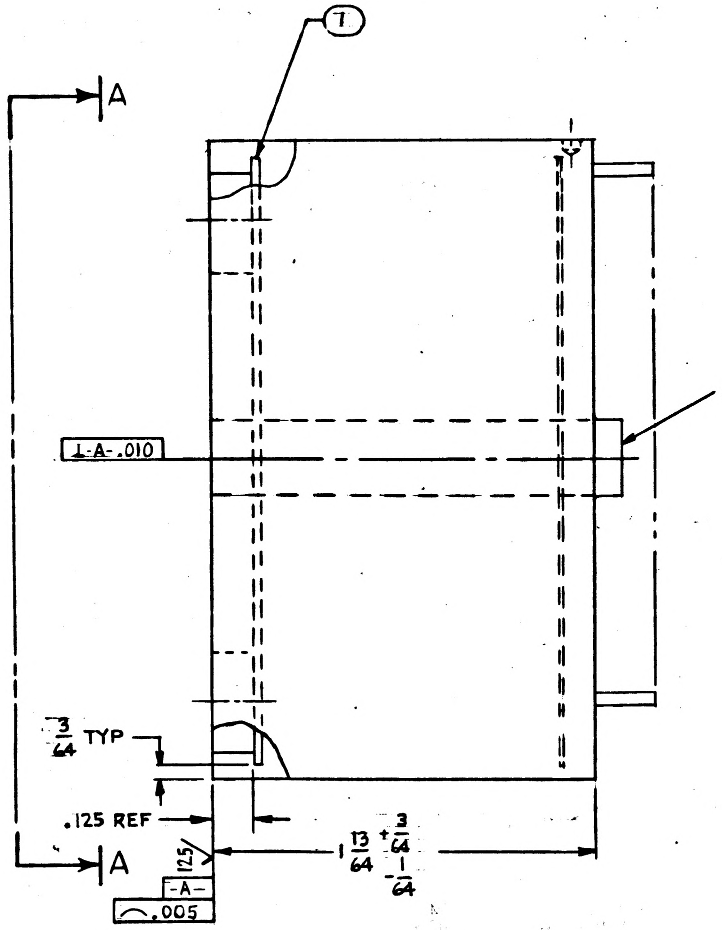


.250
.250
1.500

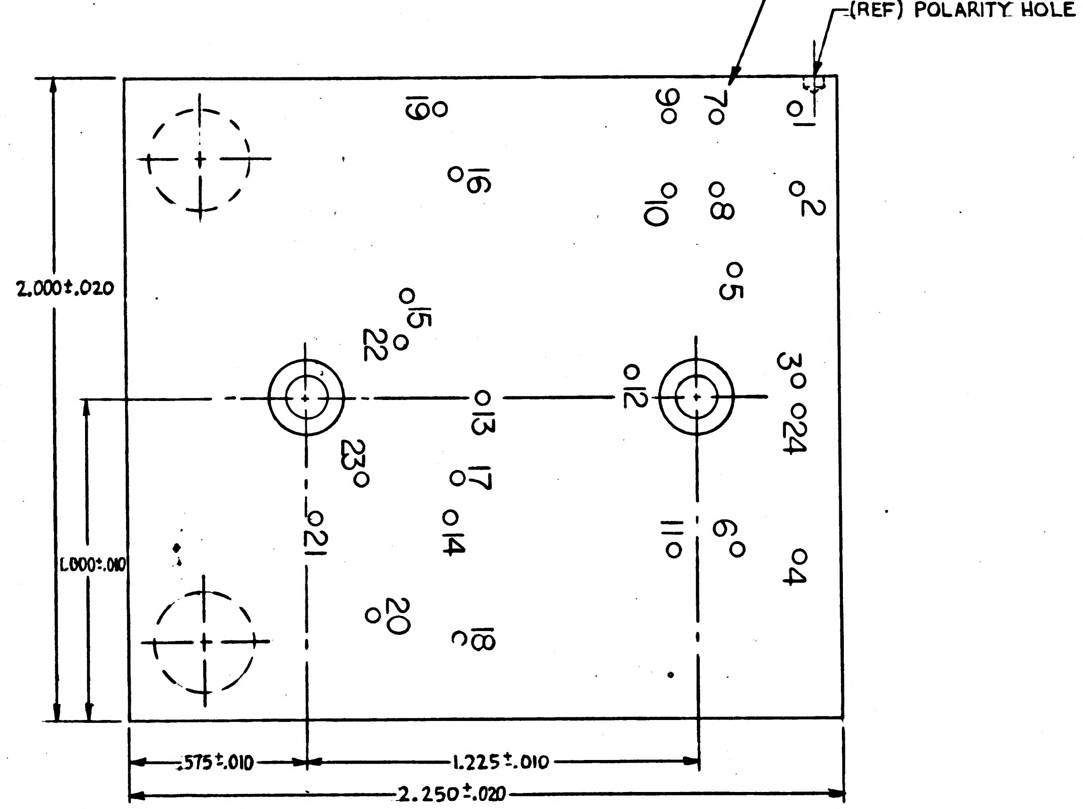
$\frac{5}{16}$ DIA × $\frac{5}{32}$ DEEP CLEARANCE CAVITY FOR CLINCH NUT (MUST BE FREE OF ENCAPSULATION MATERIAL)

PARTIAL VIEW "A-A"

MARK ALL CHARACTERS AS SHOWN 1/16 HIGH IN ACCORDANCE WITH ND1002019. REFERENCE DESIGNATION MARKINGS HAVE BEEN POSITIONED TO PERMIT SCALING FROM THIS DRAWING.



7
A
SEE NOTE 2
⊥ A .010
3/64 TYP
.125 REF
A
.125
-A-
⌒ .005
1 13/64 +3/64 −1/64



(REF) POLARITY HOLE
2.000±.020
1.000±.010
.575±.010
1.225±.010
2.250±.020
1
2
3
4
5
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11
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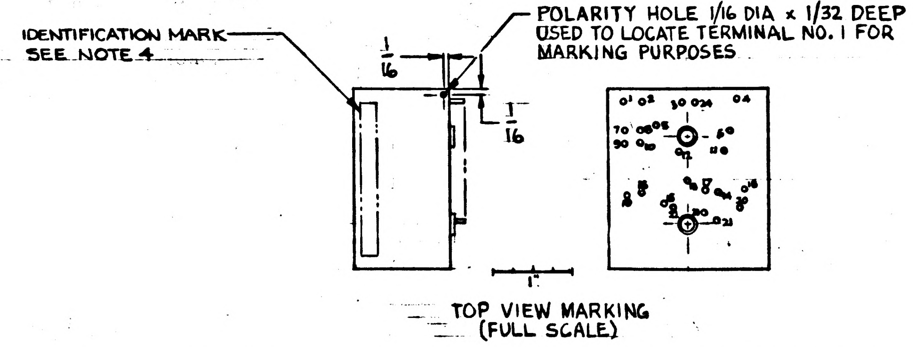
24



IDENTIFICATION MARK SEE NOTE 4
POLARITY HOLE 1/16 DIA × 1/32 DEEP USED TO LOCATE TERMINAL NO. 1 FOR MARKING PURPOSES
1/16
1/16

TOP VIEW MARKING (FULL SCALE)

MASTER

(A2)

1	1		1011486	85387000140		WAFER & COMPONENT ASSY			
ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011479	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ±.005; ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 87387000040
DRAWN J. MARGIOTTA DATE 7-12-63
CHECKED W HENDRICKSON 7-12-63
APPROVAL M. Werner 8-30-63
APPROVAL E. Thoup 9-4-63
NASA APPROVAL 9/4/63
MIT APPROVAL J Nagel 9/5/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

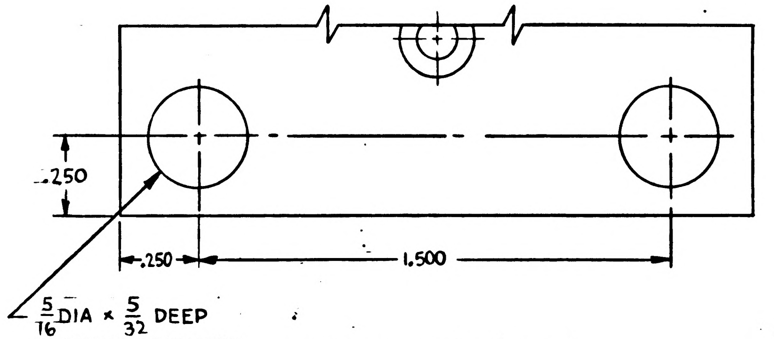
TITLE
AMPLIFIER AND SWITCH MODULE
ASSY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011478
SCALE 4:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

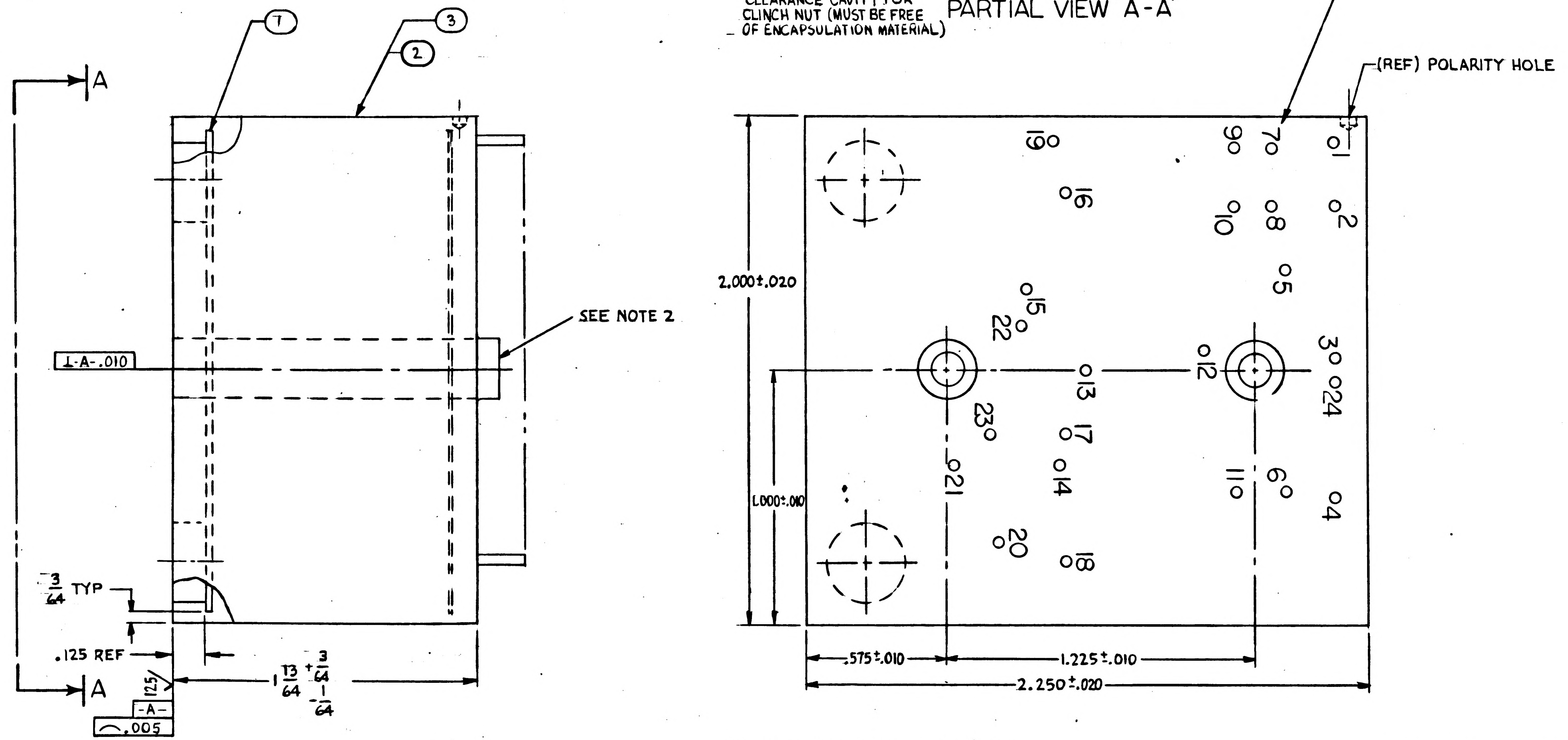
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. INSIDE DIAMETER AND FACE (BOTH ENDS) OF SPACER SLEEVE TO BE FREE OF ENCAPSULATION.
3. REFERENCE: SCHEMATIC DWG NO. 1011453.
4. IDENTIFY USING NASA DRAWING NO. REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND1002019.

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL


.250
.250
1.500
5/16 DIA × 5/32 DEEP
CLEARANCE CAVITY FOR CLINCH NUT (MUST BE FREE OF ENCAPSULATION MATERIAL)

PARTIAL VIEW "A-A"

MARK ALL CHARACTERS AS SHOWN 1/16 HIGH IN ACCORDANCE WITH ND1002019. REFERENCE DESIGNATION MARKINGS HAVE BEEN POSITIONED TO PERMIT SCALING FROM THIS DRAWING.


7
3
2
A
A
SEE NOTE 2
⊥ -A- .010
3/64 TYP
.125 REF
.125
-A-
⌒ .005
1 13/64 +3/64 -1/64
(REF) POLARITY HOLE
2.000±.020
1.000±.010
.575±.010
1.225±.010
2.250±.020
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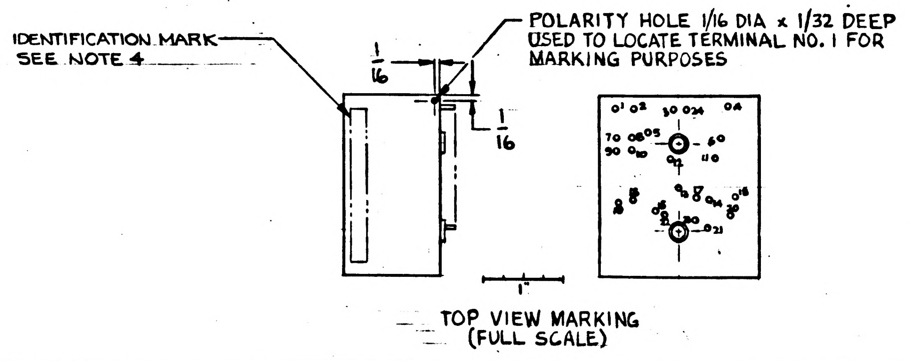

IDENTIFICATION MARK SEE NOTE 4
POLARITY HOLE 1/16 DIA × 1/32 DEEP USED TO LOCATE TERMINAL NO. 1 FOR MARKING PURPOSES
1/16
1/16
1"

TOP VIEW MARKING (FULL SCALE)

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 02941 **DATE**

3	AR		1010306	74471431001		CURING AGENT			
2	AR		1010305	74471432001		EPOXY RESIN			
1	1		1011486	85387000140		WAFER & COMPONENT ASSY			
ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011479	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ± .005; ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 87387000040
DRAWN J. MARGIOTTA DATE 7-12-63
CHECKED W. HENDRICKSON 7-17-63
APPROVAL M. Werner 8-30-63
APPROVAL E. Thorp 9-4-63
NASA APPROVAL 9/4/63
MIT APPROVAL J. Nagel 9/5/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
TITLE
AMPLIFIER AND SWITCH MODULE
ASSY OF
CODE IDENT NO.
SIZE D
NASA NUMBER 1011478
SCALE 4:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

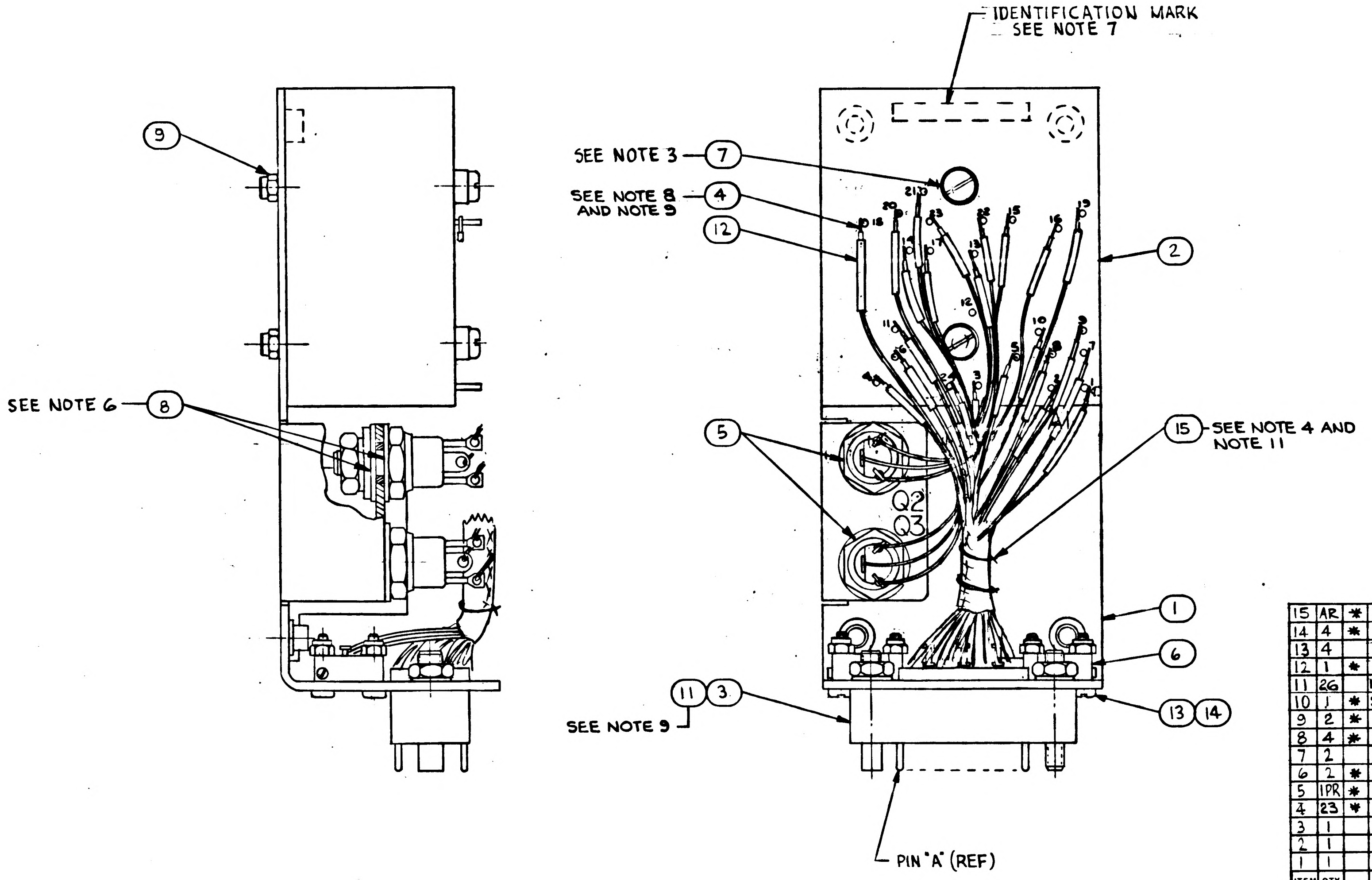
1011478

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011479 A

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		DWG REVISED & UPGRADED TO CLASS A PER TDRR NO. 03817	10 Oct 63	WK

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. SOLDER IN ACCORDANCE WITH MSFC-PROC-158, USING TYPE SN60 WAR P2, PER QQ-S-571.
3. SCREW TORQUE REQUIREMENT 3-4 IN.-LBS.
4. ROUTE ELECTRICAL WIRING IN ACCORDANCE WITH DWG NO. 1011480 USING ITEMS ⑩ AND ⑮.
5. REFERENCE SCHEMATIC DWG 1011454.
6. TRANSISTORS Q2 & Q3, REMOVE (2) MICA WASHERS SUPPLIED WITH EACH TRANSISTOR AND REPLACE WITH ITEM ⑧.
7. IDENTIFY USING NASA DRAWING NO. REVISION LETTER AND MANUFACTURER SYMBOL PER ND 1002019.
8. WELD PER ND 1002005
9. INSTALL CRIMP STYLE TERMINALS IN ACCORDANCE WITH ND1002206.
10. WIRE, ND1002105, 24 AWG, TYPE 1, WHITE, 9 FT IN TOTAL LENGTH.
11. LACE WIRES TOGETHER USING ITEM ⑮ PER MIL-S-572.



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
15	AR	*	1011753			TAPE, LACING & TYING			
14	4	*	1011750-4	74443128004		NUT, SELF-LOCKING, HEXAGON			
13	4		MS35233-5			SCREW, MACHINE, PAN HD			
12	1	*	1006776-15	60025155015		INSULATION SLEEVING 11½" LG (23 - ½" LENGTHS)			
11	26		MS17803-16-20			CONTACT, ELECTRICAL CONN., PIN, CRIMP, REMOVABLE			
10	J	*	SEE NOTE 10			WIRE, IRRADIATED, POLYOLEFIN, ELECTRICAL			
9	2	*	1011750-8	74443128008		NUT, SELF-LOCKING, HEXAGON			
8	4	*	1011495-1	74468067001		WASHER, INSULATING			
7	2		MS35233-23			SCREW, MACHINE, PAN HD			
6	2	*	1011498	68410017001		RESISTOR, VARIABLE, WIREWOUND (TRIMMER)			
5	1PR	*	1010269-2	68413008902		TRANSISTOR (2 AMP, SELECT, N-P-N METAL CASE)			
4	23	*	1011494	68107002201		CONTACT, ELECTRICAL (PIN, CRIMP TERMINATION)			
3	1		1011499	68502020501		CONNECTOR, ELECTRICAL, RECEPTACLE			
2	1		1011478	87387000040		AMP & SW. MODULE ASSY			
1	1		1011484	85387000120		BRACKET, MTG, ASSY OF			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

MASTER

NEXT ASSY	USED ON
1011483	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± —; DECIMALS ± —; ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 87387000050
DRAWN J. MARGIOTTA DATE 6-28-63
CHECKED W. HENDRICKSON 7-17-63
APPROVAL M. Werner 8-30-63
APPROVAL E. Thomas 9-4-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
AMPLIFIER AND SWITCH UNIT,
ASSY OF

CODE IDENT NO. | SIZE D | NASA NUMBER 1011479
SCALE 2/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

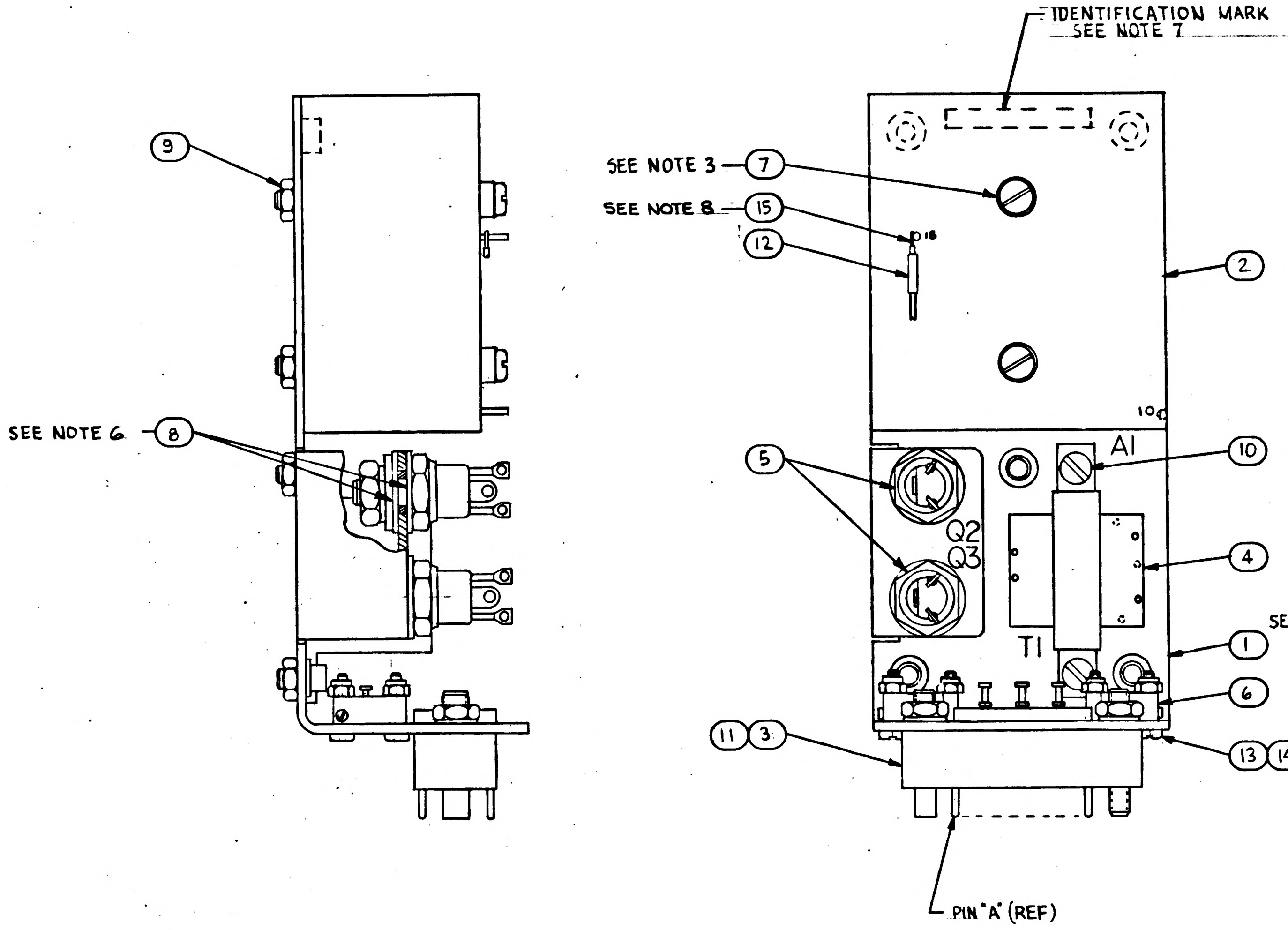
E-188

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011479

SYM	ZONE	REVISIONS DESCRIPTION	DATE	APPROVAL

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. SOLDER PER MIL-S-6872
3. SCREW TORQUE REQUIREMENT 3-4 IN LBS.
4. ROUTE ELECTRICAL WIRING IN ACCORDANCE WITH DWG NO. 1011480 USING ITEMS ⑯ AND ⑰.
5. REFERENCE SCHEMATIC DWG 1011454.
6. TRANSISTORS Q2 & Q3, REMOVE (2) MICA WASHERS SUPPLIED WITH EACH TRANSISTOR AND REPLACE WITH ITEM ⑧.
7. IDENTIFY USING NASA DRAWING NO. REVISION LETTER AND MANUFACTURER SYMBOL PER ND 1002019.
8. WELD PER ND 1002005



FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 02921 **DATE**

SEE NOTE 4 (items 16, 17)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
17	AR		1011753	60335142001		LACE, TAPE			
16	AR		1010416-20	60015153020		WIRE, ELECTRICAL			
15	25		1011494	68107002201		PIN, CRIMP			
14	4		1011750-4	74443128004		LOCKNUT			
13	4		MS35233-5	7445506 —		SCREW, PAN HD			
12	12½"		1006776-15	60025155015		INSULATION SLEEVING	1/2" LG		
11	26		1011500	68107002301		PIN (MALE)			
10	2		MS35233-14	7445506-		SCREW, PAN HD			
9	4		1011750-8	74443128008		LOCKNUT			
8	4		1011495-1	74468067001		INSULATOR, WASHER			
7	2		MS35233-23	7445506-9		SCREW, PAN HD			
6	2		1011498	68410017001		RESISTOR, VAR			
5	1PR		1010269-2	68413008902		TRANSISTORS			
4	1		1011414	68400023301		TRANSFORMER, PWR			
3	1		1011499	68502020501		CONNECTOR, RECP			
2	1		1011478	87387000040		AMP & SW. MODULE ASSY			
1	1		1011484	85387000120		BRACKET, MTG, ASSY OF			

LIST OF PARTS AND MATERIALS

1011483	1011559
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 87387000050
DRAWN J. MARGIOTTA DATE 6-28-63
CHECKED W. HENDRICKSON 7-17-63
APPROVAL M. Werner 8-30-63
APPROVAL E. Thomas 9-4-63
NASA APPROVAL W. Mi[illegible] 1/4/63
MIT APPROVAL [illegible] 9/16/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
AMPLIFIER AND SWITCH UNIT
ASSY OF

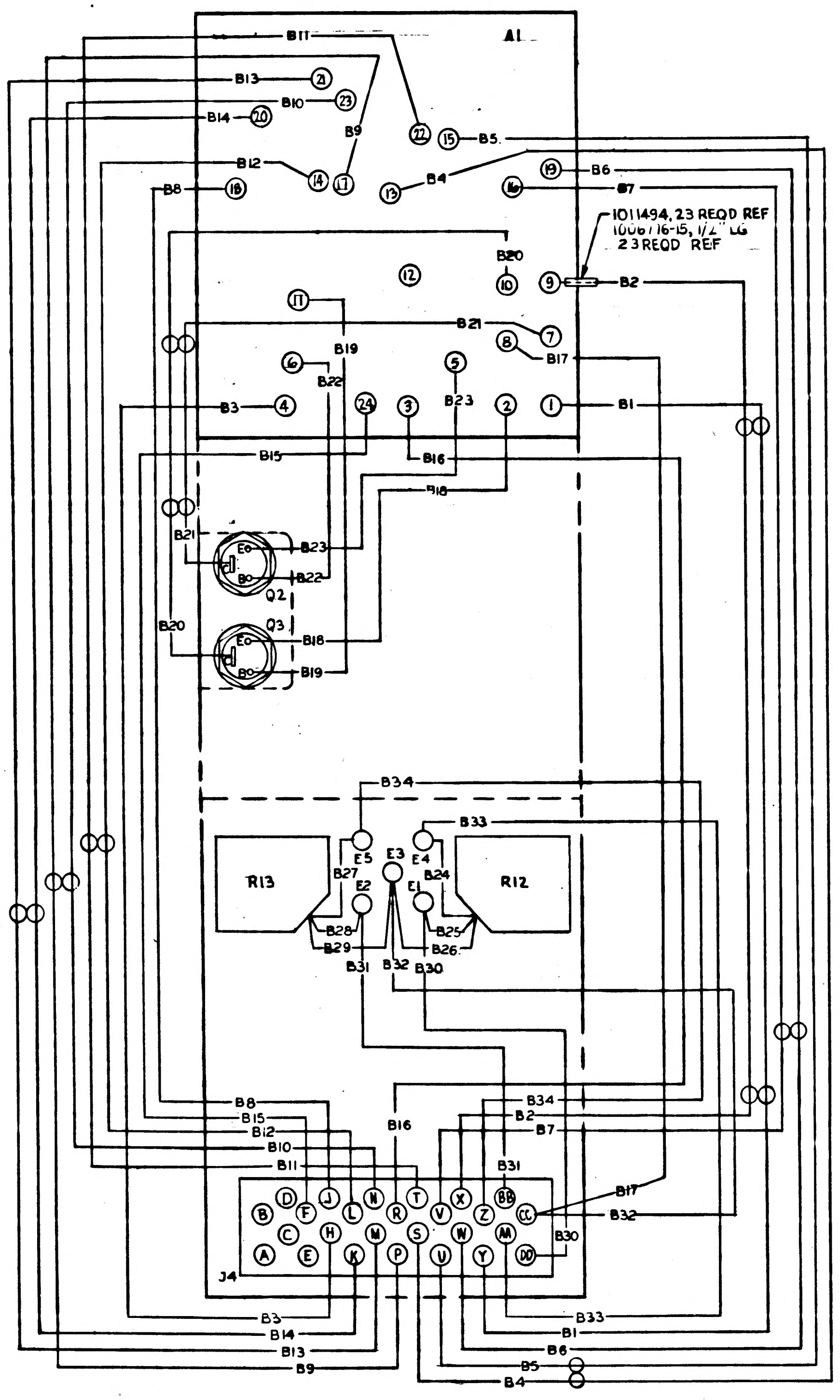
CODE IDENT NO.
SIZE D
NASA NUMBER 1011479
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011480

REVISIONS 0 3576				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. SOLDER IN ACCORDANCE WITH MSFC-PROC-158, USING TYPE SN60 WAR P2 PER QQ-S-571.
3. INSTALL CRIMP STYLE TERMINALS IN ACCORDANCE WITH ND 1002206.
4. BIND WIRES TOGETHER USING PART NO. 1011753 (REF). MIL-S-572 FORM S OR Y LOCKSTITCH AT 1/2 INCH SPACING
5. COND. NO. SHALL BE MARKED ON EACH WIRE PER ND1002019 SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY TWO (2) INCHES. MAXIMUM. SPIRALLING OF THE MARKINGS IS ALLOWED.
6. TWISTED CONDUCTORS TO CONSIST OF THREE (3) FULL TURNS PER INCH MINIMUM.


A1
B11
B13
B10
B14
B9
B12
B8
B5
B6
B7
B4
21
23
20
22
15
19
14
17
18
13
16
1011494, 23 REQD REF
1006716-15, 1/2" LG
23 REQD REF
B20
12
10
9
B2
11
B21
7
8
B17
B19
6
5
B22
B23
B3
4
24
3
2
1
B1
B15
B16
B18
B21
E
B
Q2
Q3
B20
B23
B22
B18
B19
B34
B33
R13
R12
E5
E3
E4
B27
B24
E2
E1
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B25
B29
B26
B31
B32
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F
H
J
K
L
M
N
P
R
S
T
U
V
W
X
Y
Z
AA
BB
CC
DD
J4
B3
B14
B13
B9
B33
B1
B6
B5
B4

WIRING LEGEND						
COND. NO.	COLOR	ITEM ** NO.	LENGTH (REF)	FROM	TO	SEE NOTE 6
B1	WHITE	16	4 INCH	A1-1	J4-Y	8
B2	↑	↑	↑	A1-9	J4-X	
B3				A1-4	J4-H	
B4				A1-13	J4-S	8
B5				A1-15	J4-U	
B6				A1-19	J4-W	8
B7				A1-16	J4-V	
B8				A1-18	J4-J	
B9				A1-17	J4-P	8
B10				A1-23	J4-N	
B11				A1-22	J4-T	8
B12				A1-14	J4-L	
B13				A1-21	J4-M	8
B14				A1-20	J4-K	
B15				A1-24	J4-F	
B16				A1-3	J4-R	
B17				A1-8	J4-CC	
B18				A1-2	Q3-E	
B19				A1-11	Q3-B	
B20				A1-10	Q3-C	8
B21				A1-7	Q2-C	
B22	↓	↓	↓	A1-6	Q2-B	
B23	WHITE	16	4 INCH	A1-5	Q2-E	
* B24	GREEN	—	AR	R12-GREEN	E4	
* B25	RED	—	AR	R12-RED	E1	
* B26	YELLOW	—	AR	R12-YELLOW	E3	
* B27	GREEN	—	AR	R13-GREEN	E5	
* B28	RED	—	AR	R13-RED	E2	
* B29	YELLOW	—	AR	R13-YELLOW	E3	
B30	WHITE	16	2 INCH	E1	J4-DD	
B31	↑	↑	↑	E2	J4-BB	
B32				E3	J4-CC	
B33	↓	↓	↓	E4	J4-AA	
B34	WHITE	16	2 INCH	E5	J4-Z	

*- CONDUCTOR NUMBER FOR REFERENCE ONLY-WIRE SHALL NOT BE MARKED

**- REFER TO ASS'Y DWG 1011479.

REFERENCE
1. AMPL & SW ASSY SCHEMATIC DIAGRAM 1011454
2. MECH ASSY DRAWING 1011479

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

	1011559
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± //	± //	± //

DO NOT SCALE THIS DRAWING
MATERIAL —//—
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80387000040
DRAWN J. MARGIOTTA DATE 7-22-63
CHECKED F. Costen 10/1/63
APPROVAL F. Costen 10/1/63
APPROVAL E.A. Wanderer 10-2-63
NASA APPROVAL W. J. Wh… 10-3-63
MIT APPROVAL W. Kupfer 3 Oct 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
AMPLIFIER AND SWITCH ASSY
WIRING DIAGRAM

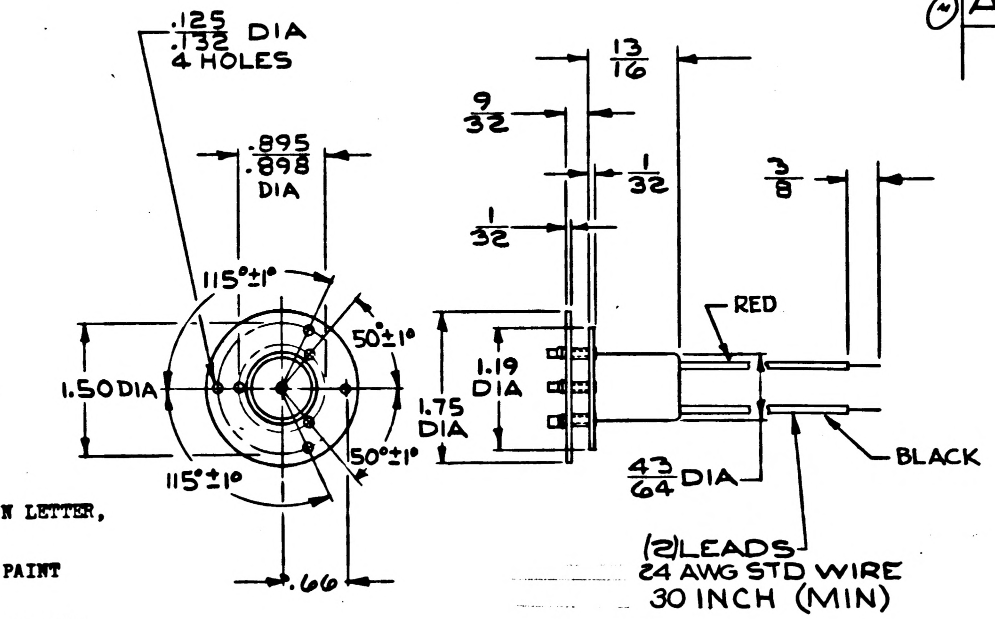
CODE IDENT NO.
SIZE E
NASA NUMBER 1011480
SCALE NONE
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

A 1011481

REVISIONS 03050			
SYM	DESCRIPTION	DATE	APPROVAL
A3	REVISED PER TDRR NO. 03803	10 Oct 63	WK



REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - 1. ALL ITEMS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER, AND MANUFACTURER'S IDENTIFICATION AS FOLLOWS:
       - a. UNITS IN ACCORDANCE WITH MIL-STD-130, EXCEPTING INK OR PAINT SHALL NOT BE USED.
       - b. PACKING AND SHIPPING CONTAINERS IN ACCORDANCE WITH MIL-STD-129.
     - 2. MECHANICAL DIMENSIONS AS SHOWN.
     - 3. ENGAGEMENT: ACCOMMODATE PREFOCUSED CANDELABRA BASED DOUBLE CONTACT LAMP.
   - B. ELECTRICAL REQUIREMENTS:
     - 1. INSULATION RESISTANCE: 1000 MEGOHMS MIN AT 500 VDC
     - 2. DIELECTRIC STRENGTH: SEA LEVEL 1000 V RMS
3. DESIGN REQUIREMENTS:
   - A. MOUNTING: FLANGE
   - B. INSULATION: FIBERGLASS, LAMINATED, SILICONE RESIN IMPREGNATED PER MIL-P-997 TYPE GT.
   - C. SHELL AND FLANGE: STEEL NICKEL PLATED PER QQ-N-290 CLASS 1, TYPE II (FS)
   - D. CONTACTS: BRASS, NICKEL PLATED PER QQ-N-290 CLASS 1, TYPE V (FC)
   - E. WIRE LEADS MIL-W-16878, TYPE B, 24 AWG
   - F. SPRING: CRES 416 IN ACCORDANCE WITH QQ-S-763 PASSIVATED PER MIL-STD-171, PAR 5.4.2.
4. SPECIAL CONDITIONS:
   - A. THE UNIT SHALL BE CAPABLE OF WITHSTANDING THE ENVIRONMENTAL CONDITIONS SPECIFIED IN THE FOLLOWING SECTIONS OF ND 1002037 WITHOUT DEGRADING PERFORMANCE SPECIFIED BY REQUIREMENT 2 (ABOVE)

APPLICABLE PARAGRAPH	TITLE
4.3	TEMPERATURE - ALTITUDE
4.6	HUMIDITY
4.8	ACCELERATION
4.9	VIBRATION
4.10.1	SHOCK - FLIGHT

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

KIC. NO. 68261001601

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON
FRACTIONS ± 1/64 DECIMALS ±.010 ANGLES ±1°
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 3

HEAT TREATMENT

FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN G. KRUK DATE 7-5-63
CHECKED V. Ruggiero
APPROVAL M. Werner 9-5-63
APPROVAL E. Dhamp 9-9-63
NASA APPROVAL K. Michael 9/11/63
MIT APPROVAL W Kupfer 10 Sep 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

HOLDER, LAMP PREFOCUSED DOUBLE CONTACT CANDELABRA SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011481
SCALE ~
WT
SHEET 1 OF 1

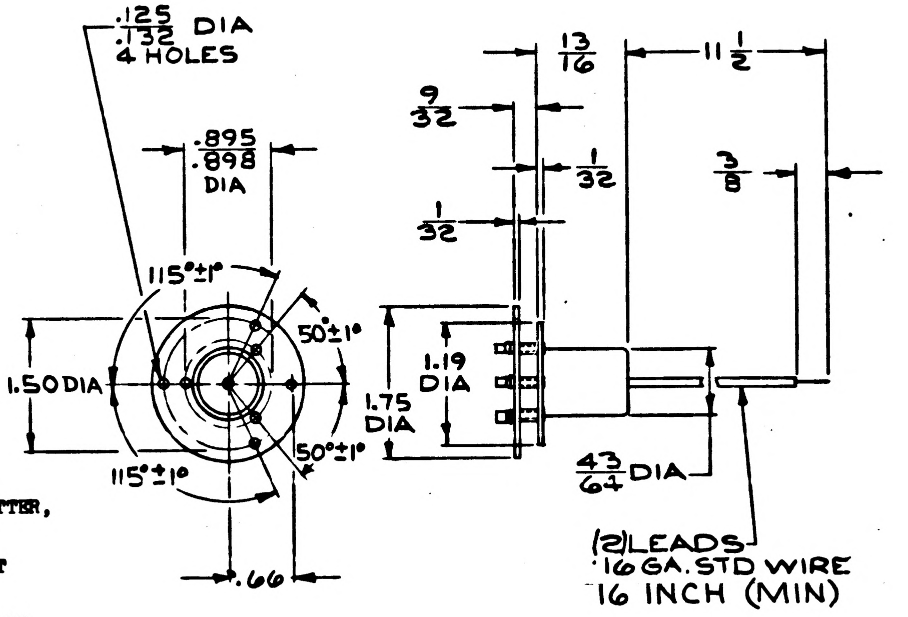
1011481 A

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1011481

REVISIONS 03050			
SYM	DESCRIPTION	DATE	APPROVAL



REQUIREMENTS:

1. GENERAL:

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

   C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.

2. INSPECTION AND ACCEPTANCE:

   A. MECHANICAL REQUIREMENTS:

      1. ALL ITEMS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER, AND MANUFACTURER'S IDENTIFICATION AS FOLLOWS:

         a. UNITS IN ACCORDANCE WITH MIL-STD-130, EXCEPTING INK OR PAINT SHALL NOT BE USED.

         b. PACKING AND SHIPPING CONTAINERS IN ACCORDANCE WITH MIL-STD-129.

      2. MECHANICAL DIMENSIONS AS SHOWN.

      3. ENGAGEMENT: ACCOMMODATE PREFOCUSED CANDELABRA BASED DOUBLE CONTACT LAMP.

   B. ELECTRICAL REQUIREMENTS:

      1. INSULATION RESISTANCE: 1000 MEGOHMS MIN AT 500 VDC

      2. DIELECTRIC STRENGTH: SEA LEVEL 1000 V RMS

3. DESIGN REQUIREMENTS:

   A. MOUNTING: FLANGE

   B. INSULATION: FIBERGLASS, LAMINATED, SILICONE RESIN IMPREGNATED PER MIL-P-997 TYPE GT.

   C. SHELL AND FLANGE: STEEL NICKEL PLATED PER QQ-N-290 CLASS 1, TYPE II (FS)

   D. CONTACTS: BRASS, NICKEL PLATED PER QQ-N-290 CLASS 1, TYPE V (FC)

   E. WIRE LEADS MIL-W-16878, TYPE B, 16 AWG 19/29

   F. SPRING: CRES 416 IN ACCORDANCE WITH QQ-S-763 PASSIVATED PER MIL-STD-171, PAR 5.4.2.

4. SPECIAL CONDITIONS:

   A. THE UNIT SHALL BE CAPABLE OF WITHSTANDING THE ENVIRONMENTAL CONDITIONS SPECIFIED IN THE FOLLOWING SECTIONS OF ND 1002037 WITHOUT DEGRADING PERFORMANCE SPECIFIED BY REQUIREMENT 2 (ABOVE)

APPLICABLE PARAGRAPH	TITLE
4.3	TEMPERATURE - ALTITUDE
4.6	HUMIDITY
4.8	ACCELERATION
4.9	VIBRATION
4.10.1	SHOCK - FLIGHT

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

MASTER

KIC. NO. 68261001601

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/64 DECIMALS ±.010 ANGLES ± 1°
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 3

HEAT TREATMENT

FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN G. KRUK DATE 7-5-63
CHECKED V. Ruggiero
APPROVAL M. Werner 9-5-63
APPROVAL E. Olsen 9-9-63
NASA APPROVAL 9/10/63
MIT APPROVAL W Kupfer 10 Sep 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

HOLDER, LAMP
PREFOCUSED DOUBLE CONTACT
CANDELABRA
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011481
SCALE ~
WT
SHEET 1 OF 1

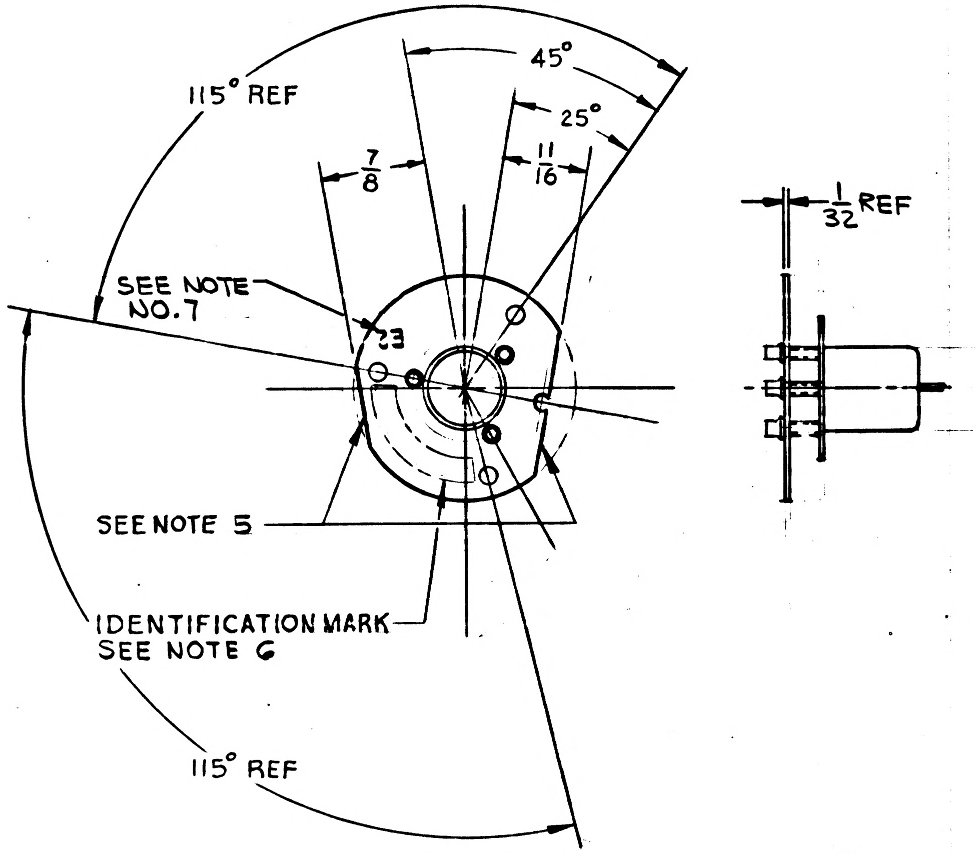
1011481

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011482 A

REVISIONS TDRR 02322				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A2		REVISED PER TDRR NO. 03158	9-16-63	9/17

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. PUNCHED, CUT, OR MACHINED SURFACES TO HAVE $\overset{125}{\surd}$.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. PAINT ALL MACHINED SURFACES WITH ZINC CHROMATE PRIMER PER MIL-P-8585. AIR DRY ONLY.
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MFR'S SYMBOL PER ND1002019.
7. MARK ELECTRICAL REFERENCE DESIGNATION PER ND 1002019



(A1)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

(A2) 1011487	1011559
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	$\pm \frac{1}{64}$	$\pm .005$	$\pm 1°$

DO NOT SCALE THIS DRAWING
MATERIAL 1011481
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 48387000020
DRAWN J. JOHN DATE 7-16-63
CHECKED M Farrell 7-19-63
APPROVAL M. Werner 7-30-63
APPROVAL E. Thomp 7-30-63
NASA APPROVAL W J Rhine 7-31-63
MIT APPROVAL I Hafel 7/31/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SOCKET, LAMP MODIFIED

CODE IDENT NO.
SIZE C
NASA NUMBER 1011482
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011482 A

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

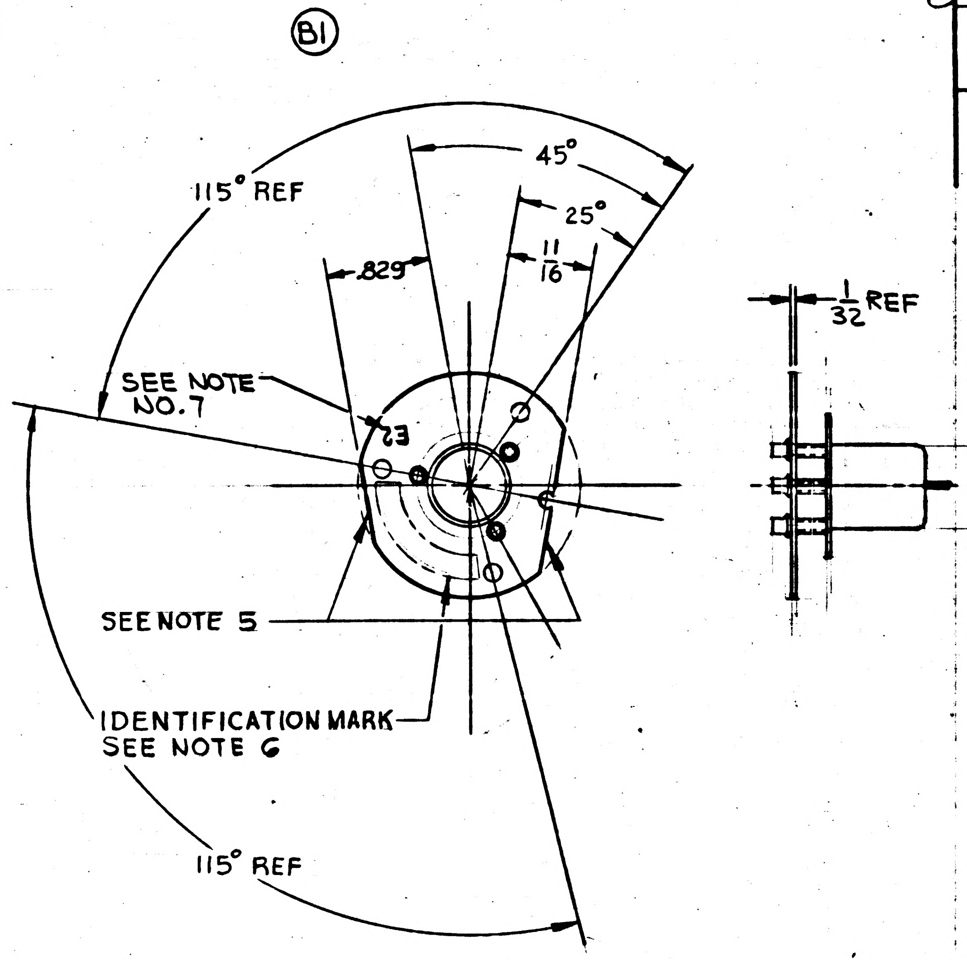
1011482 B

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   - a. PUNCHED, CUT, OR MACHINED SURFACES TO HAVE $\overset{125}{\surd}$.
   - b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. PAINT ALL MACHINED SURFACES WITH ZINC CHROMATE PRIMER PER MIL-P-8585. AIR DRY ONLY.
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MFR'S SYMBOL PER ND1002019.
7. MARK ELECTRICAL REFERENCE DESIGNATION PER ND 1002019

REVISIONS TDRR 02322

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A2		REVISED PER TDRR NO. 03158	8-16-63	9/17
B		REVISED PER TDRR NO. 08047	5/5/64	WAK



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

A1

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011487	1011559

A2

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL 1011481

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 48387000020

DRAWN J. JOHN DATE 7-16-63
CHECKED M Farrell 7-19-63
APPROVAL M Werner 7-30-63
APPROVAL E. Thomp 7-30-63
NASA APPROVAL W J Kline 7-31-63
MIT APPROVAL J Hazel 7/31/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SOCKET, LAMP MODIFIED

CODE IDENT NO.
SIZE C
NASA NUMBER 1011482
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

E-154

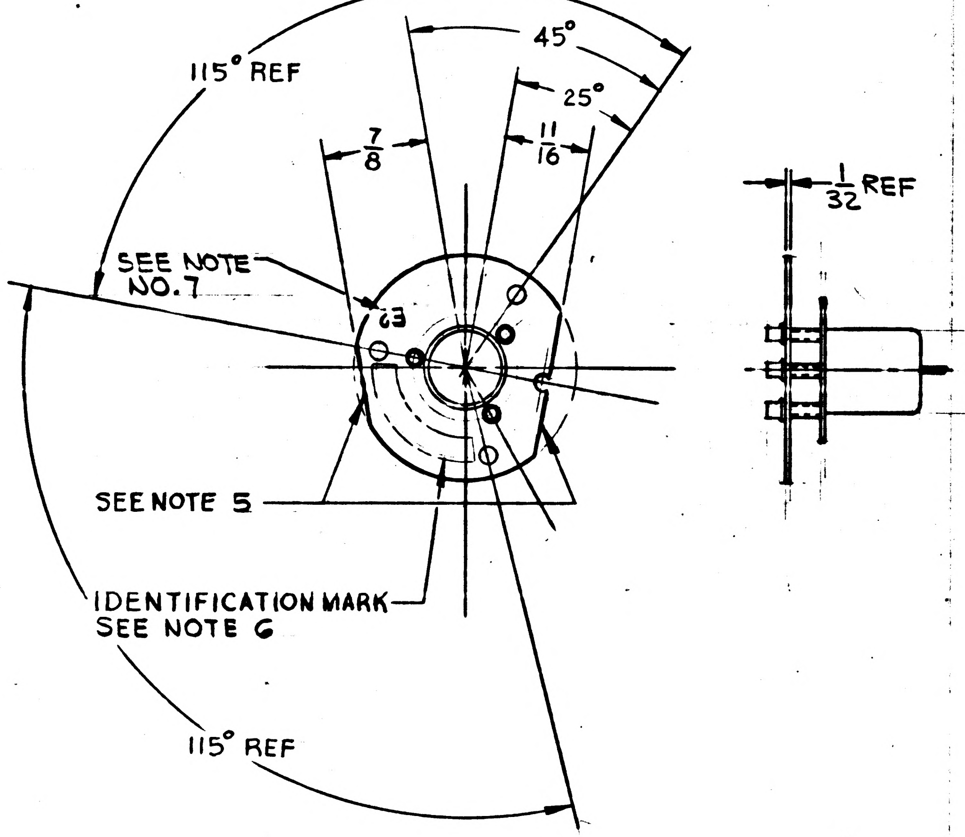
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011482

REVISIONS TDRR02322				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   - a. PUNCHED, CUT, OR MACHINED SURFACES TO HAVE $\sqrt[125]{}$.
   - b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. PAINT ALL MACHINED SURFACES WITH ZINC CHROMATE PRIMER PER MIL-P-8585. AIR DRY ONLY.
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MFR'S SYMBOL PER ND1002019.
7. MARK ELECTRICAL REFERENCE DESIGNATION PER ND 1002019



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011473	1011559
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL 1011481

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 48387000020

DRAWN J. JOHN DATE 7-16-63
CHECKED M Farrell 7-19-63
APPROVAL M. Werner 7-30-63
APPROVAL E. Tharp 7-30-63

NASA APPROVAL W J Rhine 7-31-63
MIT APPROVAL I Halzel 7/31/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SOCKET, LAMP MODIFIED

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011482
SCALE 1/1	WEIGHT CALC ACTUAL	SHEET 1 OF 1

MASTER

E-154

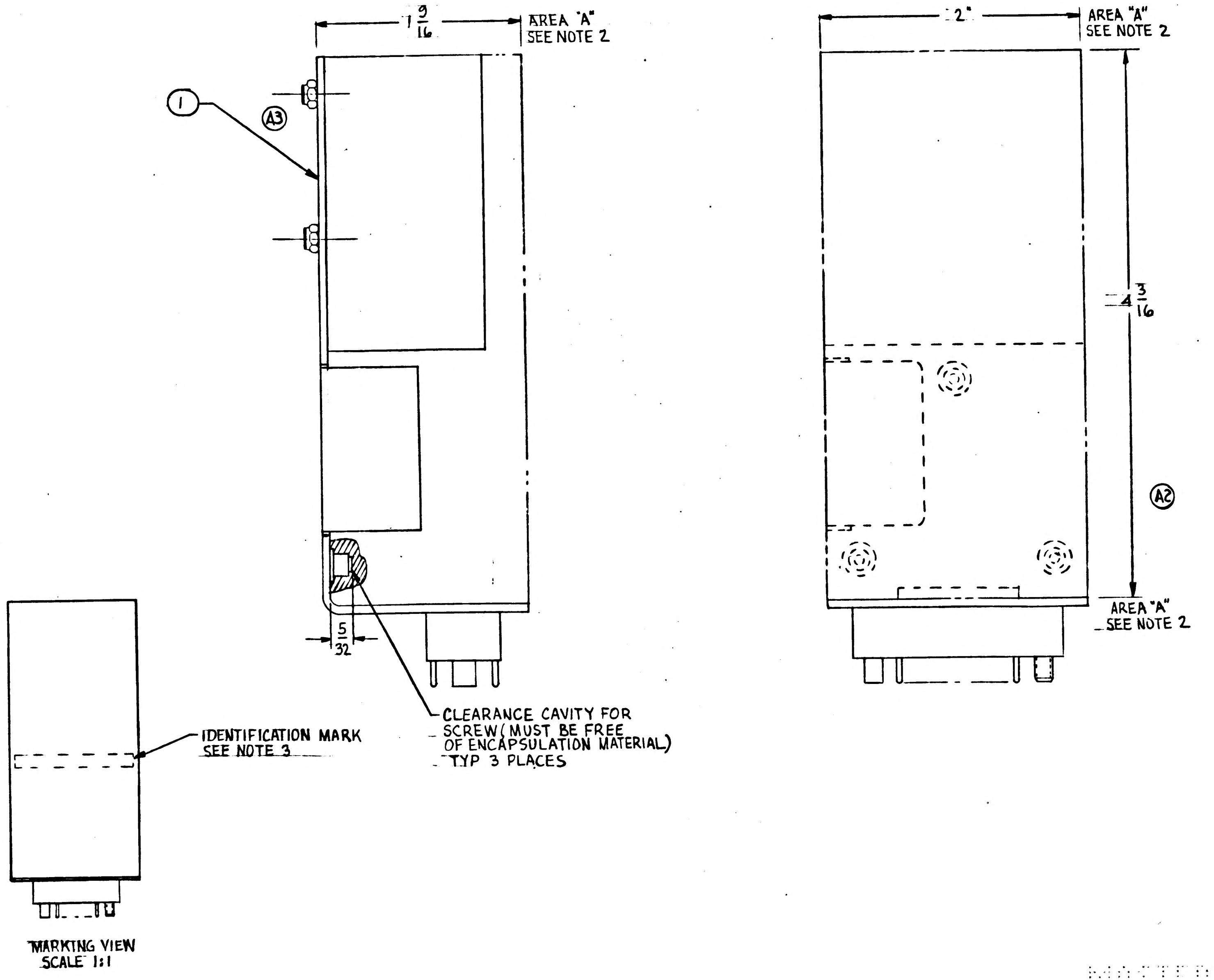
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011482

1011483 A

REVISIONS 03 051				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO. 03809	10 Oct 63	WK

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. AFTER TEST ENCAPSULATE AREA "A" PER ND 1002002
3. IDENTIFY USING NASA DRAWING NO. REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.



CLEARANCE CAVITY FOR SCREW (MUST BE FREE OF ENCAPSULATION MATERIAL) TYP 3 PLACES

IDENTIFICATION MARK SEE NOTE 3

MARKING VIEW SCALE 1:1

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
1	1		1011479	87387000050		AMPL & SW UNIT ASSY OF			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011559	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ±1/64 DECIMALS ±.005 ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 87387000080
DRAWN J. MARGIOTTA DATE 7-8-63
CHECKED W HENDRICKSON 7-20-63
APPROVAL M. Wegman 8-30-63
APPROVAL E. Thorup 9-6-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
AMPLIFIER AND SWITCH
ASSY OF

CODE IDENT NO. SIZE D NASA NUMBER 1011483
SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

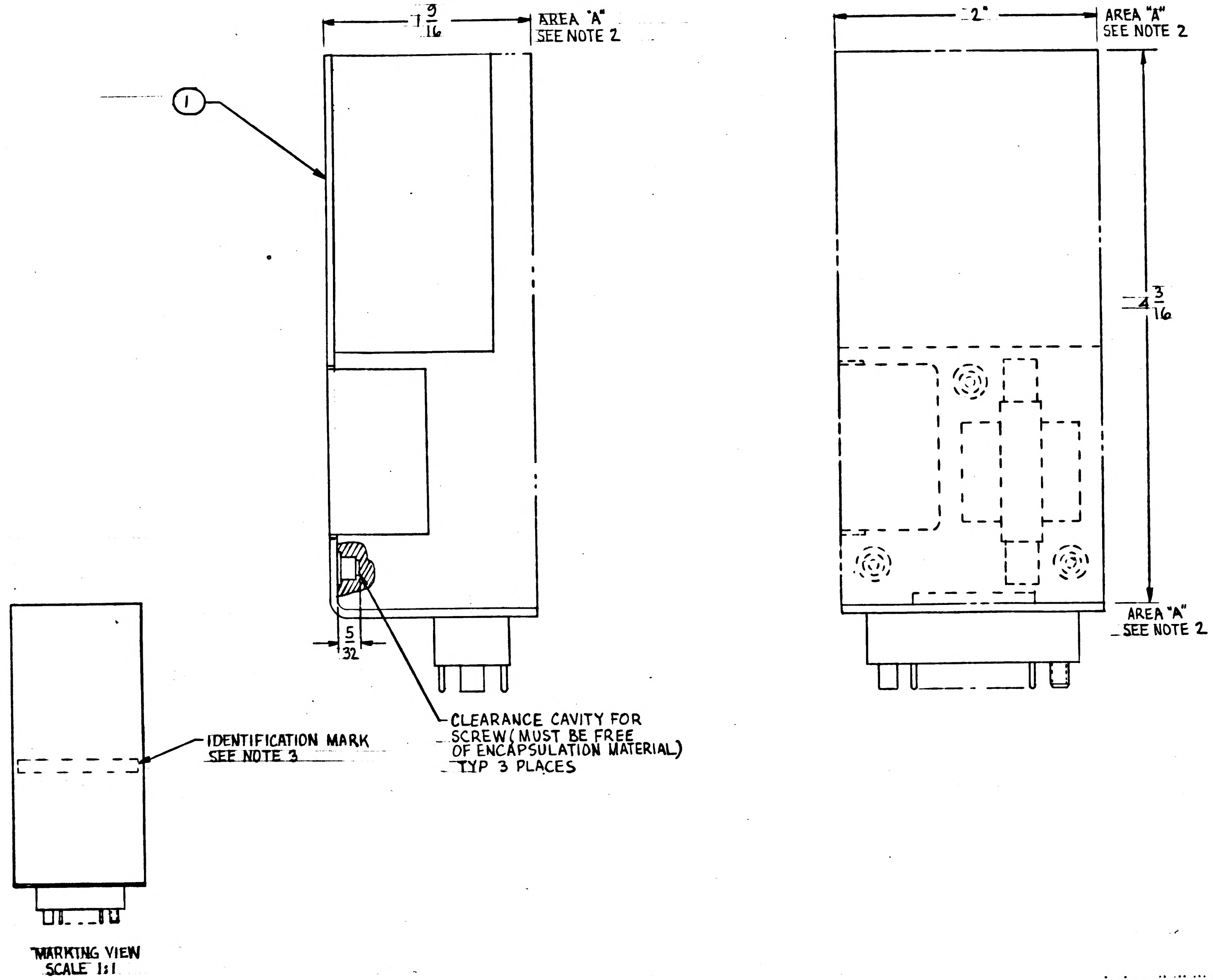
MASTER (A1)

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011483

SYM	ZONE	REVISIONS 03051 DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. AFTER TEST ENCAPSULATE AREA "A" PER ND 1002002
3. IDENTIFY USING NASA DRAWING NO. REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.



①
$1\frac{9}{16}$
AREA "A" SEE NOTE 2
2"
AREA "A" SEE NOTE 2
$4\frac{3}{16}$
AREA "A" SEE NOTE 2
$\frac{5}{32}$
CLEARANCE CAVITY FOR SCREW (MUST BE FREE OF ENCAPSULATION MATERIAL) TYP 3 PLACES
IDENTIFICATION MARK SEE NOTE 3
MARKING VIEW SCALE 1:1

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
1	1		1011479	87387000050		AMPL & SW UNIT ASSY OF			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011559	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	±1/64	±.005	± #

DO NOT SCALE THIS DRAWING

MATERIAL

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 87387000080

DRAWN J. MARGIOTTA DATE 7-8-63
CHECKED W HENRICKSON 7-20-63
APPROVAL M. Werner 8-30-63
APPROVAL E. Thorup 9-6-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
AMPLIFIER AND SWITCH
ASSY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011483
SCALE 4:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011483

MASTER

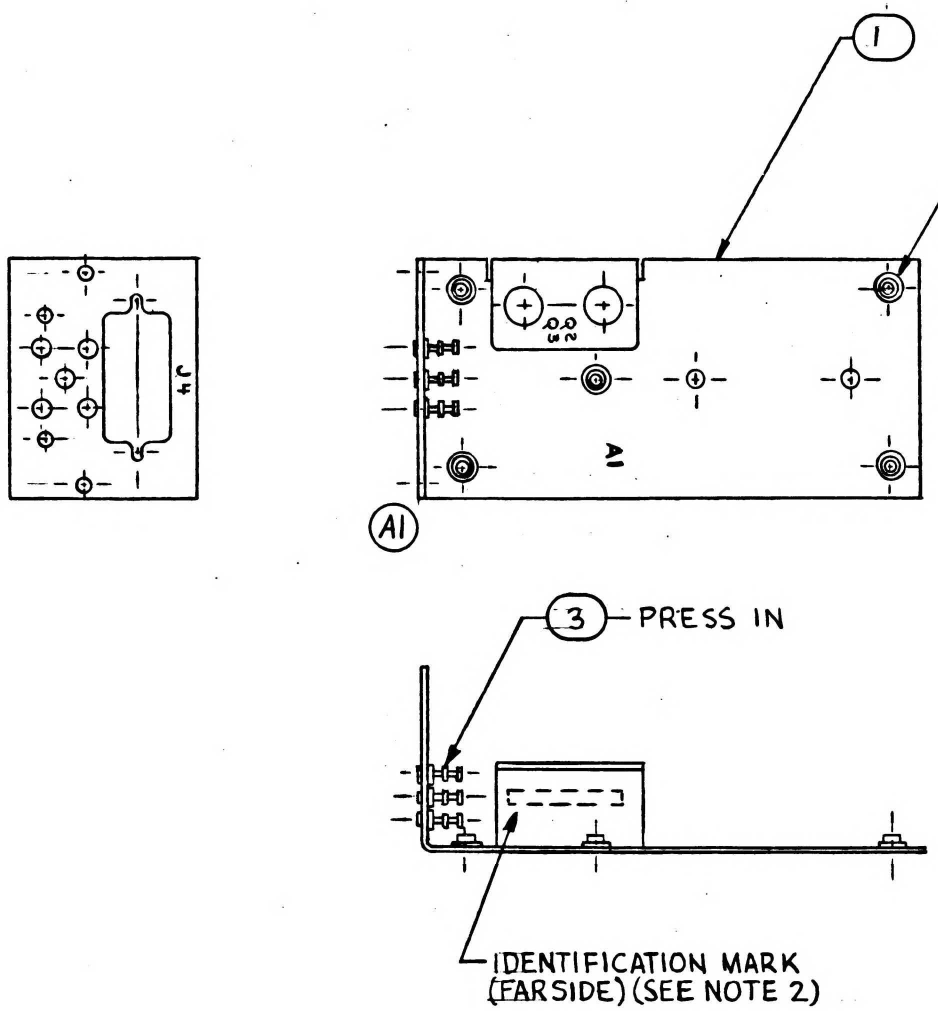
E-100

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011484A

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. IDENTIFY USING NASA DRAWING NO. REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019

REVISIONS 02920				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
Ⓜ A1		REVISED PER TDRR NO. 03804	10 Oct 63	WK



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
3	5		1000100-3	68101022903		TERMINAL, INSULATED			
2	5		1000076-8	74443141008		NUT, CLINCH FLUSH			
1	1		1011485	52387000160		BRACKET, MTG			

LIST OF PARTS AND MATERIALS

1011479	1011559
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	±	±	±

DO NOT SCALE THIS DRAWING

MATERIAL

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85387000120

DRAWN J. MARGIOTTA DATE 6-28-63
CHECKED H. Hen... 7-31-63
APPROVAL M. Werner 8/26/63
APPROVAL E. Thomas 8-30-63
NASA APPROVAL [illegible] 9/5/63
MIT APPROVAL L. Halsell 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BRACKET, MOUNTING
ASSY OF

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011484

SCALE 1/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

MASTER

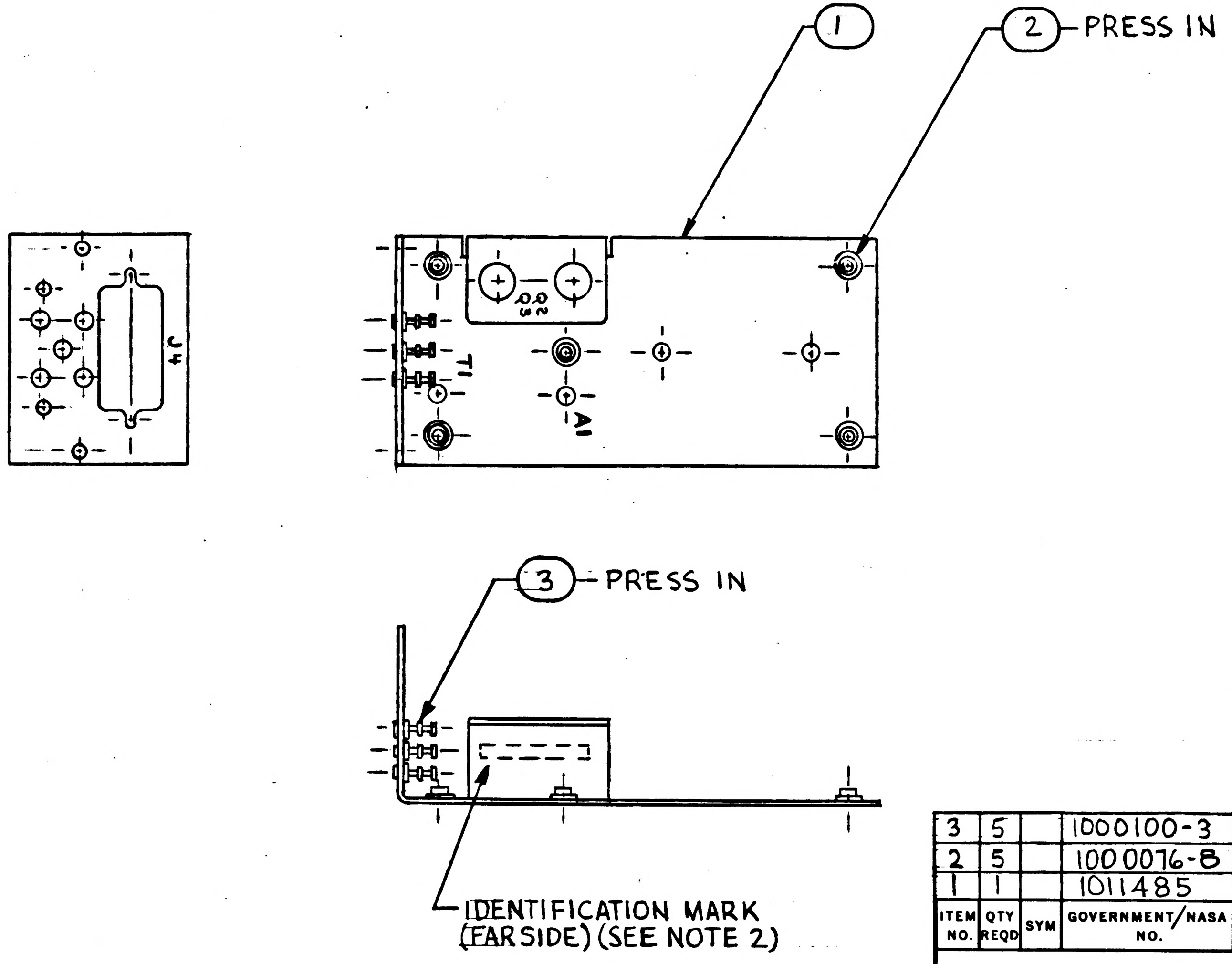
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011484

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. IDENTIFY USING NASA DRAWING NO. REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019

REVISIONS 02920

SYM	ZONE	DESCRIPTION	DATE	APPROVAL



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
3	5		1000100-3	68101022903		TERMINAL, INSULATED			
2	5		1000076-8	74443141008		NUT, CLINCH FLUSH			
1	1		1011485	52387000160		BRACKET, MTG			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011479	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± —	± —

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85387000120

DRAWN J. MARGIOTTA DATE 6-28-63
CHECKED H. Hengerhan 7-31-63
APPROVAL M. Werner 8/26/63
APPROVAL E. Thomas 8-30-63
NASA APPROVAL R. Michael 9/5/63
MIT APPROVAL L. Haley 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BRACKET, MOUNTING
ASSY OF

CODE IDENT NO.
SIZE C
NASA NUMBER 1011484
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

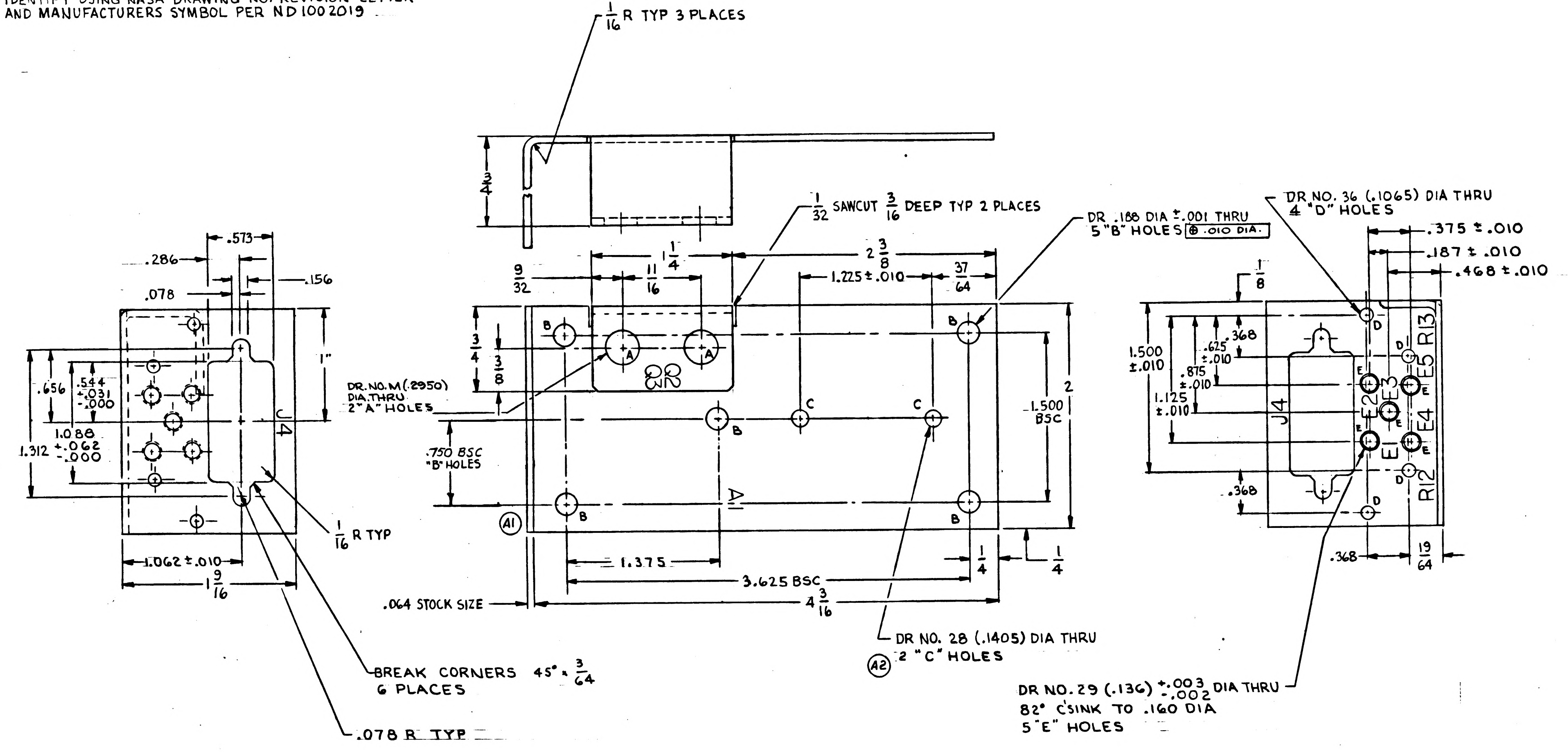
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011484

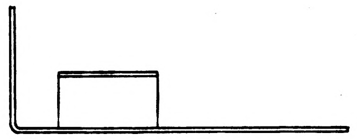
1011485 A

SYM	ZONE	DESCRIPTION	DATE	APPROV
REVISIONS 02720				
A2		REVISED PER TDRR NO. 03810	10 Oct 63	WK

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED: SURFACE ROUGHNESS AS ROLLED OR DRAWN.
4. PUNCHED, CUT, OR MACHINED SURFACES TO HAVE 125/ FINISH.
5. MARK ELECTRICAL REFERENCE DESIGNATIONS IN WHITE PER ND 1002019 USING 1/8" HIGH CHARACTERS
6. BLACK ANODIZE (SULFURIC) PER MIL-A-8625, TYPE II (KPS-1005A.201)
7. IDENTIFY USING NASA DRAWING NO. REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019



1/16 R TYP 3 PLACES
3/4
1/32 SAWCUT 3/16 DEEP TYP 2 PLACES
DR .188 DIA ±.001 THRU 5 "B" HOLES ⊕ .010 DIA.
DR NO. 36 (.1065) DIA THRU 4 "D" HOLES
.375 ±.010
.187 ±.010
.468 ±.010
1/8
.573
.286
.156
.078
1"
.656
.544 +.031 -.000
1.088 +.062 -.000
1.312
J4
1/16 R TYP
1.062 ±.010
1 9/16
9/32
1 1/4
11/16
2 3/8
1.225 ±.010
37/64
3/4
3/8
DR. NO. M (.2950) DIA. THRU 2 "A" HOLES
.750 BSC "B" HOLES
1.500 BSC
2
A1
1.375
3.625 BSC
4 3/16
1/4
1/4
.064 STOCK SIZE
DR NO. 28 (.1405) DIA THRU A2 2 "C" HOLES
1.500 ±.010
1.125 ±.010
.625 ±.010
.875 ±.010
.368
.368
.368
19/64
J4
E1 E2 E3 E4 E5
R12 R13
DR NO. 29 (.136) +.003 -.002 DIA THRU 82° CSINK TO .160 DIA 5 "E" HOLES
BREAK CORNERS 45° × 3/64 6 PLACES
.078 R TYP



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011484	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± 1/64 DECIMALS ± .005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL ALUMIMUM ALLOY 5052 H 34 FED SPEC QQ-A-318 TEMPER H 34
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52387000160
DRAWN J. MARGIOTTA DATE 6-29-63
CHECKED W. Hendrickson 7-9-63
APPROVAL M. Werner 8-27-63
APPROVAL E. Thomas 8-30-63
NASA APPROVAL
MIT APPROVAL 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BRACKET, MOUNTING

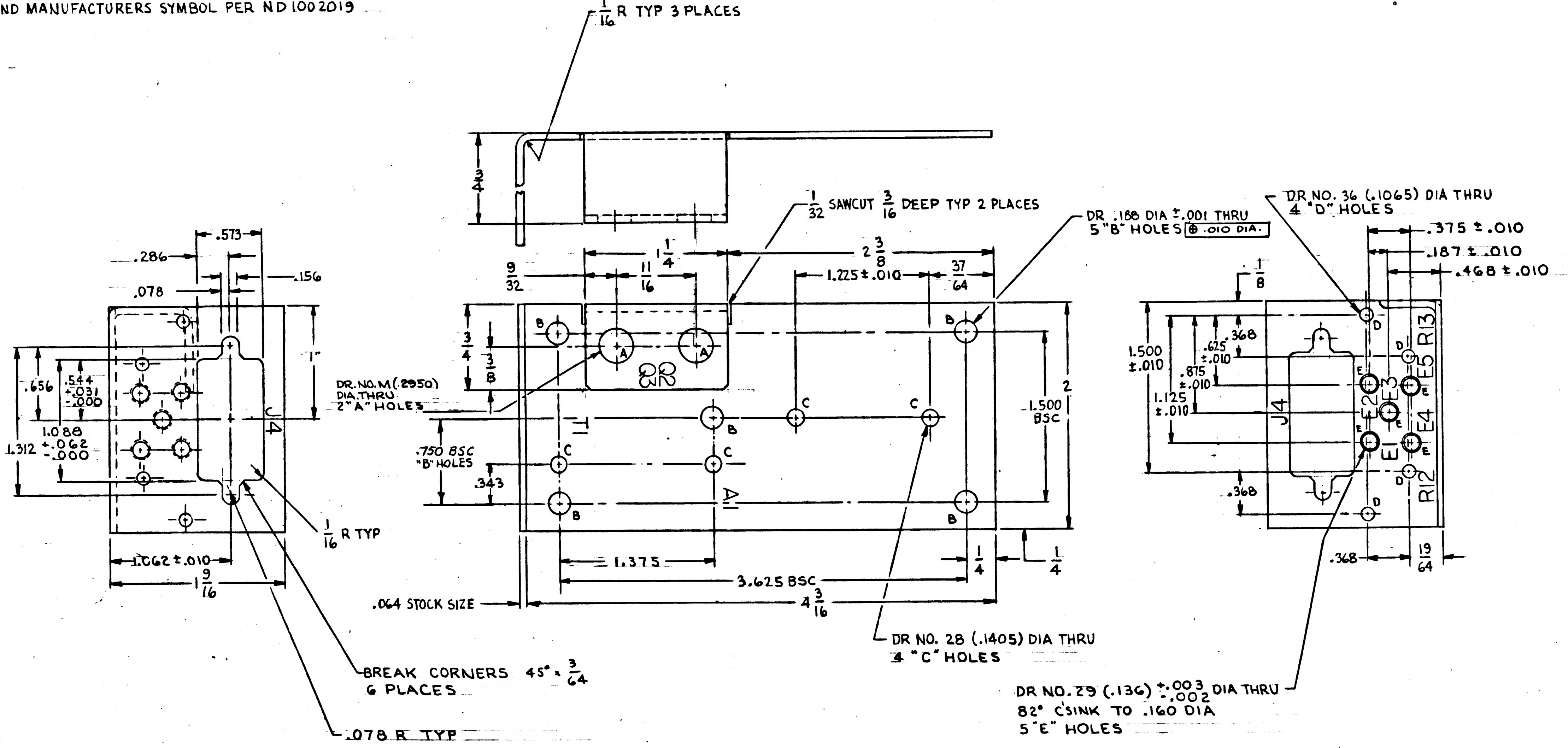
CODE IDENT NO.
SIZE D
NASA NUMBER 1011485
SCALE 2:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

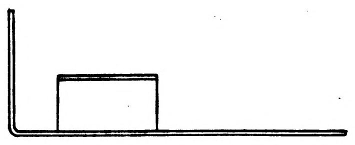
INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

1011485

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS 02920				

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED: SURFACE ROUGHNESS AS ROLLED OR DRAWN.
4. PUNCHED, CUT, OR MACHINED SURFACES TO HAVE 125√ FINISH.
5. MARK ELECTRICAL REFERENCE DESIGNATIONS IN WHITE PER ND 1002019 USING 1/8" HIGH CHARACTERS
6. BLACK ANODIZE (SULFURIC) PER MIL-A-8625, TYPE II (KPS-1005A.201)
7. IDENTIFY USING NASA DRAWING NO. REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019


1/16 R TYP 3 PLACES
3/4
1/32 SAWCUT 3/16 DEEP TYP 2 PLACES
DR .188 DIA ±.001 THRU
5 "B" HOLES ⊕ .010 DIA.
DR NO. 36 (.1065) DIA THRU
4 "D" HOLES
.375 ±.010
.187 ±.010
.468 ±.010
1/8
.573
.286
.156
.078
1"
.656
.544 +.031 -.000
1.088 +.062 -.000
1.312
J4
1/16 R TYP
1.062 ±.010
1 9/16
9/32
1 1/4
11/16
2 3/8
1.225 ±.010
37/64
3/4
3/8
A
B
C
DR. NO. M (.2950) DIA. THRU 2 "A" HOLES
.750 BSC "B" HOLES
.343
2
1.500 BSC
1/4
1/4
1.375
3.625 BSC
.064 STOCK SIZE
4 3/16
DR NO. 28 (.1405) DIA THRU
4 "C" HOLES
BREAK CORNERS 45° × 3/64
6 PLACES
.078 R TYP
1.500 ±.010
.368
.625 ±.010
.875 ±.010
1.125 ±.010
D
E
E1
E2
E3
E4
E5
R12
R13
.368
.368
19/64
DR NO. 29 (.136) +.003 -.002 DIA THRU
82° C'SINK TO .160 DIA
5 "E" HOLES


ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011484	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± –

DO NOT SCALE THIS DRAWING
MATERIAL ALUMINUM ALLOY 5052 H 34 FED SPEC QQ-A-318 TEMPER H 34
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52387000160
DRAWN J. MARGIOTTA DATE 6-29-63
CHECKED 7-9-63
APPROVAL M. Werner 8-27-63
APPROVAL 8-30-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BRACKET, MOUNTING

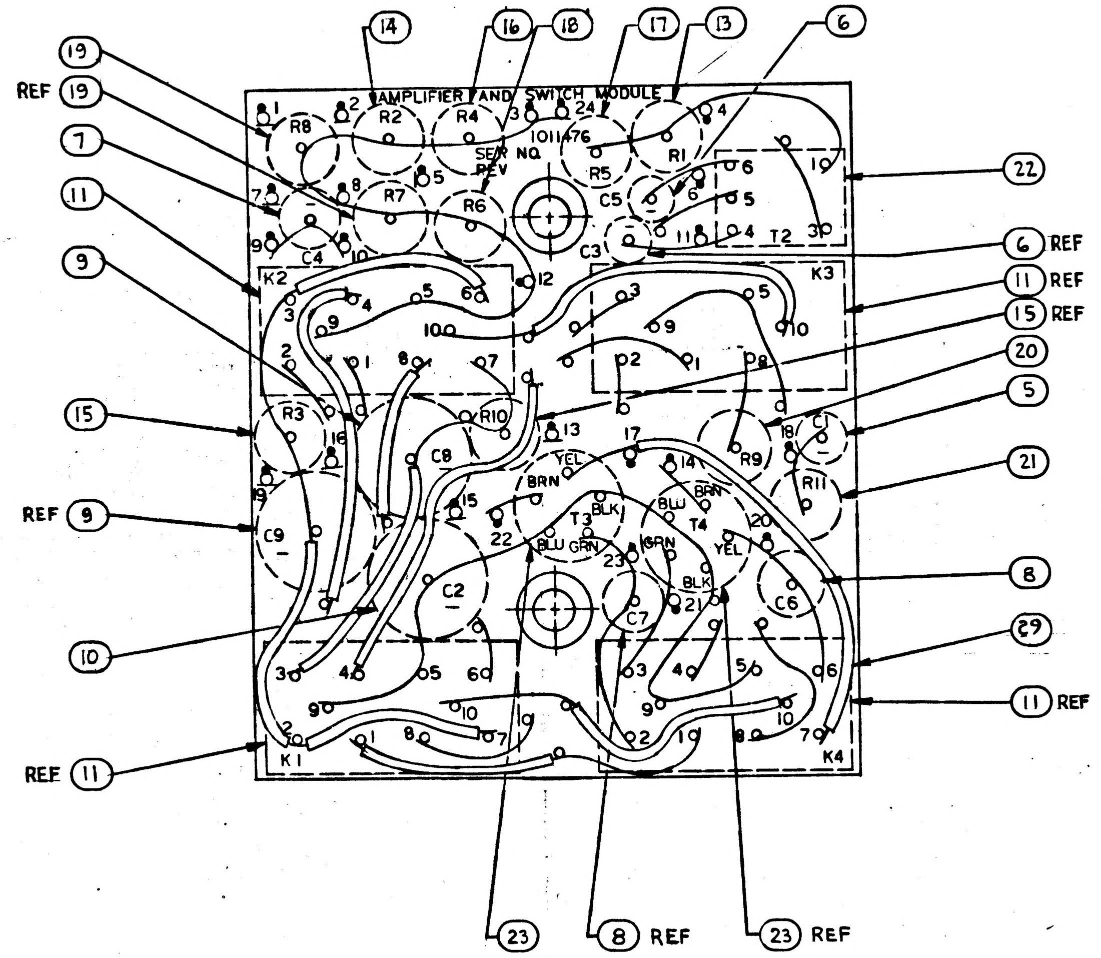
CODE IDENT NO.
SIZE D
NASA NUMBER 1011485
SCALE 2:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

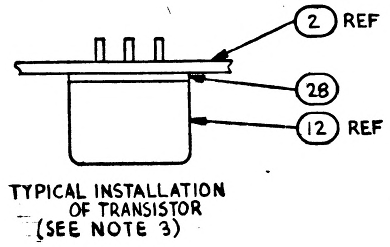
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011486

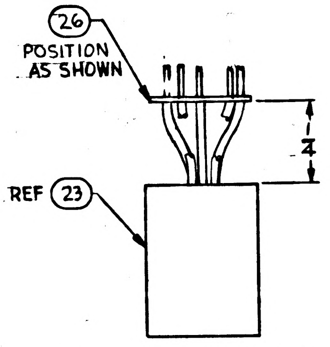
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
		REVISIONS 03051		

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. SYMBOL ȣ DENOTES TERMINAL ITEM ㉕.
3. WELD PER ND1002005.
4. TEST PER ATP 1011486 AFTER WELDING.
5. AFTER TEST, CUT OFF EXCESS MYLAR AND EXTENDED RIBBON TO DIMENSION SHOWN.
6. EXCEPT ON EXTERNAL AND INSIDE SURFACES OF ITEM ③ (SPACER, SLEEVE) AND EXTERNAL SURFACES OF ITEM ㉕ APPLY CONFORMAL COATING PER ND1002035.
7. FOR SCHEMATIC SEE DWG 1011453.
8. IDENTIFY USING NASA DWG NO., REV LETTER AND MFR'S SYMBOL PER ND1002019.





TYPICAL INSTALLATION OF TRANSISTOR (SEE NOTE 3)



TYPICAL INSTALLATION OF TRANSFORMERS T3 & T4

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
29	AR		1006776-22			INSUL, SLEEVING, ELEC			
28	1		1011493	74471413001		PAD, TSTR, MTG			
27	AR		1006757-8	60015154008		WIRE, ELECTRICAL			
26	2		1011490	46387000060		DISC, INSULATOR			
25	AR		1006757-9	60015154009		WIRE, ELECTRICAL			
24	AR		1006757-1	60015154001		WIRE, ELECTRICAL			
23	2		1010324	68400173701		XMFR (T3, T4)			
22	1		1010291-4	68400173604		XMFR (T2)			
21	1		1010363-385	65180223385		RES, FF (R11)			
20	1		1010363-635	65180223635		RES, F, F (R9)			
19	2		1010389-1	65180222001		RES, F, F (R7, R8)			
18	1		1010363-75	65180223075		RES, F, F (R6)			
17	1		1010363-381	65180223381		RES, F, F (R5)			
16	1		1010363-251	65180223251		RES, F,F (R4)			
15	2		1010389-49	65180222049		RES. F, WW (R3, R10)			
14	1		1010363-603	65180223603		RES, F, F (R2)			
13	1		1010363-827	65180223827		RES. F,F (R1)			
12	1		1010397-001	68413008801		TSTR, Si, NPN (Q1)			
11	4		1006772-2	68402015202		RELAY (K1, K2, K3 & K4)			
10	1		1006755-89	69100442089		CAP, ELECT. (C2)			
9	2		1006755-134	69100442134		CAP, ELECT. (C8, C9)			
8	2		1010279-216	69100443216		CAP, FIXED (C6, C7)			
7	1		1010393-034	69100441034		CAP., Ta (C4)			
6	2		1010393-017	69100441017		CAP., Ta (C3, C5)			
5	1		1010393-029	69100441029		CAP., Ta (C1)			
4	2		1011492	46387000070		INSULATION, SHEET			
3	2		1011491	57387000140		SPACER, SLEEVE			
2	1		1011477	46387000050		WAFER, BOTTOM			
1	1		1011476	46387000040		WAFER, TOP			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011478	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ± .005; ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85387000140
DRAWN J. MARGIOTTA DATE 7-11-63
CHECKED W HENDRICKSON 7-17-63
APPROVAL M. Warner 8-2-63
APPROVAL
NASA APPROVAL 9/4/63
MIT APPROVAL 10/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

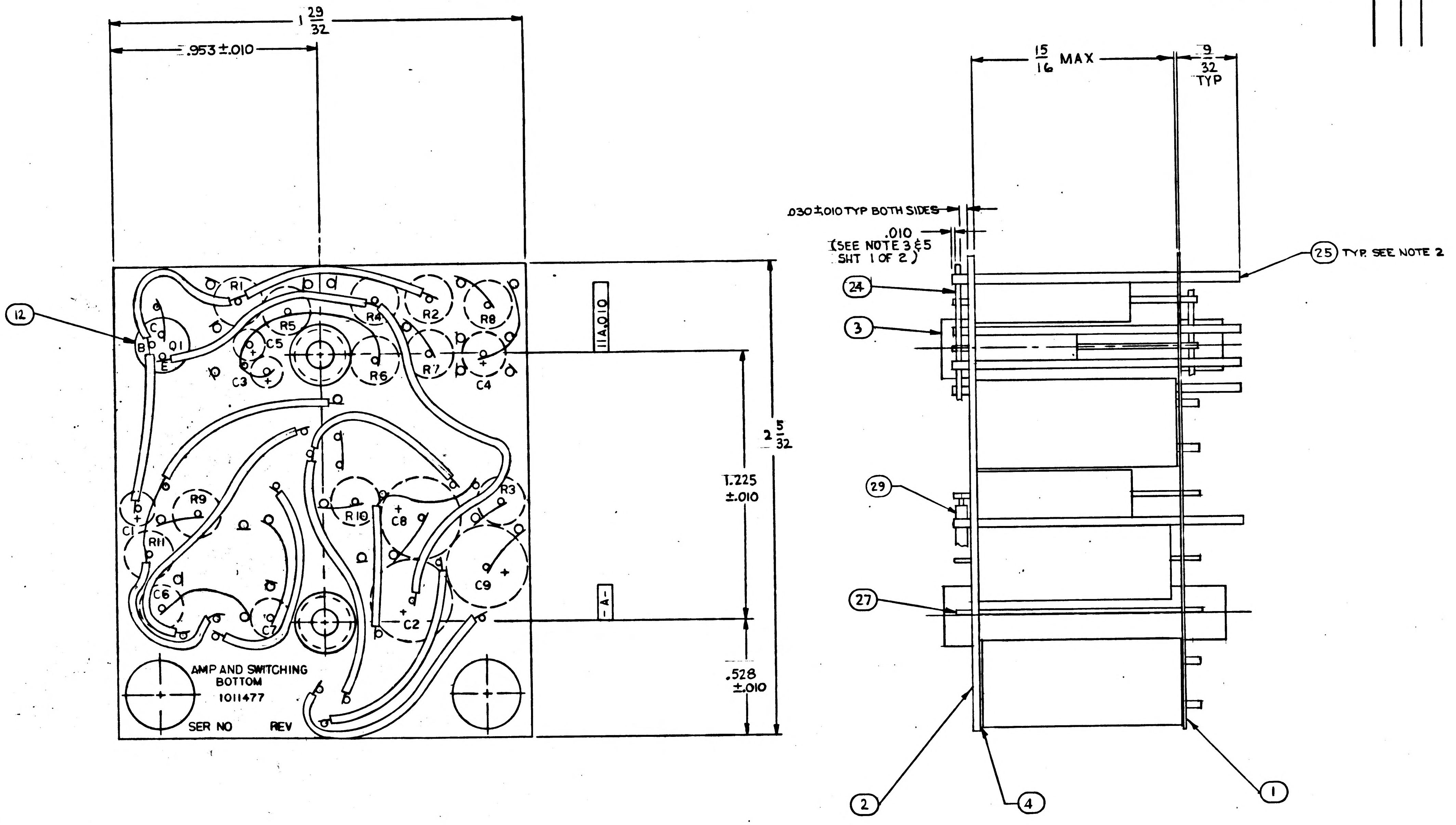
TITLE
WAFER AND COMPONENT ASSY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011486
SCALE 4:1
WEIGHT CALC ACTUAL
SHEET 1 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011486

SYM	ZONE	REVISIONS 03051 DESCRIPTION	DATE	APPROVAL



1 29/32
.953 ±.010
12
R1
R5
R4
R2
R8
C
B
Q1
E
C5
C3
R6
R7
C4
R3
R9
C1
R11
R10
C8
C9
C6
C7
C2
AMP AND SWITCHING
BOTTOM
1011477
SER NO
REV
11A010
-A-
2 5/32
1.225 ±.010
.528 ±.010
15/16 MAX
9/32 TYP
.030 ±.010 TYP BOTH SIDES
.010
(SEE NOTE 3 & 5 SHT 1 OF 2)
25 TYP. SEE NOTE 2
24
3
29
27
2
4
1

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011478	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ± .005; ANGLES ± ½
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85387000140
DRAWN J. MARGIOTTA DATE 7-10-63
CHECKED N Hendrickson 7-17-63
APPROVAL M. Warner 8-2-63
APPROVAL
NASA APPROVAL 9/4/63
MIT APPROVAL W Kopfer 10/8/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
WAFER AND COMPONENT
ASSY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011486
SCALE 4:1
WEIGHT CALC ACTUAL
SHEET 2 OF 2

MASTER

INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

1011487 A

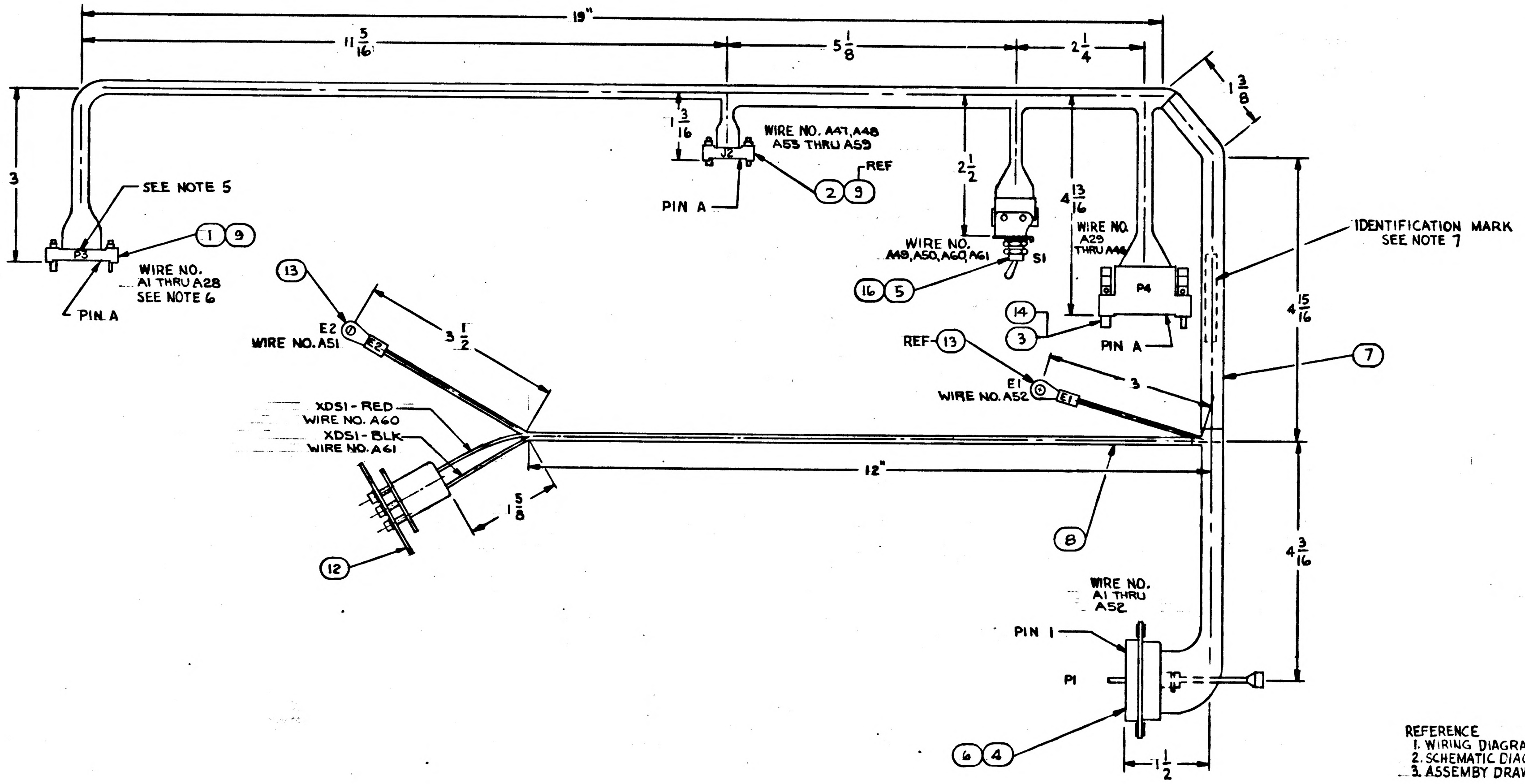
REVISIONS 03576				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TORR NO 05908	28 JAN 64	

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. SOLDER IN ACCORDANCE WITH MSFC-PROC-158, USING TYPE SN 60 WAR P2 PER QQ-S-571.
3. INSTALL CRIMP STYLE TERMINALS IN ACCORDANCE WITH ND1002206.
4. BIND WIRES TOGETHER USING ITEM ⑮, MIL-S-572, FORM S OR Y LOCKSTITCH AT 1/2 INCH SPACING.
5. MARK ELECTRICAL REFERENCE DESIGNATION IN ACCORDANCE WITH ND1002019.
6. COND NO. SHALL BE MARKED ON EACH WIRE IN ACCORDANCE WITH ND1002019. SPACING OF COND IDENT SHALL BE EVERY TWO (2) INCHES MAX. SPIRALLING OF THE MARKINGS IS ALLOWED.
7. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND1002019.
8. WIRE, ND1002105, 24 AWG, TYPE 1, WHITE, 125 FEET IN TOTAL LENGTH.
9. WIRE, ND1002105, 22 AWG, TYPE 1, WHITE, 9 INCHES IN TOTAL LENGTH.
10. TWISTED CONDUCTORS TO CONSIST OF THREE (3) FULL TURNS PER INCH MINIMUM.

WIRING LEGEND						
COND NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 10
A1	WHITE	10	35 IN.	P1-51	P3-A	8
A2	↑	↑	↑	↑ -52	↑ -B	
A3				-71	-C	8
A4				-82	-D	
A5				-60	-E	8
A6				-61	-F	
A7				-72	-H	8
A8				-83	-J	
A9				-73	-K	8
A10				-84	-L	
A11				-50	-M	8
A12				-70	-N	
A13				-40	-P	8
A14				-28	-R	
A15				-18	-S	8
A16				-19	-T	
A17				-62	-U	8
A18				-63	-V	
A19				-41	-W	8
A20				-30	-X	
A21				-42	-Y	8
A22				-31	-Z	
A23				-15	-AA	8
A24				-17	-BB	
A25				-53	-CC	8
A26				-54	-DD	
A27			↓	-43	↓ -EE	8
A28			35 IN.	-32	P3-FF	
A29	↓	↓	17½ IN.	↓ -78	P4-U	8
A30	WHITE	10	17½ IN.	P1-106	P4-S	

WIRING LEGEND						
COND NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 10
A31	WHITE	10	17½ IN.	P1-79	P4-W	8
A32	↑	↑	↑	↑ -93	↑ -V	
A33				-77	-BB	8
A34				-65	-DD	
A35				-95	-CC	—
A36				-45	-AA	8
A37				-35	-Z	
A38				-1	-M	8
A39				-2	-K	
A40				-3	-N	8
A41				-4	-P	
A42				-92	-R	8
A43				-67	-H	
A44				-6	-Y	8
A45			↓	-7	↓ -X	
A46			17½ IN.	-66	P4-J	—
A47			21 IN.	-81	J2-J	—
A48			21 IN.	-68	J2-R	—
A49			17½ IN.	-46	S1-NC	8
A50		↓	17½ IN.	-55	S1-NO	
A51		10	22 IN.	↓ -36	E2	
A52		11	9 IN.	P1-29	E1	—
A53		10	14 IN.	P4-R	J2-P	8
A54		↑	↑	↑ -H	↑ -H	
A55				-L	-M	8
A56				-F	-S	
A57				-T	-N	
A58	↓	↓	↓	↓ -Y	↓ -K	8
A59	WHITE	10	14 IN.	P4-X	J2-L	
A60 *	RED	—	25 IN.	XDS1-RED	S1-C	8
A61 *	BLACK	—	25 IN.	XDS1-BLK	S1-NO	

* CONDUCTOR NO. FOR REFERANCE ONLY - WIRE SHALL NOT BE MARKED.



REFERENCE
1. WIRING DIAGRAM - 1011526
2. SCHEMATIC DIAGRAM 1011405
3. ASSEMBY DRAWING 1011559

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT W⁻
16	AR	*	1006776-13			INSULATION, SLEEVING 1½ LG (3-½" LENGTHS)			
15	AR	*	1011753			TAPE, LACING & TYING			
14	26	*	MS17804-16-20			CONTACT, SOCKET			
13	2	*	MS25036-48			LUG, TERMINAL			
12	1	*	1011482	48387000020		SOCKET, LAMP, MODIFIED			
11	1	*	SEE NOTE 9			WIRE, IRRADIATED, POLY INSULATED			
10	1	*	SEE NOTE 8			WIRE, IRRADIATED, POLY INSULATED			
9	AR	*	1006776-20			INSULATION, SLEEVING 1½" LG (37-½" LENGTHS)			
8	1	*	1006776-10			INSULATION, SLEEVING 11⅝" LG			
7	1	*	1015864-816			INSULATION, SLEEVING 8" LG			
6	52	*	1010738-1			CONTACTS, ELECTRICAL			
5	1	*	1011368	68150025701		SWITCH, TOGGLE			
4	1	*	1010347-1			CONN, PLUG, ELECTRICAL			
3	1	*	1011501			CONN, ELECTRICAL			
2	1	*	1011411	68502018701		CONN, ELECTRICAL			
1	1	*	1000119			CONN, ELECTRICAL, RECP			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

1011559	1011559
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/8; DECIMALS ± #; ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80387000050
DRAWN J. MARGIOTTA DATE 7-26-63
CHECKED R.E. Costey 10/1/63
APPROVAL Jm Werner 10/1/63
APPROVAL E. Thomp 10/2/63
NASA APPROVAL 10-3-63
MIT APPROVAL W. Kaffe 3 Oct 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
WIRING HARNESS, BRANCHED
(MAP & DATA VIEWER)

CODE IDENT NO. | SIZE E | NASA NUMBER 1011487
SCALE 1/1 | WEIGHT | CALC ACTUAL | SHEET | OF

MASTER

10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1

1011487	B

REVISIONS 03576				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR NO 05908	28 JAN 64	
B2		REVISED PER TDRR NO. 07371	7 APR 64	

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. SOLDER IN ACCORDANCE WITH MSFC-PROC-158, USING TYPE SN 60 WAR P2 PER QQ-S-571.
3. INSTALL CRIMP STYLE TERMINALS IN ACCORDANCE WITH ND1002206.
4. BIND WIRES TOGETHER USING ITEM ⑮, MIL-S-572, FORM 50RY LOCKSTITCH AT 1/2 INCH SPACING
5. MARK ELECTRICAL REFERENCE DESIGNATION IN ACCORDANCE WITH ND1002019.
6. COND NO. SHALL BE MARKED ON EACH WIRE IN ACCORDANCE WITH ND1002019. SPACING OF COND IDENT SHALL BE EVERY TWO (2) INCHES MAX. SPIRALLING OF THE MARKINGS IS ALLOWED.
7. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND1002019.
8. WIRE, ND1002105, 24 AWG, TYPE 1, WHITE, 125 FEET IN TOTAL LENGTH.
9. WIRE, ND1002105, 22AWG, TYPE 1, WHITE, 9 INCHES IN TOTAL LENGTH.
10. TWISTED CONDUCTORS TO CONSIST OF THREE (3) FULL TURNS PER INCH MINIMUM.

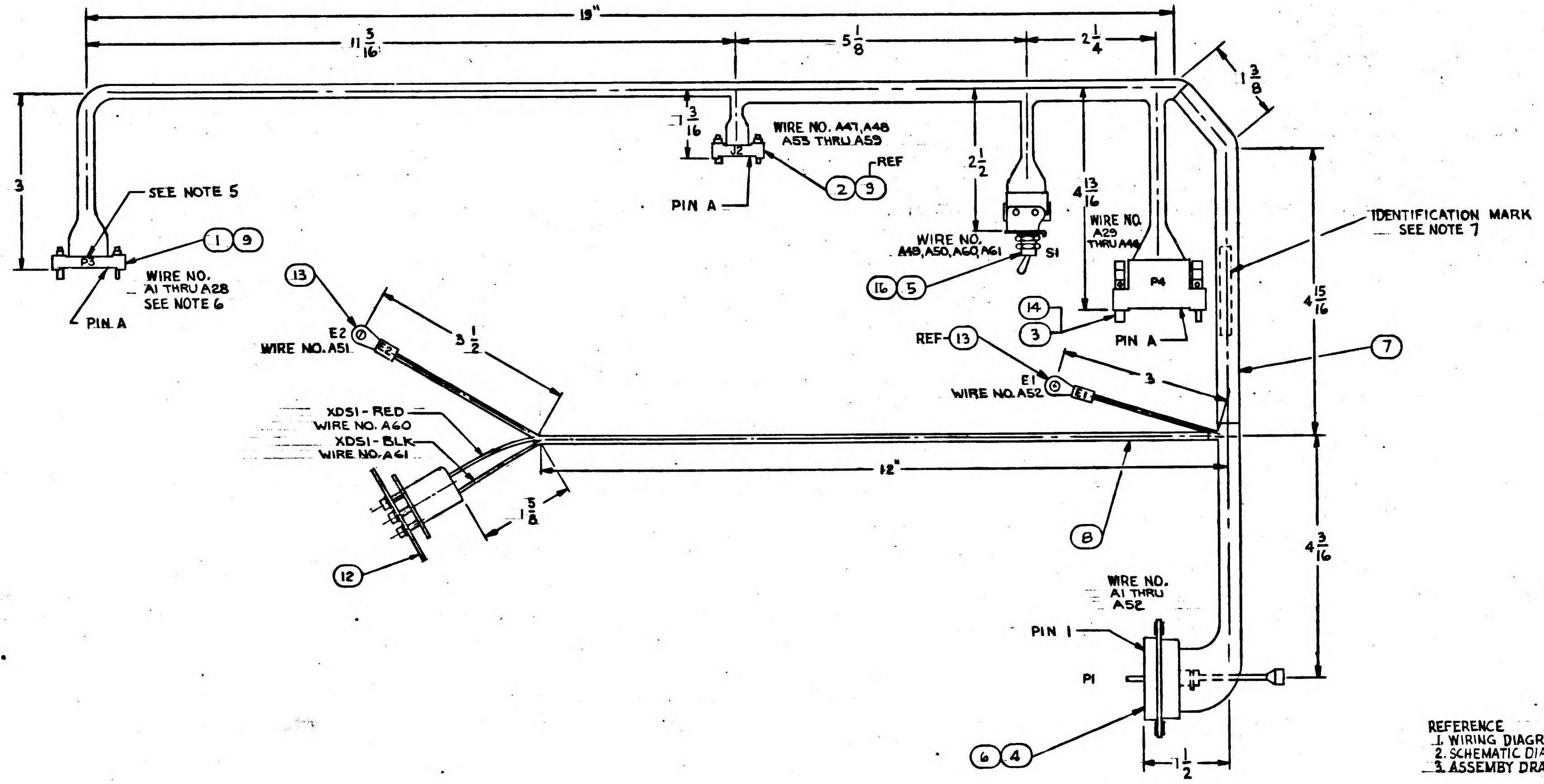
WIRING LEGEND

COND NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 10
A1	WHITE	10	35 IN.	P1-51	P3-A	8
A2	↑	↑	↑	↑ -52	↑ -B	
A3				-71	-C	8
A4				-82	-D	
A5				-60	-E	8
A6				-61	-F	
A7				-72	-H	8
A8				-83	-J	
A9				-73	-K	8
A10				-84	-L	
A11				-50	-M	8
A12				-70	-N	
A13				-40	-P	8
A14				-28	-R	
A15				-18	-S	8
A16				-19	-T	
A17				-62	-U	8
A18				-63	-V	
A19				-41	-W	8
A20				-30	-X	
A21				-42	-Y	8
A22				-31	-Z	
A23				-15	-AA	8
A24				-17	-BB	
A25				-53	-CC	8
A26				-54	-DD	
A27			↓	-43	↓ -EE	8
A28			35 IN.	-32	P3-FF	
A29	↓	↓	17½ IN.	↓ -78	P4-U	8
A30	WHITE	10	17½ IN.	P1-106	P4-S	

WIRING LEGEND

COND NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 10
A31	WHITE	10	17½ IN.	P1-79	P4-W	8
A32	↑	↑	↑	↑ -93	↑ -V	
A33				-77	-BB	8
A34				-65	-DD	
A35				-95	-CC	—
A36				-45	-AA	8
A37				-35	-Z	
A38				-1	-M	8
A39				-2	-K	
A40				-3	-N	8
A41				-4	-P	
A42				-92	-R	8
A43				-67	-H	
A44				-6	-Y	8
A45			↓	-7	↓ -X	
A46			17½ IN.	-66	P4-J	—
A47			21 IN.	-81	J2-J	—
A48			21 IN.	-68	J2-R	—
A49			17½ IN.	-46	S1-NC	8
A50		↓	17½ IN.	-55	S1-NO	
A51		10	22 IN.	↓ -36	E2	
A52		11	9 IN.	P1-29	E1	—
A53		10	14 IN.	P4-R	J2-P	8
A54		↑	↑	↑ -H	↑ -H	
A55				-L	-M	8
A56				-F	-S	
A57				-T	-N	
A58	↓	↓	↓	↓ -Y	↓ -K	8
A59	WHITE	10	14 IN.	P4-X	J2-L	
A60 *	RED	—	25 IN.	XDS1-RED	S1-C	8
A61 *	BLACK	—	25 IN.	XDS1-BLK	S1-NO	

* CONDUCTOR NO. FOR REFERANCE ONLY - WIRE SHALL NOT BE MARKED.



REFERENCE
1. WIRING DIAGRAM - 1011526
2. SCHEMATIC DIAGRAM 1011405
3. ASSEMBY DRAWING 1011559

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
16	AR	*	1010490-112			INSULATION SLEEVING ELECT. HEATSHRINKABLE			
15	AR	*	1011753			TAPE, LACING & TYING			
14	26	*	MS17804-16-20			CONTACT, SOCKET			
13	2	*	MS25036-48			LUG, TERMINAL			
12	1	*	1011482	48387000020		SOCKET, LAMP, MODIFIED			
11	1	*	SEE NOTE 9			WIRE, IRRADIATED, POLY INSULATED			
10	1	*	SEE NOTE 8			WIRE, IRRADIATED, POLY INSULATED			
9	AR	*	1010490-060			INSULATION SLEEVING ELECT. HEATSHRINKABLE			
8	1	*	1001776-10			INSULATION, SLEEVING 11 5/8" LG			
7	1	*	1015864-816			INSULATION, SLEEVING 6" LG			
6	52	*	1010738-1			CONTACTS, ELECTRICAL			
5	1	*	1011368	68150025701		SWITCH, TOGGLE			
4	1	*	1010347-1			CONN. PLUG, ELECTRICAL			
3	1	*	1011501			CONN, ELECTRICAL			
2	1	*	1011411	68502018701		CONN, ELECTRICAL			
1	1	*	1000119			CONN, ELECTRICAL, RECP			

LIST OF PARTS AND MATERIALS

B1 (item 16); B2 (item 9)

NEXT ASSY	USED ON
1011559	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± 1/8, DECIMALS ± —, ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION ELMHURST NEW YORK
KIC PN 80387000050
DRAWN L. MARGIOTTA DATE 7-26-63
CHECKED 10/1/63
APPROVAL 10/1/63
APPROVAL 10/3/63
NASA APPROVAL 10-3-63
MIT APPROVAL W Kupfer 30Ø63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
WIRING HARNESS, BRANCHED
(MAP & DATA VIEWER)

CODE IDENT NO. | SIZE E | NASA NUMBER 1011487
SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

INCHES
PHOTOGRAPHIC SCALE ONLY

1011487

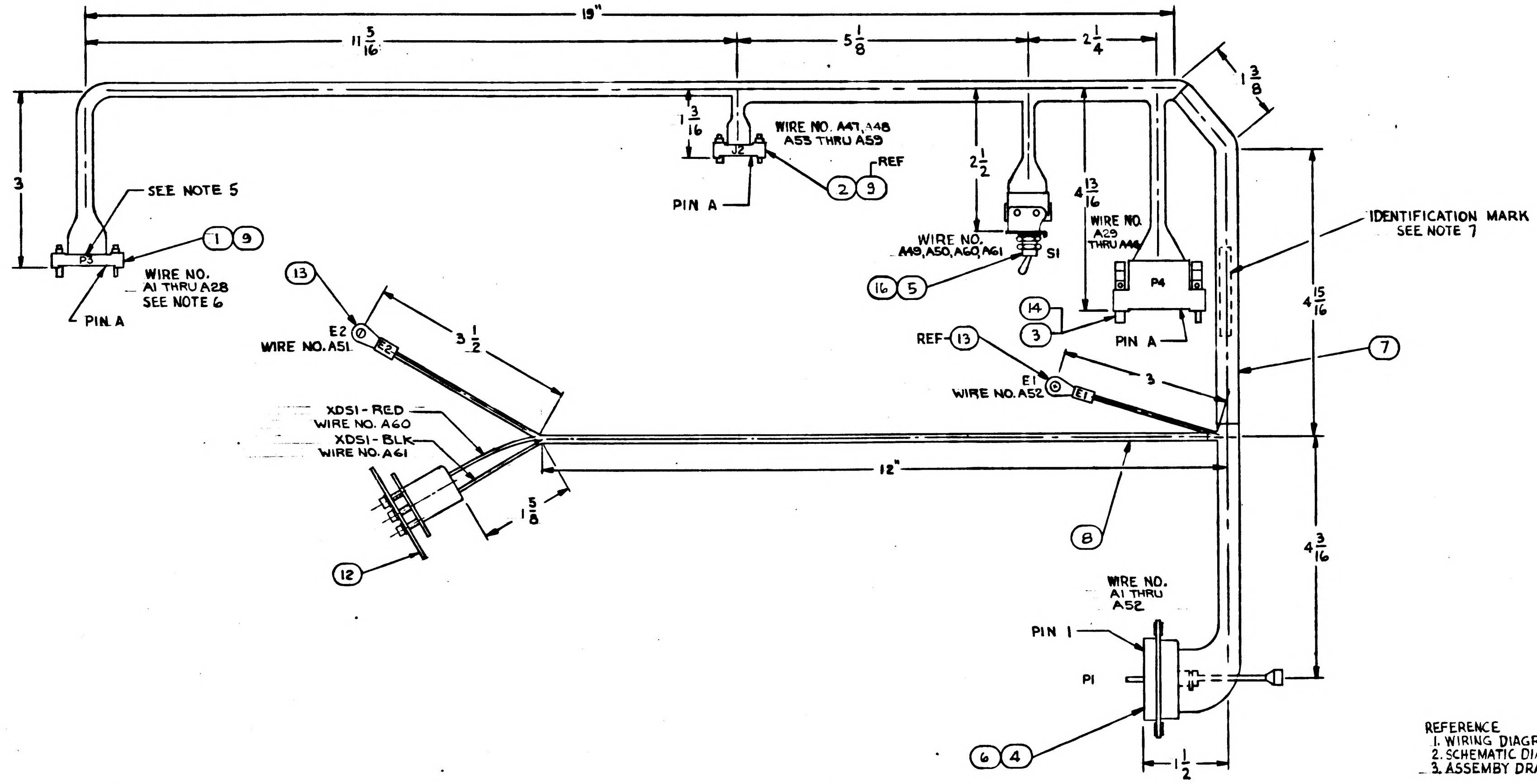
REVISIONS 03576				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. SOLDER IN ACCORDANCE WITH MSFC-PROC-158, USING TYPE SN 60 WAR P2 PER QQ-S-571.
3. INSTALL CRIMP STYLE TERMINALS IN ACCORDANCE WITH ND1002206.
4. BIND WIRES TOGETHER USING ITEM ⑮, MIL-S-572, FORM S OR Y LOCKSTITCH AT 1/2 INCH SPACING
5. MARK ELECTRICAL REFERENCE DESIGNATION IN ACCORDANCE WITH ND1002019.
6. COND NO. SHALL BE MARKED ON EACH WIRE IN ACCORDANCE WITH ND1002019. SPACING OF COND IDENT SHALL BE EVERY TWO (2) INCHES MAX. SPIRALLING OF THE MARKINGS IS ALLOWED.
7. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND1002019.
8. WIRE, ND1002105, 24 AWG, TYPE 1, WHITE, 125 FEET IN TOTAL LENGTH.
9. WIRE, ND1002105, 22AWG, TYPE 1, WHITE, 9 INCHES IN TOTAL LENGTH.
10. TWISTED CONDUCTORS TO CONSIST OF THREE (3) FULL TURNS PER INCH MINIMUM.

WIRING LEGEND						
COND NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 10
A1	WHITE	10	35 IN.	P1 - 51	P3 - A	8
A2	↑	↑	↑	↑ - 52	↑ - B	
A3				- 71	- C	8
A4				- 82	- D	
A5				- 60	- E	8
A6				- 61	- F	
A7				- 72	- H	8
A8				- 83	- J	
A9				- 73	- K	8
A10				- 84	- L	
A11				- 50	- M	8
A12				- 70	- N	
A13				- 40	- P	8
A14				- 28	- R	
A15				- 18	- S	8
A16				- 19	- T	
A17				- 62	- U	8
A18				- 63	- V	
A19				- 41	- W	8
A20				- 30	- X	
A21				- 42	- Y	8
A22				- 31	- Z	
A23				- 15	- AA	8
A24				- 17	- BB	
A25				- 53	- CC	8
A26				- 54	- DD	
A27			↓	- 43	↓ - EE	8
A28			35 IN.	- 32	P3 - FF	
A29	↓	↓	17½ IN.	↓ - 78	P4 - U	8
A30	WHITE	10	17½ IN.	P1 - 106	P4 - S	

WIRING LEGEND						
COND NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 10
A31	WHITE	10	17½ IN.	P1 - 79	P4 - W	8
A32	↑	↑	↑	↑ - 93	↑ - V	
A33				- 77	- BB	8
A34				- 65	- DD	
A35				- 95	- CC	—+—
A36				- 45	- AA	8
A37				- 35	- Z	
A38				- 1	- M	8
A39				- 2	- K	
A40				- 3	- N	8
A41				- 4	- P	
A42				- 92	- R	8
A43				- 67	- H	
A44				- 6	- Y	8
A45			↓	- 7	↓ - X	
A46			17½ IN.	- 66	P4 - J	—+—
A47			21 IN.	- 81	J2 - J	—+—
A48			21 IN.	- 68	J2 - R	—+—
A49			17½ IN.	- 46	S1 - NC	8
A50		↓	17½ IN.	- 55	S1 - NO	
A51		10	22 IN.	↓ - 36	E2	
A52		11	9 IN.	P1 - 29	E1	—+—
A53		10	14 IN.	P4 - R	J2 - P	8
A54		↑	↑	↑ - H	↑ - H	
A55				- L	- M	8
A56				- F	- S	
A57				- T	- N	
A58	↓	↓	↓	↓ - Y	↓ - K	8
A59	WHITE	10	14 IN.	P4 - X	J2 - L	
A60 *	RED	—	25 IN.	XDS1-RED	S1 - C	8
A61 *	BLACK	—	25 IN.	XDS1-BLK	S1 - NO	

* CONDUCTOR NO. FOR REFERANCE ONLY - WIRE SHALL NOT BE MARKED.



REFERENCE
1. WIRING DIAGRAM - 1011526
2. SCHEMATIC DIAGRAM 1011405
3. ASSEMBY DRAWING 1011559

16	AR	*	1006776-13			INSULATION, SLEEVING 1½ LG (3-½" LENGTHS)			
15	AR	*	1011753			TAPE, LACING & TYING			
14	26	*	MS17804-16-20			CONTACT, SOCKET			
13	2	*	MS25036-48			LUG, TERMINAL			
12	1	*	1011482	48387000020		SOCKET, LAMP, MODIFIED			
11	1	*	SEE NOTE 9			WIRE, IRRADIATED, POLY INSULATED			
10	1	*	SEE NOTE 8			WIRE, IRRADIATED, POLY INSULATED			
9	AF.	*	1006776-20			INSULATION, SLEEVING 18½" LG (37-½" LENGTHS)			
8	1	*	1006776-10			INSULATION, SLEEVING 11 5/8" LG			
7	1	*	1015864-816			INSULATION, SLEEVING 6" LG			
6	52	*	1010464-1			CONTACTS, ELECTRICAL			
5	1	*	1011368	68150025701		SWITCH, TOGGLE			
4	1	*	1010347-1			CONN, PLUG, ELECTRICAL			
3	1	*	1011501			CONN, ELECTRICAL			
2	1	*	1011411	68502018701		CONN, ELECTRICAL			
1	1	*	1000119			CONN, ELECTRICAL, RECP			
ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

1011559	1011559
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/8; DECIMALS ± #; ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 60387000050
DRAWN J. MARGIOTTA DATE 7-26-63
CHECKED 10/1/63
APPROVAL 10/1/63
APPROVAL 10/2/63
NASA APPROVAL 10-3-63
MIT APPROVAL 3 Oct 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
WIRING HARNESS, BRANCHED
(MAP & DATA VIEWER)

CODE IDENT NO.
SIZE E
NASA NUMBER 1011487
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1011495 (M)

REVISIONS 02719			
SYM	DESCRIPTION	DATE	APPROVAL
A3	REVISED PER TDRR NO. 05914	21 JAN 64	

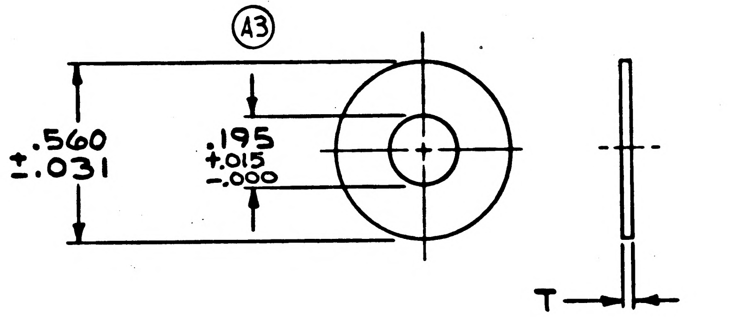
REQUIREMENTS:

1. **GENERAL:**
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.
2. **INSPECTION AND ACCEPTANCE:**
   - A. MECHANICAL REQUIREMENTS
     - 1. ALL ITEMS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER, AND MANUFACTURER'S IDENTIFICATION IN ACCORDANCE WITH:
       - a. (UNITS) MIL-STD-130, EXCEPT INK OR PAINT NOT ACCEPTABLE.
       - b. (PACKING AND SHIPPING CONTAINERS) MIL-STD-129
     - 2. PHYSICAL DIMENSIONS AS SHOWN.
   - B. ELECTRICAL REQUIREMENTS
     - (A1) 1. DIELECTRIC TEST STRENGTH: 10 VOLTS/MIL THK WITH 60 CPS AC POWER SOURCE.
3. **DESIGN REQUIREMENTS**
   - A. PHYSICAL REQUIREMENTS
     - 1. COMPOSITION:
       - a. BERYLLIUM OXIDE: 99.5% BY WEIGHT MINIMUM
       - b. MAXIMUM CHEMICAL IMPURITIES:

TOTAL Al, Mg AND Si:	4,500 PARTS PER MILLION
TOTAL Ca, Sr, AND Ba:	200 PARTS PER MILLION
TOTAL Fe, Ni, Co and Cu:	200 PARTS PER MILLION
TOTAL Na, Li, AND K:	100 PARTS PER MILLION
TOTAL C:	10 PARTS PER MILLION

2. DENSITY:	2.85 GRAMS/CC
3. THERMAL CONDUCTIVITY:	120 BTU PER SQUARE FOOT, PER HOUR, PER DEGREE F, PER FOOT AT 25°C
4. MOISTURE ABSORPTION:	.01% MAXIMUM

(A2) 5. DIELECTRIC STRENGTH: 300 VOLTS/MIL THK WITH 60 CPS AC POWER SOURCE.



NASA DASH NO.	THICKNESS (T)	TOLERANCE
-1	.031	±.005
-2	.062	±.010

6. WORKMANSHIP:	VISUAL EXAMINATION UNDER ULTRA VIOLET LIGHT USING APPROPRIATE DIE PENETRANT SHALL INDICATE FREEDOM FROM CRACKS, FISSURES, PIN HOLES AND OTHER PHYSICAL DEFECTS WHICH COULD CONTRIBUTE TO DIELECTRIC BREAKDOWN OR MECHANICAL BREAKDOWN.

B. ELECTRICAL REQUIREMENTS:

1. DIELECTRIC CONSTANT:	5.8 TO 7.0 AT 1 MEGACYCLE. CONSTANT SHALL NOT VARY MORE THAN ±5% BETWEEN ROOM TEMPERATURE AND 500°C

2. DIELECTRIC LOSS (AT 1 MEGACYCLE):
   - a. ROOM TEMPERATURE: .0006 MAXIMUM
   - b. ROOM TEMPERATURE TO 500°C: .0010 MAXIMUM
3. VOLUME RESISTIVITY (100 VOLTS DC FOR ONE MINUTE):
   - a. ROOM TEMPERATURE: 10^{15} OHM-CENTIMETERS MINIMUM
   - b. ROOM TEMPERATURE TO 500°C: 10^{12} OHM-CENTIMETERS MINIMUM

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

MASTER

KIC NO. 74468067001 THRU 7002

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN G.KRUK DATE 7-9-63
CHECKED V Ruggiero
APPROVAL F. Kirschmann 8/29/63
APPROVAL E. Dhoney 8/29/63
NASA APPROVAL 7/5/63
MIT APPROVAL 9/5/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WASHER, INSULATING
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011495
SCALE ~
WT
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

B 1011495 Ⓜ

SYM	DESCRIPTION	DATE	APPROVAL
A₃	REVISED PER TDRR NO. 05914	21 JAN 64	WK
B₁	REVISED PER TDRR NO. 07369	7 APR 64	WK

REVISIONS 02919

Ⓜ

REQUIREMENTS:

1. **GENERAL:**

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

   (B1) B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.

   C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.

2. **INSPECTION AND ACCEPTANCE:**

   A. MECHANICAL REQUIREMENTS

      1. ALL ITEMS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER, AND MANUFACTURER'S IDENTIFICATION IN ACCORDANCE WITH:

         a. (ITEMS) MIL-STD-130, EXCEPT INK OR PAINT NOT ACCEPTABLE.

         b. (PACKING AND SHIPPING CONTAINERS) MIL-STD-129

      2. PHYSICAL DIMENSIONS AS SHOWN.

   B. ELECTRICAL REQUIREMENTS

      (A1) 1. DIELECTRIC TEST STRENGTH: 10 VOLTS/MIL THK WITH 60 CPS AC POWER SOURCE.

3. **DESIGN REQUIREMENTS**

   A. PHYSICAL REQUIREMENTS

      1. COMPOSITION:

         a. BERYLLIUM OXIDE: 99.5% BY WEIGHT MINIMUM

         b. MAXIMUM CHEMICAL IMPURITIES:

TOTAL Al, Mg AND Si:	4,500 PARTS PER MILLION
TOTAL Ca, Sr, AND Ba:	200 PARTS PER MILLION
TOTAL Fe, Ni, Co and Cu:	200 PARTS PER MILLION
TOTAL Na, Li, AND K:	100 PARTS PER MILLION
TOTAL C:	10 PARTS PER MILLION

      2. DENSITY: 2.85 GRAMS/CC

      3. THERMAL CONDUCTIVITY: 120 BTU PER SQUARE FOOT, PER HOUR, PER DEGREE F, PER FOOT AT 25°C

      4. MOISTURE ABSORPTION: .01% MAXIMUM

      (A2) 5. DIELECTRIC STRENGTH: 300 VOLTS/MIL THK WITH 60 CPS AC POWER SOURCE.

      6. WORKMANSHIP: VISUAL EXAMINATION UNDER ULTRA VIOLET LIGHT USING APPROPRIATE DIE PENETRANT SHALL INDICATE FREEDOM FROM CRACKS, FISSURES, PIN HOLES AND OTHER PHYSICAL DEFECTS WHICH COULD CONTRIBUTE TO DIELECTRIC BREAKDOWN OR MECHANICAL BREAKDOWN.

   B. ELECTRICAL REQUIREMENTS:

      1. DIELECTRIC CONSTANT: 5.8 TO 7.0 AT 1 MEGACYCLE. CONSTANT SHALL NOT VARY MORE THAN ±5% BETWEEN ROOM TEMPERATURE AND 500°C

      2. DIELECTRIC LOSS (AT 1 MEGACYCLE):

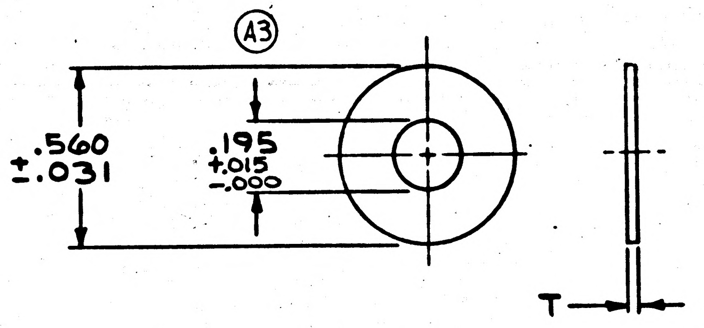
         a. ROOM TEMPERATURE: .0006 MAXIMUM

         b. ROOM TEMPERATURE TO 500°C: .0010 MAXIMUM

      3. VOLUME RESISTIVITY (100 VOLTS DC FOR ONE MINUTE):

         a. ROOM TEMPERATURE: 10^{15} OHM-CENTIMETERS MINIMUM

         b. ROOM TEMPERATURE TO 500°C: 10^{12} OHM-CENTIMETERS MINIMUM



NASA DASH NO.	THICKNESS (T)	TOLERANCE
-1	.031	±.005
-2	.062	±.010

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

MASTER

KIC NO. 74468067001 THRU 7002	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN G. KRUK DATE 7-9-63
CHECKED V Ruggiero
APPROVAL F. Ruisilemma 8/24/63
APPROVAL E. Thoreson 8/29/63
NASA APPROVAL 7/5/63
MIT APPROVAL 9/5/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WASHER, INSULATING
SPECIFICATION CONTROL DRAWING

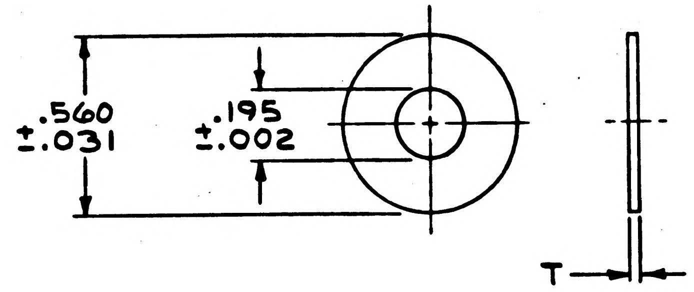
CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011495
SCALE ∼
WT
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1011495

REVISIONS 0,719			
SYM	DESCRIPTION	DATE	APPROVAL



NASA DASH NO.	THICKNESS (T)	TOLERANCE
-1	.031	±.005
-2	.062	±.010

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS
     - 1. ALL ITEMS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER, AND MANUFACTURER'S IDENTIFICATION IN ACCORDANCE WITH:
       - a. (UNITS) MIL-STD-130, EXCEPT INK OR PAINT NOT ACCEPTABLE.
       - b. (PACKING AND SHIPPING CONTAINERS) MIL-STD-129
     - 2. PHYSICAL DIMENSIONS AS SHOWN.
   - B. ELECTRICAL REQUIREMENTS
     - 1. DIELECTRIC STRENGTH: 300 VOLTS/MIL THK WITH AC POWER SOURCE

3. DESIGN REQUIREMENTS
   - A. PHYSICAL REQUIREMENTS
     - 1. COMPOSITION:
       - a. BERYLLIUM OXIDE: 99.5% BY WEIGHT MINIMUM
       - b. MAXIMUM CHEMICAL IMPURITIES:

TOTAL Al, Mg AND Si:	4,500 PARTS PER MILLION
TOTAL Ca, Sr, AND Ba:	200 PARTS PER MILLION
TOTAL Fe, Ni, Co and Cu:	200 PARTS PER MILLION
TOTAL Na, Li, AND K:	100 PARTS PER MILLION
TOTAL C:	10 PARTS PER MILLION

2. DENSITY:	2.85 GRAMS/CC
3 THERMAL CONDUCTIVITY:	120 BTU PER SQUARE FOOT, PER HOUR, PER DEGREE F, PER FOOT AT 25°C
4 MOISTURE ABSORPTION:	.01% MAXIMUM
6. WORKMANSHIP:	VISUAL EXAMINATION UNDER ULTRA VIOLET LIGHT USING APPROPRIATE DIE PENETRANT SHALL INDICATE FREEDOM FROM CRACKS, FISSURES, PIN HOLES AND OTHER PHYSICAL DEFECTS WHICH COULD CONTRIBUTE TO DIELECTRIC BREAKDOWN OR MECHANICAL BREAKDOWN.

B. ELECTRICAL REQUIREMENTS:

1. DIELECTRIC CONSTANT:	5.8 TO 7.0 AT 1 MEGACYCLE. CONSTANT SHALL NOT VARY MORE THAN ±5% BETWEEN ROOM TEMPERATURE AND 500°C

2. DIELECTRIC LOSS (AT 1 MEGACYCLE):
   - a. ROOM TEMPERATURE: .0006 MAXIMUM
   - b. ROOM TEMPERATURE TO 500°C: .0010 MAXIMUM

3. VOLUME RESISTIVITY (100 VOLTS DC FOR ONE MINUTE):
   - a. ROOM TEMPERATURE: 10^{15} OHM-CENTIMETERS MINIMUM
   - b. ROOM TEMPERATURE TO 500°C: 10^{12} OHM-CENTIMETERS MINIMUM

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

MASTER

KIC NO. 74468067001 THRU 7002	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

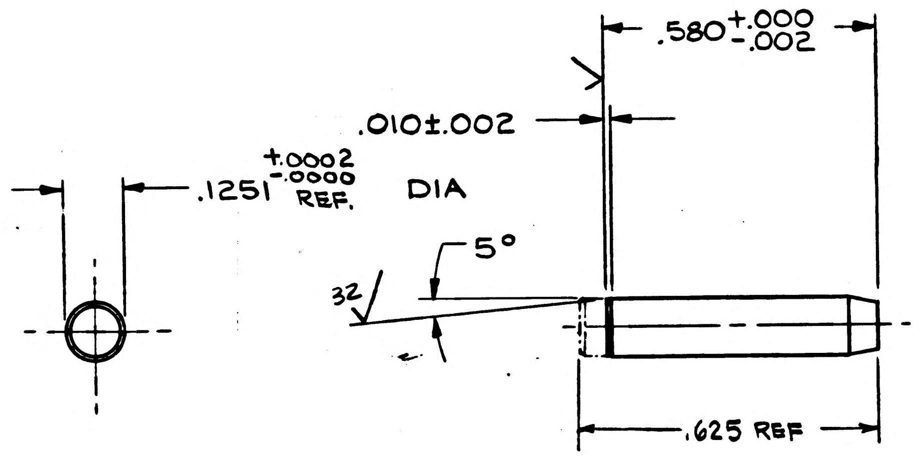
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DWG. NO. CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
MATERIAL	DRAWN G.KRUK DATE 7-9-63 CHECKED V Ruggiero APPROVAL F. Rasmussen 8/29/63 APPROVAL E. Thorup 8/28/63	WASHER, INSULATING SPECIFICATION CONTROL DRAWING
HEAT TREATMENT	NASA APPROVAL 7/11/63	CODE IDENT NO. | SIZE C | NASA DRAWING NO. 1011495
FINAL FINISH	MIT APPROVAL 9/5/63	SCALE ~ | WT | SHEET 1 OF 1

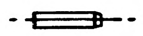
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011496

SYM	ZONE	REVISIONS TDRR 02279 DESCRIPTION	DATE	APPROVAL

NOTE:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
   b. 125/√ FINISH ALL OVER EXCEPT AS NOTED.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. PASSIVATE PER MIL-STD-171 (KPS10051.200)
6. IDENTIFY USING NASA DWG NO, REVISION LETTER AND MFR'S SYMBOL (KIC) PER ND 1002019.




ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011462	1011430

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	±	±.005	±.1°

DO NOT SCALE THIS DRAWING

MATERIAL MS 16555-628

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 39387000030

DRAWN V. LOZITO DATE 6-12-63
CHECKED M Fennell 6-12-63
APPROVAL M. Werner - 7-22-63
APPROVAL

NASA APPROVAL 7/24/63
MIT APPROVAL 24 July 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PIN, GUIDE

CODE IDENT NO.
SIZE C
NASA NUMBER 1011496
SCALE 4:1
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

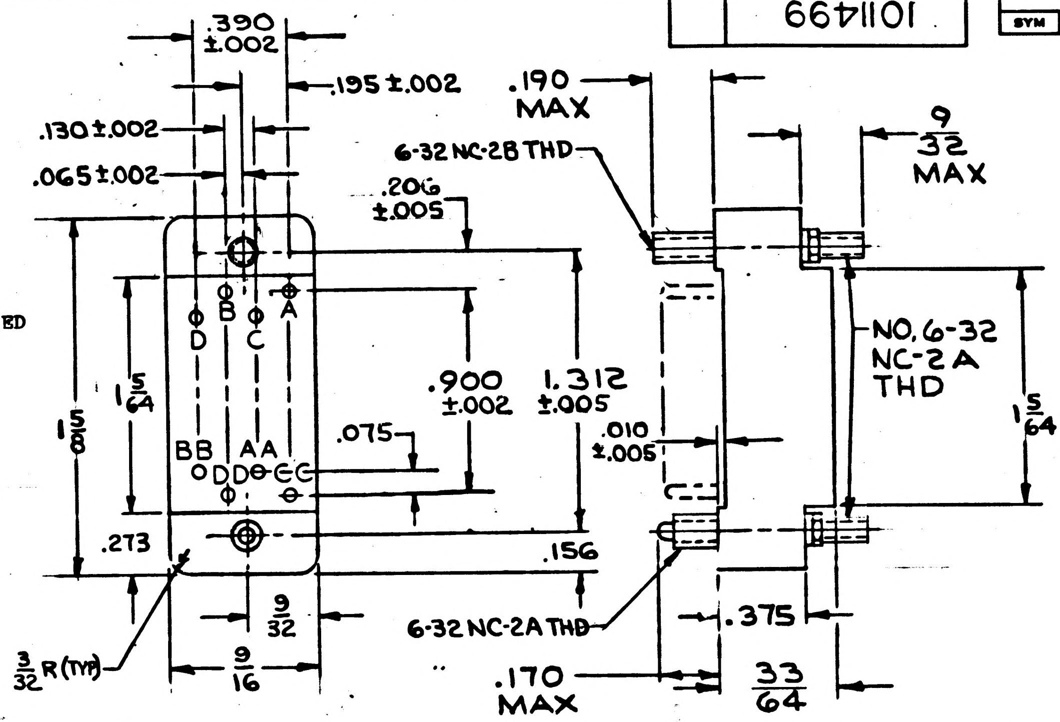
1011496

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011499

REVISIONS 03342			
SYM	DESCRIPTION	DATE	APPROVAL

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.



REQUIREMENTS:

1. GENERAL:

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

   C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.

   D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052.

   E. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-C-22857.

2. INSPECTION AND ACCEPTANCE:

   A. MECHANICAL REQUIREMENTS:

      1. ITEMS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION AS FOLLOWS:

         a. PACKAGES AND SHIPPING CONTAINERS PER MIL-STD-129.
         b. PARTS PER MIL-STD-130 EXCEPT INK OR PAINT SHALL NOT BE USED.

      2. MECHANICAL DIMENSIONS AS SHOWN.

      3. CONTACTS: ACCOMMODATES 26 PIN CONTACTS.

      4. ALL PIN LOCATIONS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.

      5. ENGAGEMENT: SCREWLOCKS, POLARIZED.

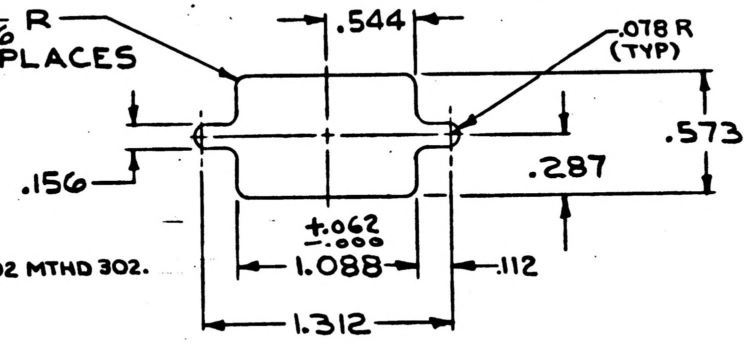
      6. THIS DRAWING SHALL MATE WITH A MATCHING PART NASA DRAWING NO. 1011501.

   B. ELECTRICAL REQUIREMENTS:

      1. INSULATION RESISTANCE: 1000 MEGOHMS MIN AT 1000 VDC, PER MIL-STD 202 MTHD 302.

      2. SERVICE RATING: 700 VDC, 500 VAC RMS AT SEA LEVEL.

      3. DIELECTRIC WITHSTANDING STRENGTH: 1850 VAC RMS AT SEA LEVEL, WITH CONTACTS INSERTED, PER MIL-STD 202 MTHD 301.



MOUNTING HOLE CUTOUT (REF)

3. DESIGN REQUIREMENTS:

   A. MOUNTING: PANEL

   B. SERVICE RATING: 125 VAC RMS AT 70,000 FEET.

   C. DIELECTRIC WITHSTANDING STRENGTH: 640 VAC RMS AT 70,000 FEET, WITH CONTACTS INSERTED, PER MIL-STD 202 MTHD 301.

   D. INSULATION (BODY): GLASS FILLED DIALLYL PHTHALATE PER MIL-M-14, TYPE SDG-F.

   E. CONTACTS: REMOVABLE CRIMP TYPE PIN CONTACTS. MUST BE ORDERED SEPARATELY AS MS17803-16-20.

   F. SCREWLOCKS: CRES 303 PER QQ-S-763, PASSIVATED PER MIL-STD-171, PAR. 5.4.2.

   G. CONTACT CENTER TO CENTER: 3/32 ± .002.

   H. SURFACE-CREEPAGE DISTANCE: 1/16 MIN.

   I. AIR SPACE; BETWEEN CONTACTS: 5/64 MIN.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

KIC. NO. 68502020501	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/64 DECIMALS ±.010 ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN G. KRUK DATE 7-11-63
CHECKED G. Conte 8/20/63
APPROVAL M. Warner 8/29/63
APPROVAL E. Thomp 9-23-63
NASA APPROVAL 7/26/63
MIT APPROVAL 9/24/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CONNECTOR, RECEPTACLE, ELECTRICAL
CRIMP TYPE, 26 # 20 PINS
SPECIFICATION CONTROL DRAWING

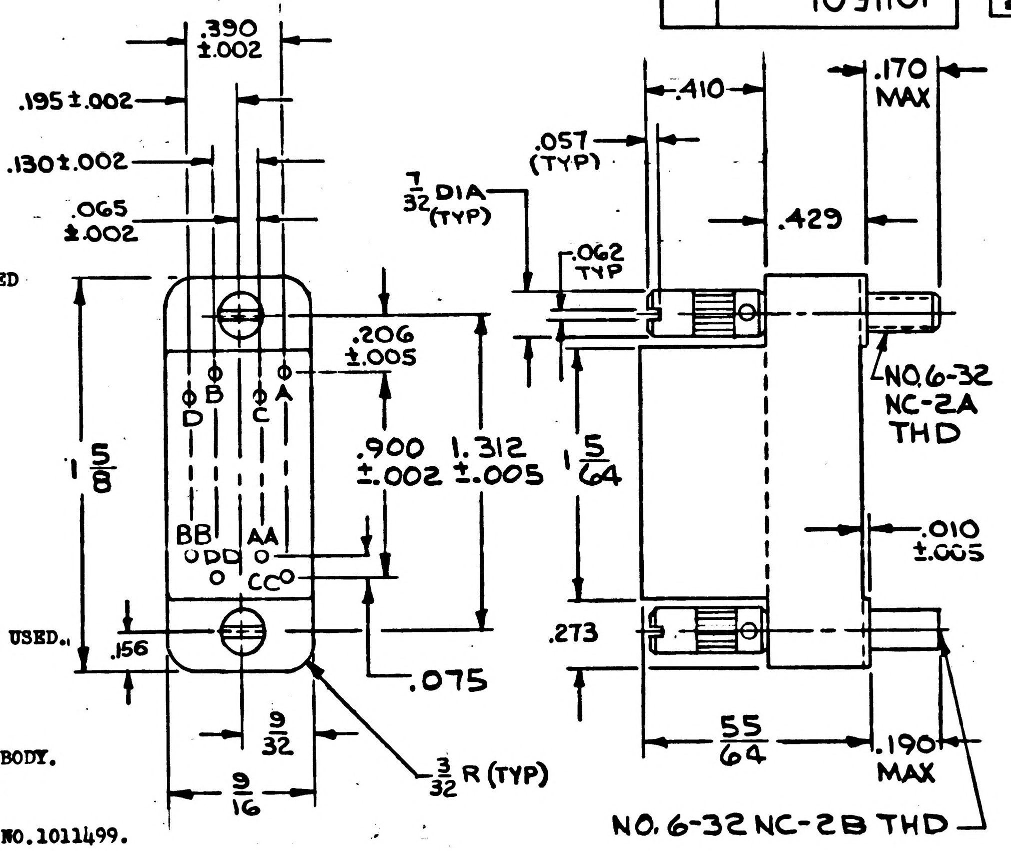
CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011499
SCALE ~
WT
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011501

REVISIONS 03342			
SYM	DESCRIPTION	DATE	APPROVAL

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.



REQUIREMENTS:

1. GENERAL:
    - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
    - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
    - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.
    - D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052.
    - E. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-C-22857.
2. INSPECTION AND ACCEPTANCE:
    - A. MECHANICAL REQUIREMENTS:
        1. ITEMS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION AS FOLLOWS:
            - a. PACKAGES AND SHIPPING CONTAINERS PER MIL-STD-129.
            - b. PARTS PER MIL-STD-130 EXCEPT INK OR PAINT SHALL NOT BE USED.
        2. MECHANICAL DIMENSIONS AS SHOWN.
        3. CONTACTS: ACCOMMODATES 26 SOCKET CONTACTS.
        4. ALL SOCKET LOCATIONS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.
        5. ENGAGEMENT: SCREWLOCKS, POLARIZED.
        6. THIS DRAWING SHALL MATE WITH A MATCHING PART NASA DRAWING NO.1011499.
    - B. ELECTRICAL REQUIREMENTS:
        1. INSULATION RESISTANCE: 1000 MEGOHMS MIN AT 1000 VDC. PER MIL-STD 202 MTHD 302.
        2. SERVICE RATING: 700 VDC, 500 VAC RMS AT SEA LEVEL.
        3. DIELECTRIC WITHSTANDING STRENGTH: 1850 VAC RMS AT SEA LEVEL, WITH CONTACTS INSERTED, PER MIL-STD 202 MTHD 301.
3. DESIGN REQUIREMENTS:
    - A. MOUNTING: PENDANT (CABLE).
    - B. SERVICE RATING: 125 VAC RMS AT 70,000 FEET.
    - C. DIELECTRIC WITHSTANDING STRENGTH: 640 VAC RMS AT 70,000 FEET, WITH CONTACTS INSERTED, PER MIL-STD 202 MTHD 301.
    - D. INSULATION (BODY): GLASS FILLED DIALLYL PHTHALATE PER MIL-M-14, TYPE SDG-F.
    - E. CONTACTS: REMOVABLE CRIMP TYPE SOCKET CONTACTS. MUST BE ORDERED SEPARATELY AS MS17804-16-20.
    - F. SCREWLOCKS:

        SLOTTED KNOBS: ALUMINUM PER QQ-A-365
        ANODIZED PER MIL-A-8625, TYPE II

        OTHER HARDWARE: CRES 303 PER QQ-S-763 PASSIVATED PER MIL-STD-171, PAR.5.4.2.
    - G. CONTACT CENTER TO CENTER: 3/32 ± .002
    - H. SURFACE-CREEPAGE DISTANCE: 1/16
    - I. AIR SPACE; BETWEEN CONTACTS: 5/64 MIN.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

KIC NO. 68502019801

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ±1/64 DECIMALS ±.010 ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN G. KRUK DATE 7-1963
CHECKED 8/27/63
APPROVAL M. Werner 8-29-63
APPROVAL E. Thoruf 9-23-63
NASA APPROVAL 7/24/63
MIT APPROVAL D. Hazel 7/26/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CONNECTOR, PLUG, ELECTRICAL
CRIMP TYPE, 26 #20 SOCKETS
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. SIZE C NASA DRAWING NO. 1011501
SCALE ~ WT SHEET 1 OF 1

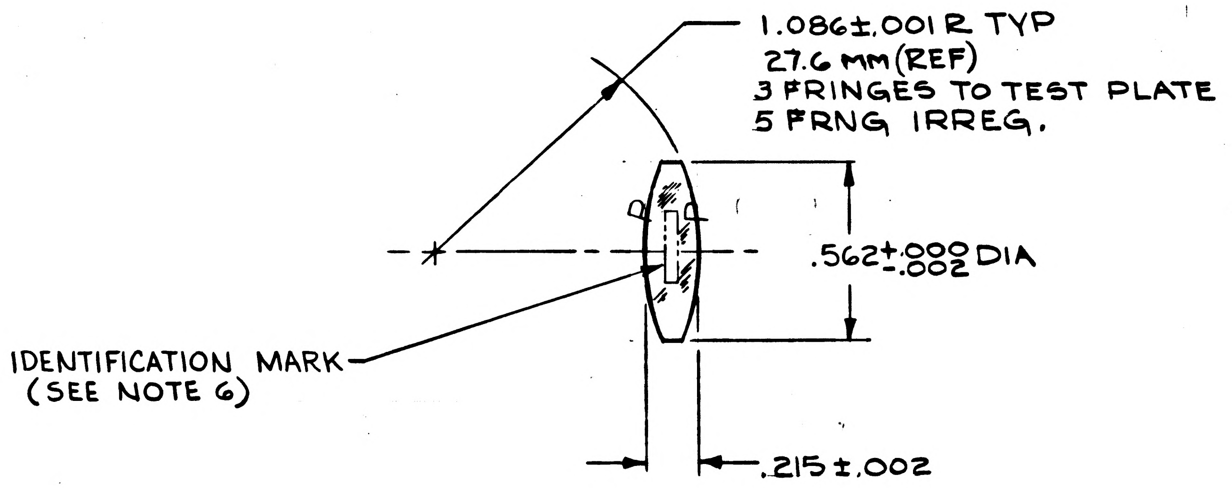
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

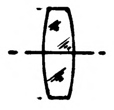
1011501

1011503

REVISIONS 02559				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. ELEMENT IN ACCORDANCE WITH SPEC MIL-O-13830
3. MATERIAL:
   GLASS, OPTICAL PER JAN-G-174, GRADE C, FINE ANNEALED
   TYPE 517-645 $n = 64.5$ $N_D = 1.517$
4. CA: ENT = .510 EXIT = .510
   SURF. QUAL: 60-40
   CTRG ERROR: 3 MINUTES
5. SURFACE MARKED "P" POL. ALL OTHERS GRD.
6. IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019.





ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011473	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± —

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 3

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 28 38700 0020

DRAWN J. Lozito DATE 6-7-63
CHECKED J. Joh 7-12-63
APPROVAL H. Werner by C. F. Costey 8/9/63
APPROVAL E. Phony 8-13-63
NASA APPROVAL W J Rhine 8-14-63
MIT APPROVAL 8-14-63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LENS, POSITIVE

CODE IDENT NO.
SIZE C
NASA NUMBER 1011503
SCALE 2/1
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

E-154

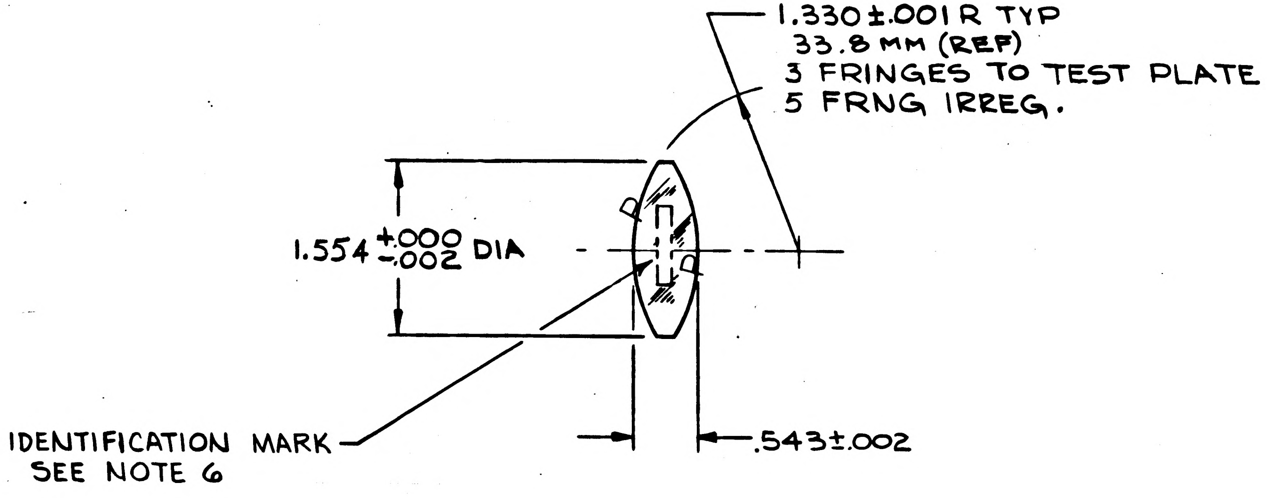
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011504

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REVISIONS 02559

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. ELEMENT IN ACCORDANCE WITH MIL-O-13830
3. MATERIAL:
   GLASS, OPTICAL PER JAN-G-174, GRADE C, FINE ANNEALED
   TYPE 517-645 n = 64.5 ND = 1.517
4. CA: ENT = 1.437 EXIT = 1.437
   SURF. QUAL: 60-40
   CTRG ERROR: 3 MINUTES
5. SURFACE MARKED "P" POL. ALL OTHERS GRD.
6. IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND1002019.



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011473	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	± .005	± —

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 3

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 28387000030

DRAWN J. LOZITO DATE 7-6-63
CHECKED J. Joh 7-12-63
APPROVAL M Werner by J. E. Costa 8/9/63
APPROVAL RJM E. Whang
NASA APPROVAL W J Rhine 5-14-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LENS, POSITIVE

CODE IDENT NO.
SIZE C
NASA NUMBER 1011504
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

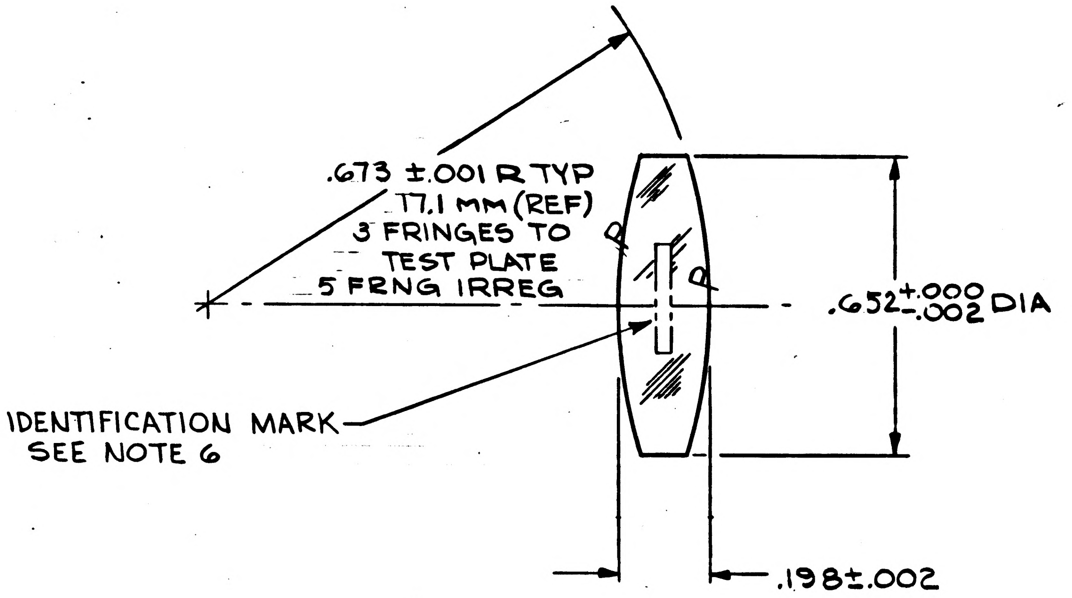
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

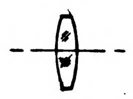
1011504

1011505

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS 02559				

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. ELEMENT IN ACCORDANCE WITH SPEC. MIL-O-13830
3. MATERIAL:
   GLASS, OPTICAL PER JAN-G-174, GRADE C, FINE ANNEALED
   TYPE 517-645 n=64.5 ND=1.517
4. CA: ENT=.578 EXIT=.578
   SURF. QUAL: 60-40
   CTRG ERROR: 3 MINUTES
5. SURFACE MARKED "P" POL. ALL OTHERS GRD.
6. IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND1002019.





ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011473	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	±.005	± ~

DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 3

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 28387000040

DRAWN J. LOZITO DATE 6-7-63
CHECKED J. John 7-12-63
APPROVAL M Werner by [illegible] 8/9/63
APPROVAL [illegible] E. [illegible] 8-13-63
NASA APPROVAL W J Rhine 8-14-63
MIT APPROVAL [illegible] 14 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LENS, POSITIVE

CODE IDENT NO.
SIZE C
NASA NUMBER 1011505
SCALE 4/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

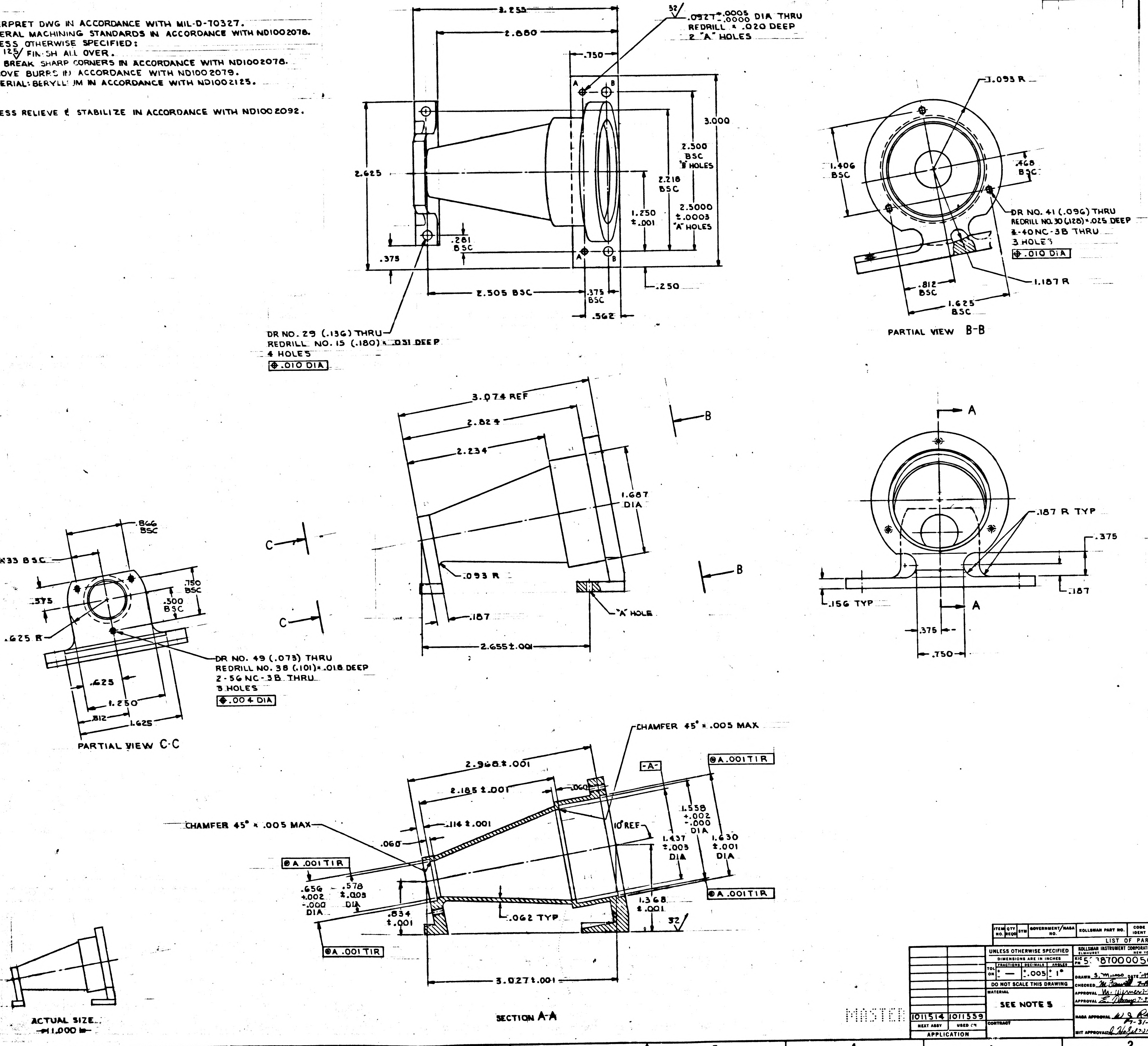
1011506

SYM	ZONE	REVISIONS TDRR 02322 DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 125√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. MATERIAL: BERYLLIUM IN ACCORDANCE WITH ND1002125.

6. STRESS RELIEVE & STABILIZE IN ACCORDANCE WITH ND1002092.



3.255
2.880
.750
.0527 +.0005 -.0000 DIA THRU
REDRILL × .020 DEEP
2 "A" HOLES
3.000
2.500 BSC "B" HOLES
2.218 BSC
1.250 ±.001
2.5000 ±.0003 "A" HOLES
2.625
.375
.281 BSC
2.505 BSC
.375 BSC
.562
.250
DR NO. 29 (.136) THRU
REDRILL NO. 15 (.180) × .031 DEEP
4 HOLES
⌖ .010 DIA
.093 R
1.406 BSC
.468 BSC
DR NO. 41 (.096) THRU
REDRILL NO. 30 (.128) × .025 DEEP
4-40NC-3B THRU
3 HOLES
⌖ .010 DIA
1.187 R
.812 BSC
1.625 BSC
PARTIAL VIEW B-B
3.074 REF
2.824
2.234
1.687 DIA
.093 R
.187
"A" HOLE
2.655 ±.001
B
B
C
C
A
A
.187 R TYP
.375
.187
.156 TYP
.375
.750
.866 BSC
.433 BSC
.750 BSC
.375
.500 BSC
.625 R
DR NO. 49 (.073) THRU
REDRILL NO. 38 (.101) × .018 DEEP
2-56NC-3B THRU
3 HOLES
⌖ .004 DIA
.625
1.250
.812
1.625
PARTIAL VIEW C-C
CHAMFER 45° × .005 MAX
2.968 ±.001
-A-
◎ A .001 TIR
2.185 ±.001
.060
.114 ±.001
.060
CHAMFER 45° × .005 MAX
10° REF
1.558 +.002 -.000 DIA
1.437 ±.003 DIA
1.630 ±.001 DIA
◎ A .001 TIR
.656 +.002 -.000 DIA
.578 ±.003 DIA
.834 ±.001
.062 TYP
1.368 ±.001
◎ A .001 TIR
◎ A .001 TIR
32
3.027 ±.001
SECTION A-A
ACTUAL SIZE
1.000

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011514	1011539

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 5

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 5 387000050

DRAWN S. Musso DATE 7-19-63
CHECKED M. Fausell 7-19-63
APPROVAL M. Werner 7-31-63
APPROVAL E. Dhomp 7-31-63
NASA APPROVAL W. J. Rhine 7-31-63
MIT APPROVAL L. Hasel 7-31-63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, LENS

CODE IDENT NO.
SIZE E
NASA NUMBER 1011506
SCALE 2 : 1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011506

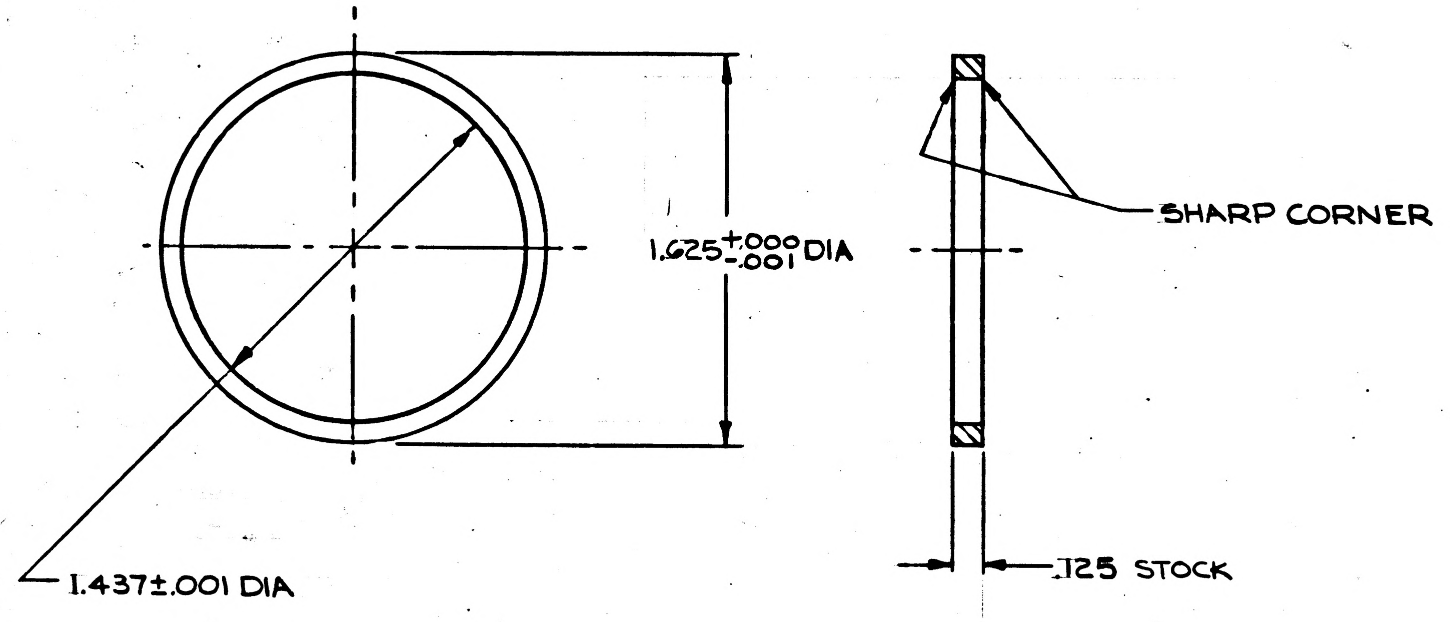
INCHES
PHOTOGRAPHIC SCALE ONLY

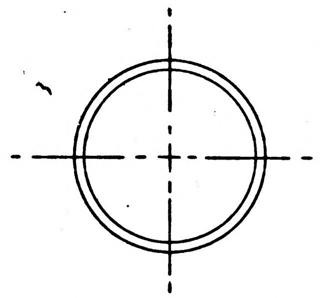
1011508

REVISIONS TDRR 02322

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078
3. UNLESS OTHERWISE SPECIFIED:
   a. 125/√ FINISH ALL OVER
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. FINISH: CHROMATE FILM PER MIL-C-5541 (KPS-1005A.300)
6. IDENTIFY USING NASA DRAWING NO. REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019




ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011473	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	±.005	± ~

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 2024 FED. SPEC QQ-A-355 TEMPER T3

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 45 387000010

DRAWN V. LOZITO DATE 7-14-63
CHECKED M Fowell 7-17-63
APPROVAL M. Werner 7-30-63
APPROVAL E. Thorup 7-30-63
NASA APPROVAL WJ Rhine 7-31-63
MIT APPROVAL D. Nagel 7/31/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE SPACER, LENS

CODE IDENT NO. SIZE C NASA NUMBER 1011508

SCALE 2:1 WEIGHT CALC ACTUAL SHEET 1 OF 1

1011508

E-184

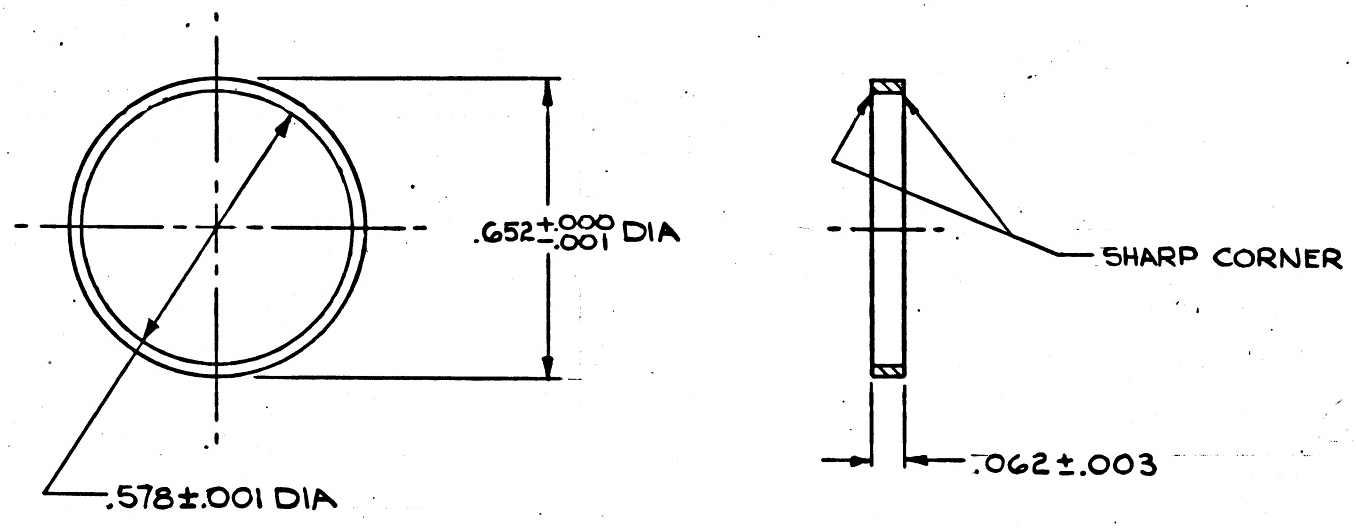
INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

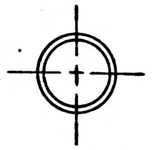
6051101

REVISIONS TDRR 02322

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078
3. UNLESS OTHERWISE SPECIFIED:
   a. 125/√ FINISH ALL OVER
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. FINISH: CHROMATE FILM PER MIL-C-554 (KPS-1005A.300)
6. IDENTIFY USING NASA DRAWING NO. REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019




ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011473	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCE ON: FRACTIONS ± ~ ; DECIMALS ± .005 ; ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL: ALUMINUM ALLOY 2024 FED. SPEC. QQ-A-355 TEMPER-T3
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 45387000030
DRAWN J. LOZITO DATE 7-13-63
CHECKED M. Fauwell 7-17-63
APPROVAL M. Werner 7-30-63
APPROVAL E. Dhong 7-30-63
NASA APPROVAL W J [illegible] 7-31-63
MIT APPROVAL D Waj 7/31/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE: SPACER, LENS

CODE IDENT NO.
SIZE: C
NASA NUMBER: 1011509
SCALE 4:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

K-E

Z-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011509

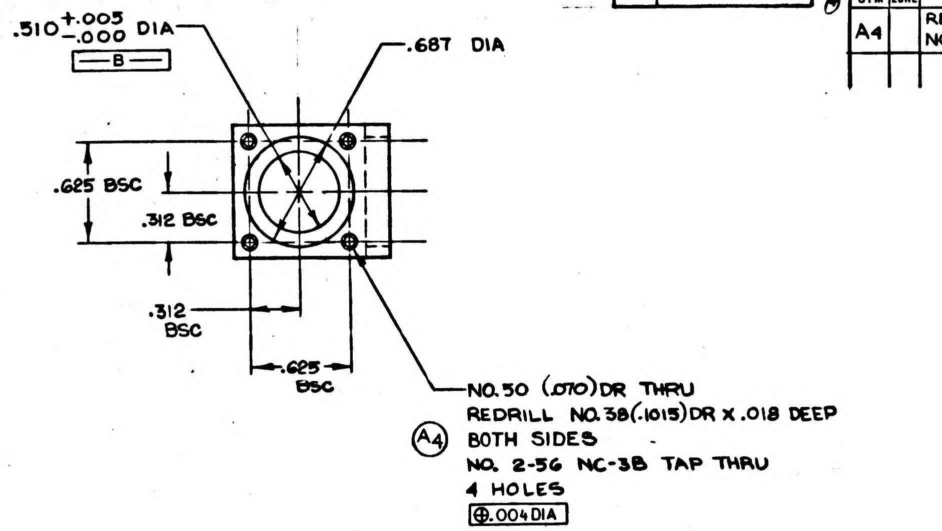
1011510 A

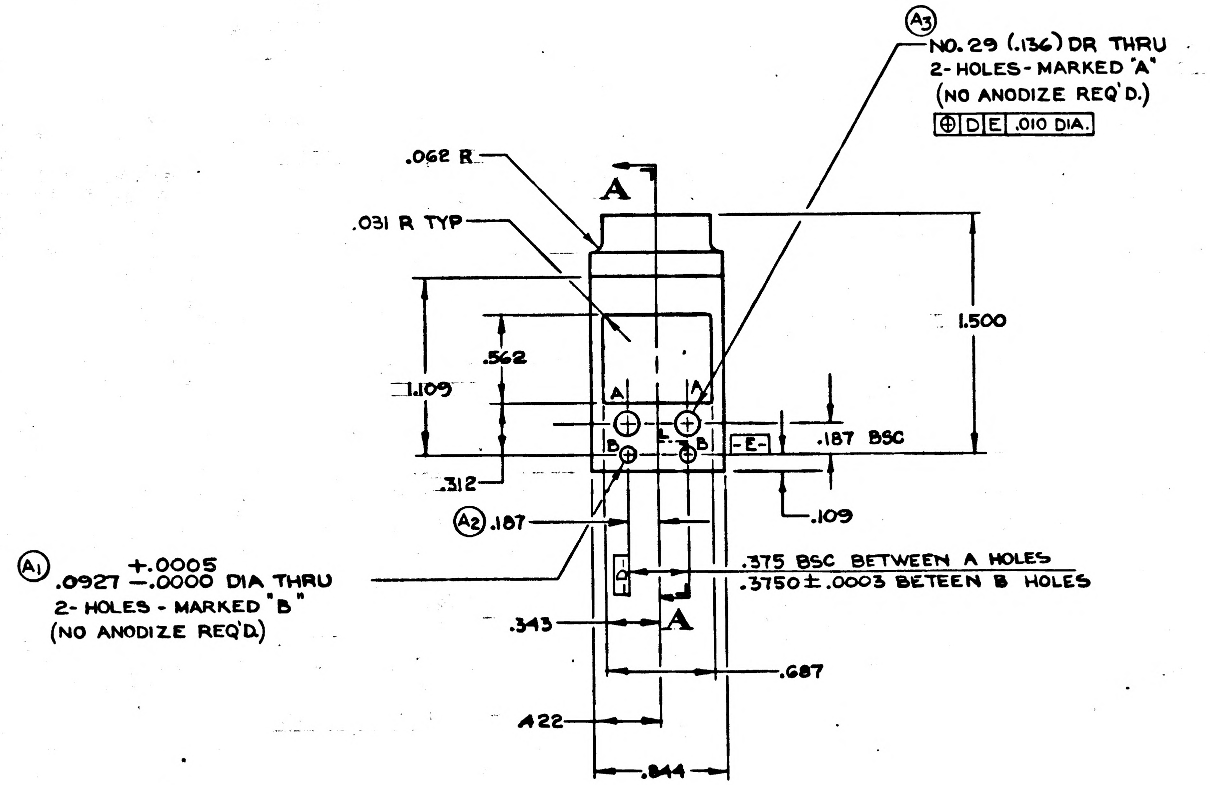
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO. 0Y630	11/14/[illegible]	[illegible]

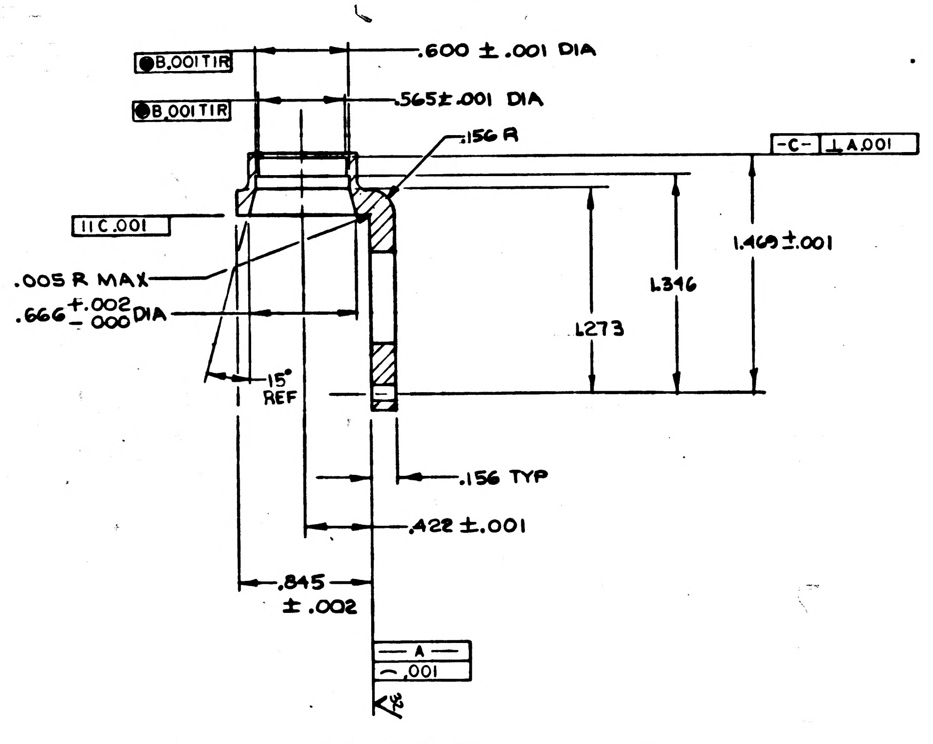
REVISIONS TDRR 02322

NOTES:

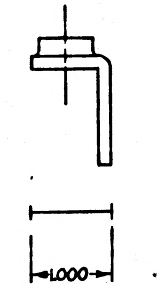
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 125√ FINISH ALL OVER
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: BLACK ANODIZE PER MIL-A-8625, TYPE II (KPS-1005A.201).


.510 +.005 −.000 DIA
—B—
.687 DIA
.625 BSC
.312 BSC
.312 BSC
.625 BSC
NO. 50 (.070) DR THRU
REDRILL NO. 38 (.1015) DR X .018 DEEP
BOTH SIDES
A4
NO. 2-56 NC-3B TAP THRU
4 HOLES
⊕.004 DIA


A3
NO. 29 (.136) DR THRU
2-HOLES-MARKED "A"
(NO ANODIZE REQ'D.)
⊕ D E .010 DIA.
.062 R
A
.031 R TYP
1.500
.562
1.109
A
A
B
B
-E-
.187 BSC
.312
A2 .187
.109
A1
.0927 +.0005 −.0000 DIA THRU
2-HOLES-MARKED "B"
(NO ANODIZE REQ'D.)
.375 BSC BETWEEN A HOLES
.3750 ± .0003 BETEEN B HOLES
.343
A
.687
.422
.844


●B .001 TIR
.600 ± .001 DIA
●B .001 TIR
.565 ± .001 DIA
.156 R
-C- ⊥ A .001
‖ C .001
.005 R MAX
.666 +.002 −.000 DIA
1.469 ± .001
1.346
1.273
15° REF
.156 TYP
.422 ± .001
.845 ± .002
—A—
⌒ .001
32

SECTION A-A



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011516	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 2024
FED SPEC QQ-A-268
TEMPER T4

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52387000180

DRAWN R CARROLL DATE 7/10/63
CHECKED M. Farrell 7-19-63
APPROVAL [illegible] Warner 7-31-63
APPROVAL E. Thomp[illegible] 7-31-63
NASA APPROVAL W.J. [illegible] 7-31-63
MIT APPROVAL [illegible] 7/31/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BRACKET, LENS

CODE IDENT NO.
SIZE D
NASA NUMBER 1011510
SCALE 2:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

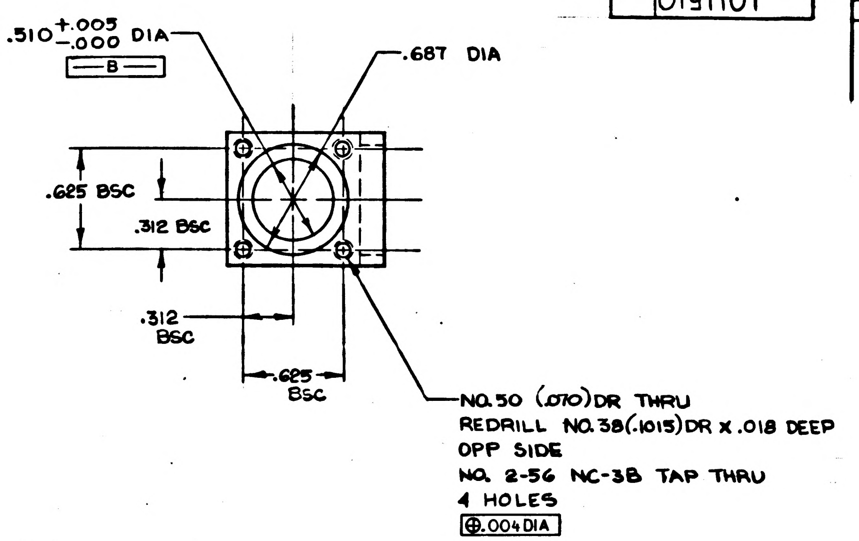
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

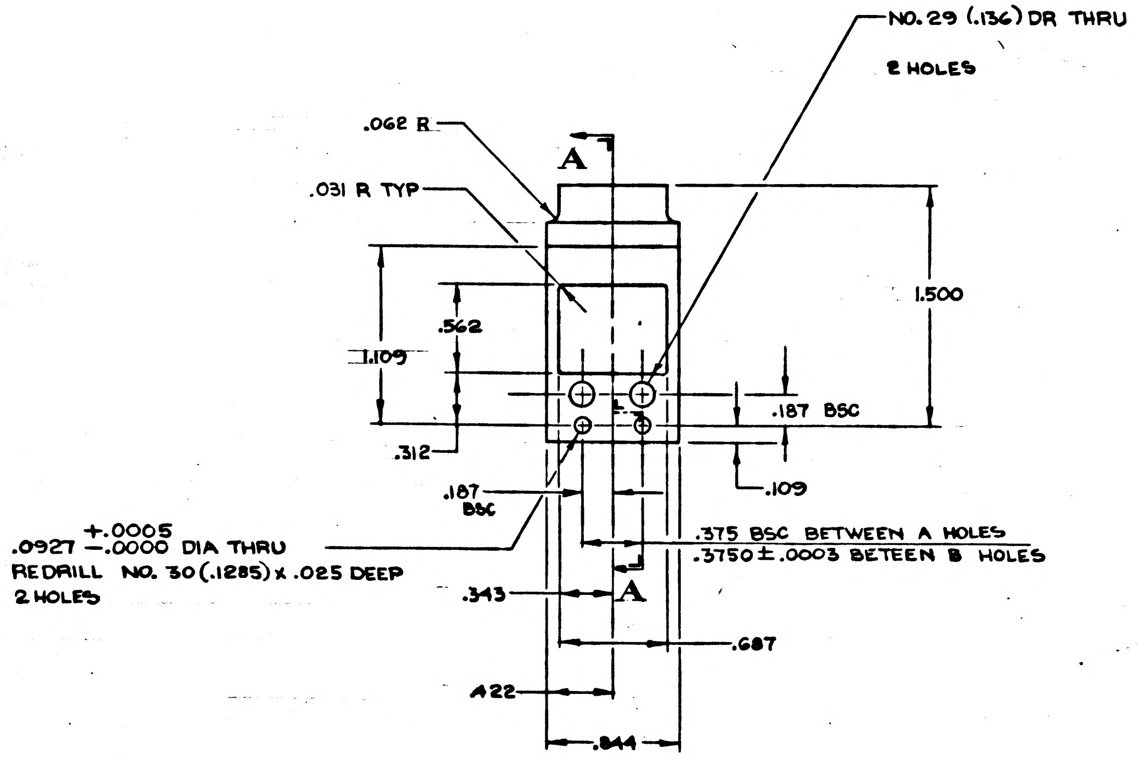
0151101

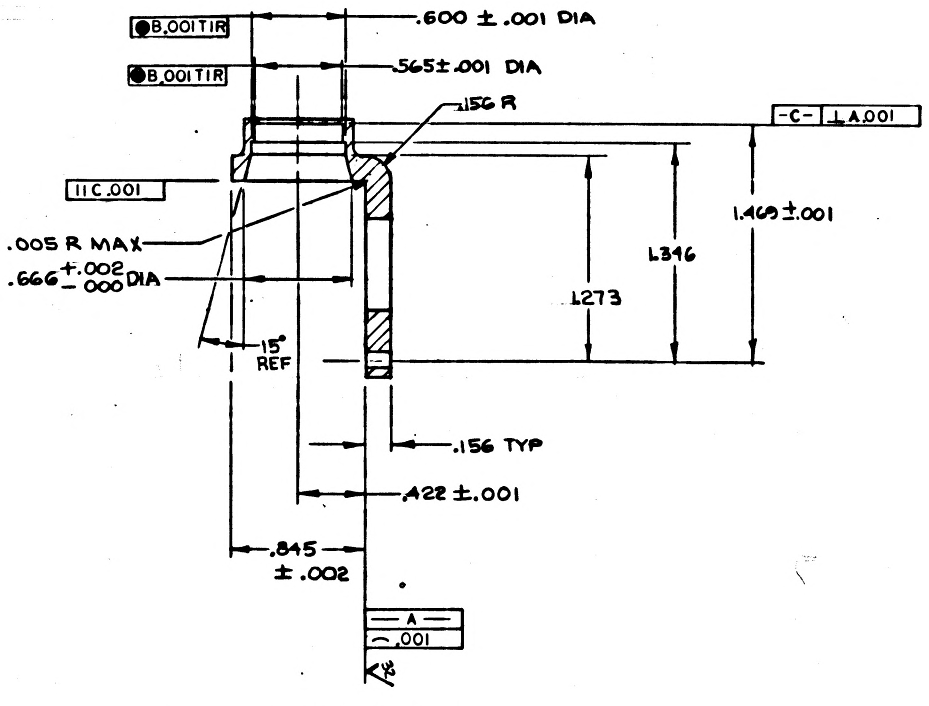
REVISIONS TDRR 02322				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

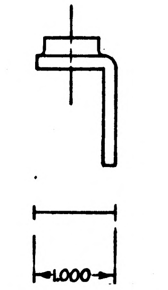
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   - a. 125/√ FINISH ALL OVER
   - b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: BLACK ANODIZE PER MIL-A-8625, TYPE II (KPS-1005A.201).


.510 +.005 −.000 DIA
—B—
.687 DIA
.625 BSC
.312 BSC
.312 BSC
.625 BSC
NO.50 (.070) DR THRU
REDRILL NO.38 (.1015) DR x .018 DEEP
OPP SIDE
NO. 2-56 NC-3B TAP THRU
4 HOLES
⊕.004 DIA


NO. 29 (.136) DR THRU
2 HOLES
.062 R
A
.031 R TYP
1.500
.562
1.109
.187 BSC
.312
.109
.187 BSC
+.0005
.0927 −.0000 DIA THRU
REDRILL NO. 30 (.1285) x .025 DEEP
2 HOLES
.375 BSC BETWEEN A HOLES
.3750 ± .0003 BETEEN B HOLES
.343
A
.687
.422
.844


●B .001 TIR
.600 ± .001 DIA
●B .001 TIR
.565 ± .001 DIA
.156 R
−C− ⊥A .001
II C .001
1.469 ± .001
1.346
.005 R MAX
.666 +.002 −.000 DIA
1.273
15° REF
.156 TYP
.422 ± .001
.845 ± .002
—A—
⌒ .001
32

SECTION A-A



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011516	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 2024
FED SPEC QQ-A-268
TEMPER T4

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52387000180

DRAWN R CARROLL DATE 7/1/63
CHECKED M Farrell 7-19-63
APPROVAL Mc Werner 7-31-63
APPROVAL E. Thomp 7-31-63
NASA APPROVAL W J Rhine 7-31-63
MIT APPROVAL J Hol 7/31/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BRACKET, LENS

CODE IDENT NO.	SIZE	NASA NUMBER
	D	1011510

SCALE 2:1 WEIGHT CALC ACTUAL SHEET 1 OF 1

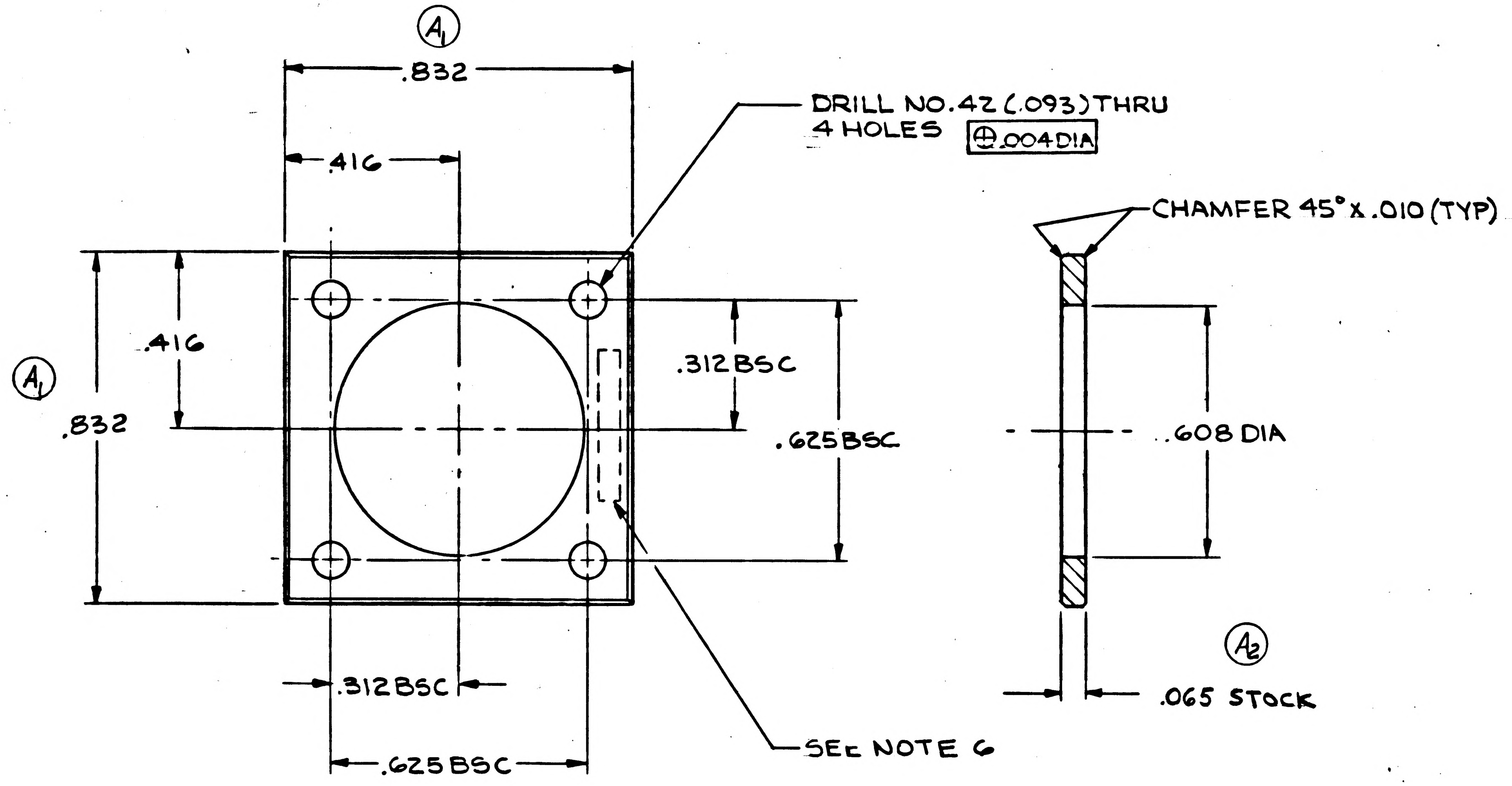
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

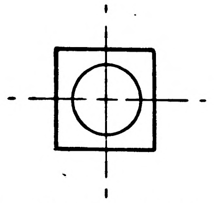
1011511 A

REVISIONS TDRR 02322				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A2		REVISED PER TDRR NO. 02951	9/4/63	

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS PER ND1002078
3. UNLESS OTHERWISE SPECIFIED:
   a. 125/√ FINISH ALL OVER
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. FINISH: BLACK ANODIZE PER MIL-A-8625 TYPE II (KPS-1005A.201)
6. IDENTIFY USING NASA DWG. NO. REVISION LETTER AND MANUFACTURES SYMBOL PER ND1002019.





ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011473	1011559
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	± .005	± ~

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 2024
FED SPEC QQ-A-355
TEMPER T3

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52387000190

DRAWN J. LOZITO DATE 7-17-63
CHECKED M. Farrell 7-19-63
APPROVAL M. Werner 7-30-63
APPROVAL E. Thomp 7-31-63
NASA APPROVAL W J Rhine 7-31-63
MIT APPROVAL R Nagel 7/31/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RETAINER, LENS

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011511

SCALE 4:1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

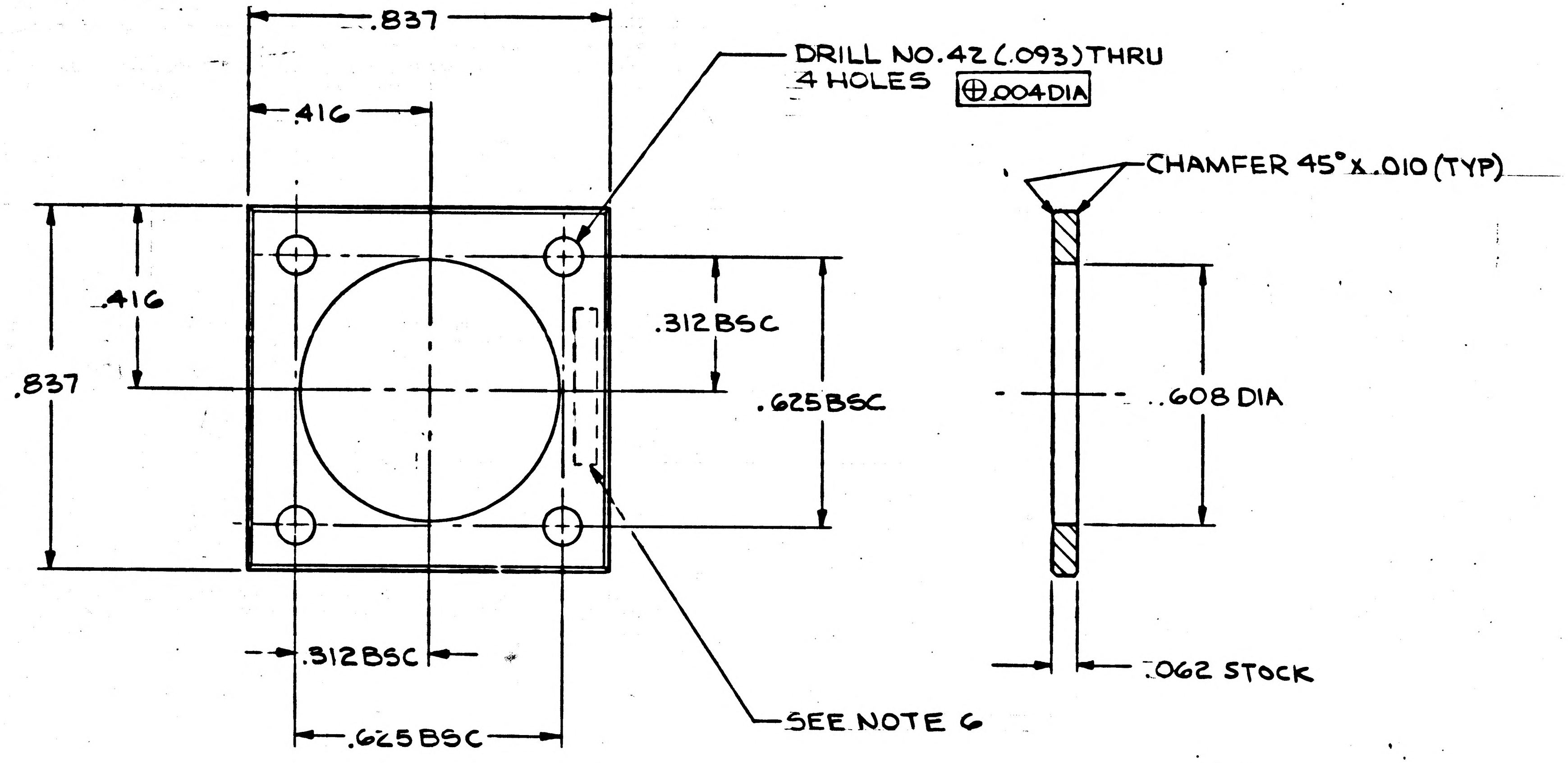
E-154

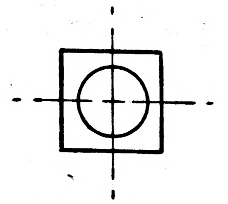
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

REVISIONS TDRR 02322				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS PER ND1002078
3. UNLESS OTHERWISE SPECIFIED:
   a. 125/√ FINISH ALL OVER
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. FINISH: BLACK ANODIZE PER MIL-A-8625 TYPE II (KPS-1005A.201)
6. IDENTIFY USING NASA DWG. NO. REVISION LETTER AND MANUFACTURES SYMBOL PER ND1002019.





ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011473	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	±.005	± ~

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 2024
FED SPEC QQ-A-355
TEMPER T3

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST N. W YORK
KIC PN 52387000190

DRAWN V. LOZITO DATE 7-17-63
CHECKED M. Farwell 7-19-63
APPROVAL M. Werner 7-30-63
APPROVAL E. Thorup 7-31-63
NASA APPROVAL W J Rhine 7-31-63
MIT APPROVAL R Nagel 7/31/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RETAINER, LENS

CODE IDENT NO.
SIZE C
NASA NUMBER 1011511
SCALE 4:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

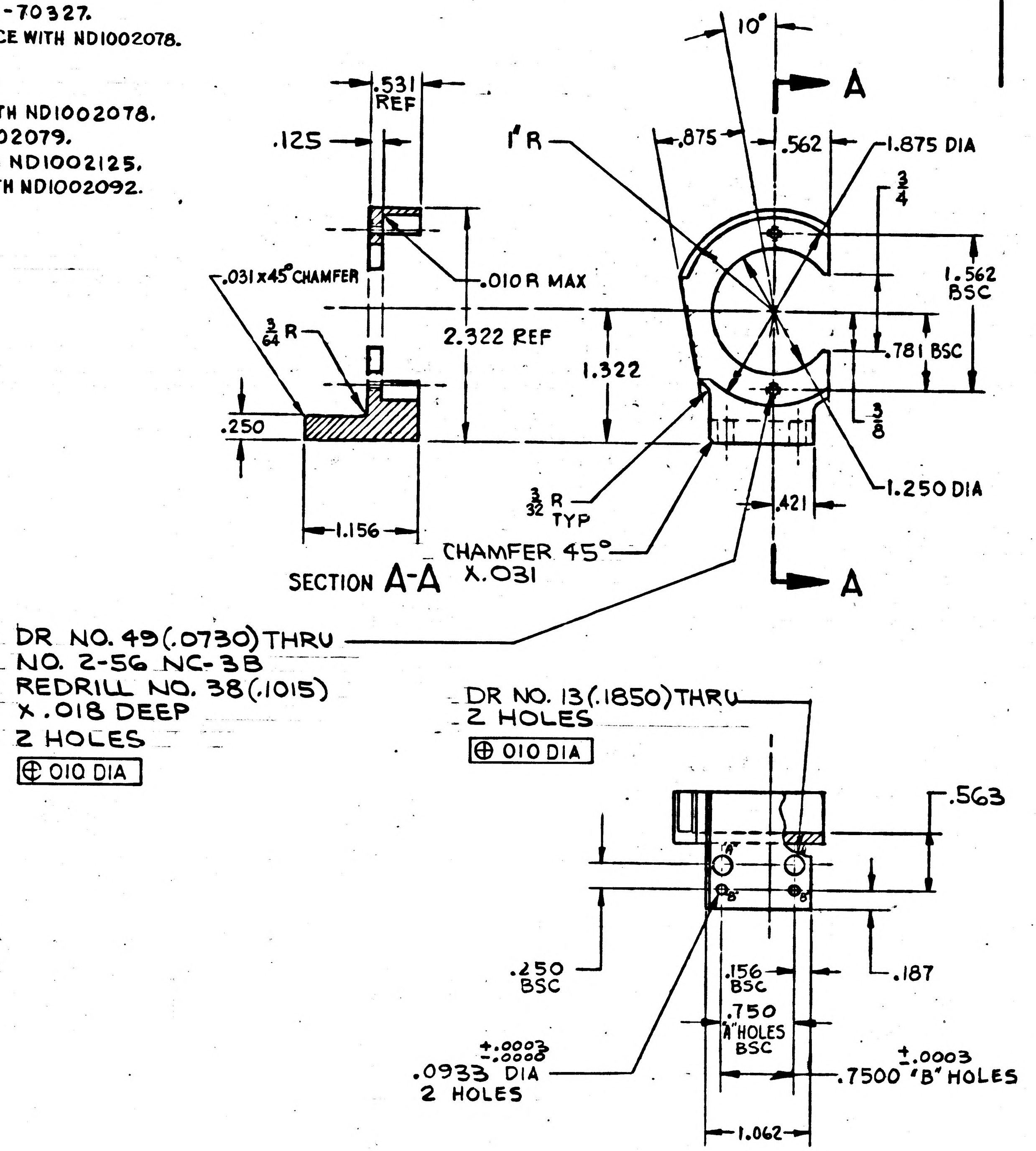
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011512

REVISIONS T DRR 02322				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   - a. $\overset{125}{\checkmark}$ FINISH ALL OVER.
   - b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. MATERIAL: BERYLLIUM IN ACCORDANCE WITH ND1002125.
6. STRESS RELIEVE & STABILIZE IN ACCORDANCE WITH ND1002092.


10°
A
.531 REF
.125
1" R
.875
.562
1.875 DIA
3/4
1.562 BSC
.781 BSC
.031 x 45° CHAMFER
.010 R MAX
3/64 R
2.322 REF
1.322
.250
3/8
1.250 DIA
3/32 R TYP
.421
1.156
CHAMFER 45° X.031
SECTION A-A
A
DR NO. 49(.0730) THRU
NO. 2-56 NC-3B
REDRILL NO. 38(.1015)
X .018 DEEP
2 HOLES
⊕ 010 DIA
DR NO. 13(.1850) THRU
2 HOLES
⊕ 010 DIA
.563
"A"
"B"
.250 BSC
.156 BSC
.187
.750 "A" HOLES BSC
+.0003 -.0000 .0933 DIA 2 HOLES
±.0003 .7500 "B" HOLES
1.062

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011523	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 5

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52387000170

DRAWN J. JOHN DATE 7-12-63
CHECKED M. Fennell 9-18-63
APPROVAL M. Werner 7-30-63
APPROVAL E. Thomp 7-30-63

NASA APPROVAL W J Rhine 7-31-63
MIT APPROVAL D Hoagl 7/31/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BRACKET, LAMP

CODE IDENT NO.
SIZE C
NASA NUMBER 1011512
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

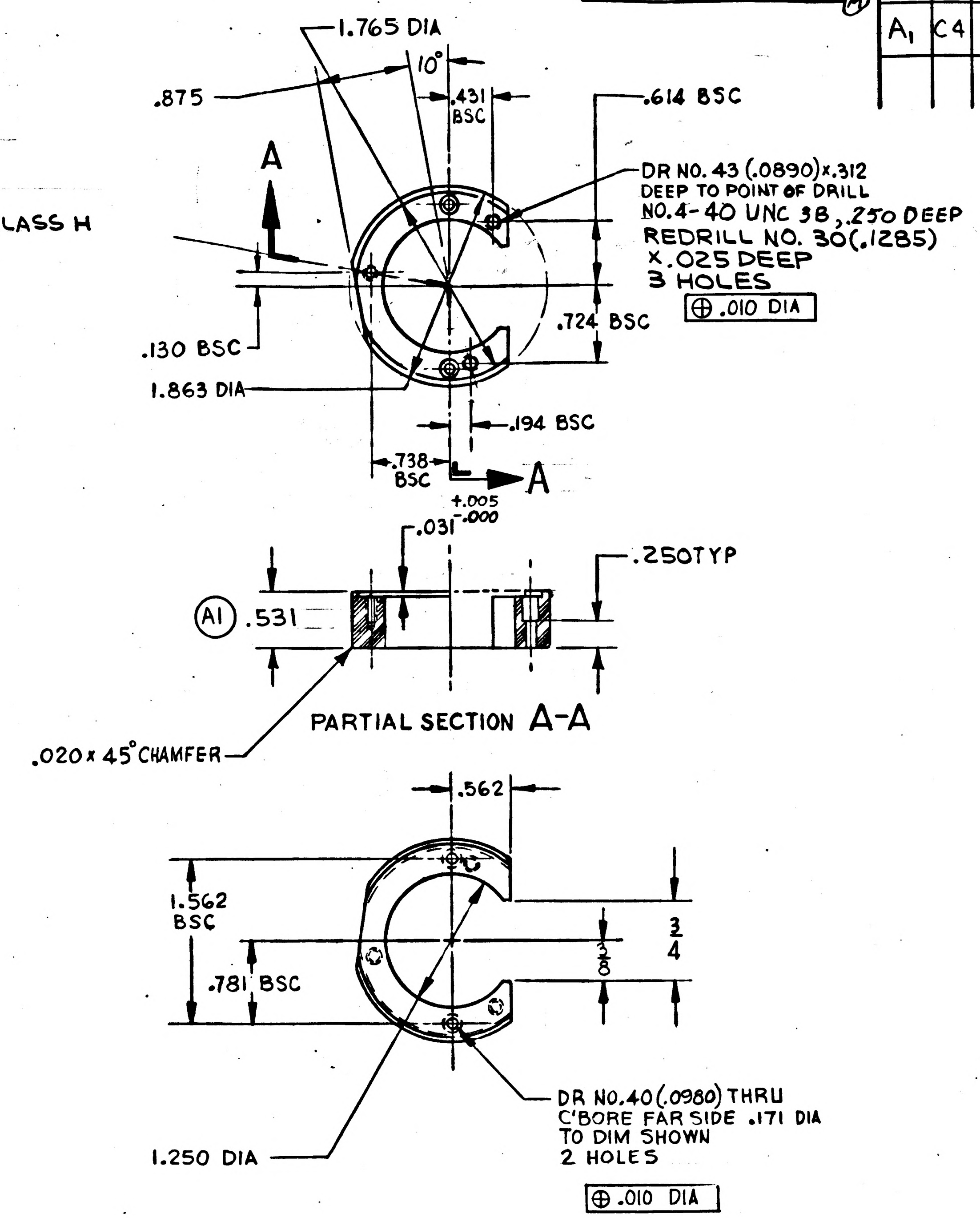
MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011513 A

REVISIONS 02559				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A1	C4	REVISED PER TDRR NO. 05257	12-17-63	

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 125√ FINISH ON MACHINED SURFACES.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. MATERIAL:- PLASTIC MATERIAL, LAMINATED, THERMO SETTING PER MIL-P-997C TYPE GSG, CLASS H
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURER'S SYMBOL PER ND1002019.


1.765 DIA
10°
.875
.431 BSC
.614 BSC
A
DR NO. 43 (.0890) x .312 DEEP TO POINT OF DRILL
NO. 4-40 UNC 3B, .250 DEEP
REDRILL NO. 30 (.1285) x .025 DEEP
3 HOLES
⊕ .010 DIA
.724 BSC
.130 BSC
1.863 DIA
.194 BSC
.738 BSC
A
+.005 -.000
.031
.250 TYP
A1
.531
PARTIAL SECTION A-A
.020 x 45° CHAMFER
.562
1.562 BSC
.781 BSC
3/8
3/4
DR NO. 40 (.0980) THRU
C'BORE FAR SIDE .171 DIA
TO DIM SHOWN
2 HOLES
1.250 DIA
⊕ .010 DIA

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011473	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ± .005; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE 5
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 46387000080
DRAWN J. JOHN DATE 7-13-63
CHECKED M Farrell 7-18-63
APPROVAL M. Werner by C. Costey 8/8/63
APPROVAL E. Thomy 8-13-63
NASA APPROVAL W J Rhine 8-14-63
MIT APPROVAL W Kupfer 14 Aug 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
TITLE
RING, INSULATION
CODE IDENT NO.
SIZE C
NASA NUMBER 1011513
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

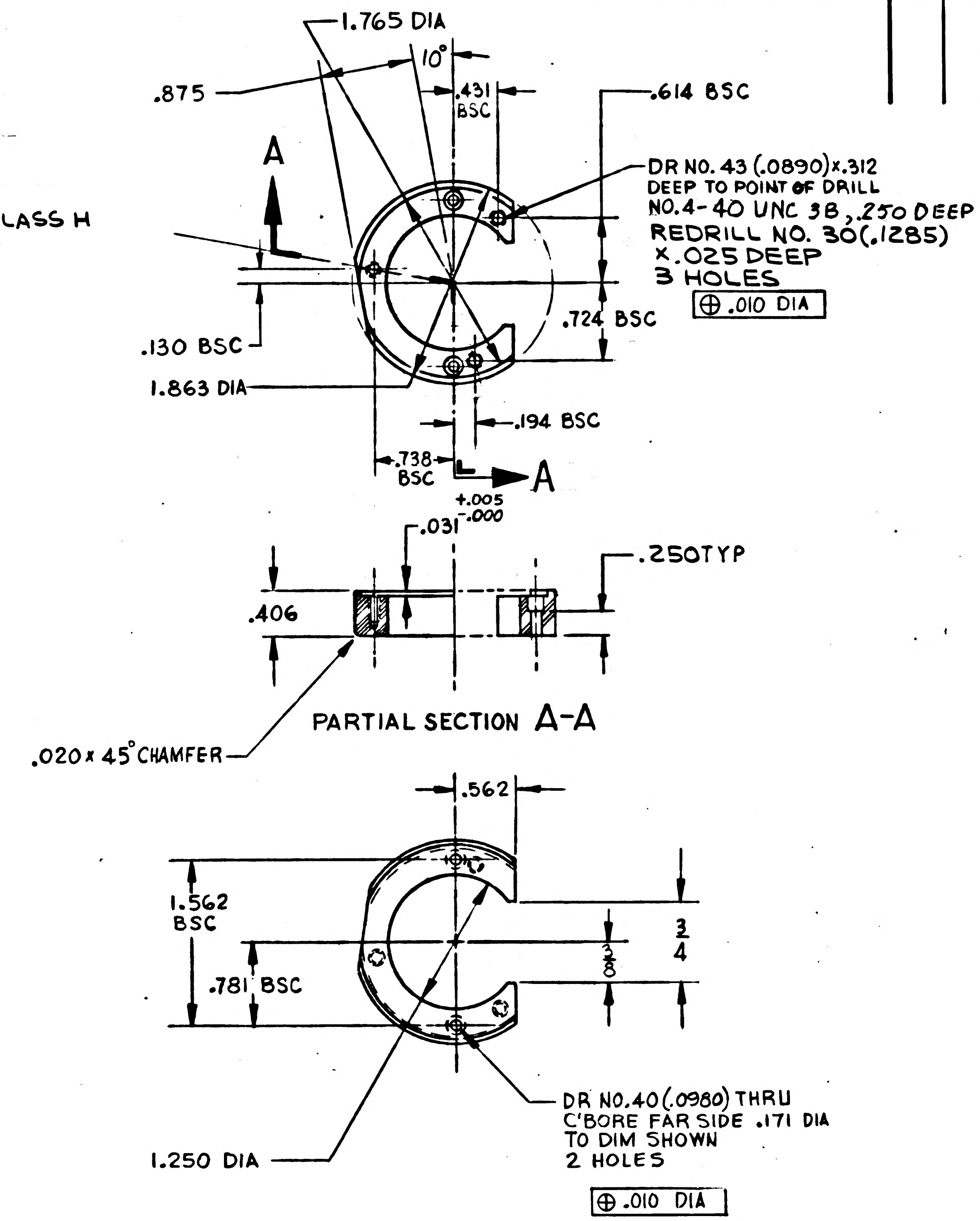
MASTER

1011513

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS 02559				

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 125√ FINISH ON MACHINED SURFACES.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. MATERIAL:- PLASTIC MATERIAL, LAMINATED, THERMO SETTING PER MIL-P-997C TYPE GSG, CLASS H
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURER'S SYMBOL PER ND1002019.


1.765 DIA
10°
.875
.431 BSC
.614 BSC
A
DR NO. 43 (.0890) x .312 DEEP TO POINT OF DRILL
NO. 4-40 UNC 3B, .250 DEEP
REDRILL NO. 30 (.1285)
X .025 DEEP
3 HOLES
⊕ .010 DIA
.724 BSC
.130 BSC
1.863 DIA
.194 BSC
.738 BSC
A
+.005 -.000
.031
.250 TYP
.406
.020 x 45° CHAMFER
PARTIAL SECTION A-A
.562
1.562 BSC
.781 BSC
3/8
3/4
DR NO. 40 (.0980) THRU
C'BORE FAR SIDE .171 DIA
TO DIM SHOWN
2 HOLES
1.250 DIA
⊕ .010 DIA

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011473	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 5

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 46387000080

DRAWN J. JOHN DATE 7-13-63
CHECKED M Farrell 7-18-63
APPROVAL M. Werner by J.E. Costey 8/8/63
APPROVAL E. Nhony 8-13-63
NASA APPROVAL W J Rhine 8-14-63
MIT APPROVAL W Kupfer 14 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RING, INSULATION

CODE IDENT NO.
SIZE C
NASA NUMBER 1011513
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

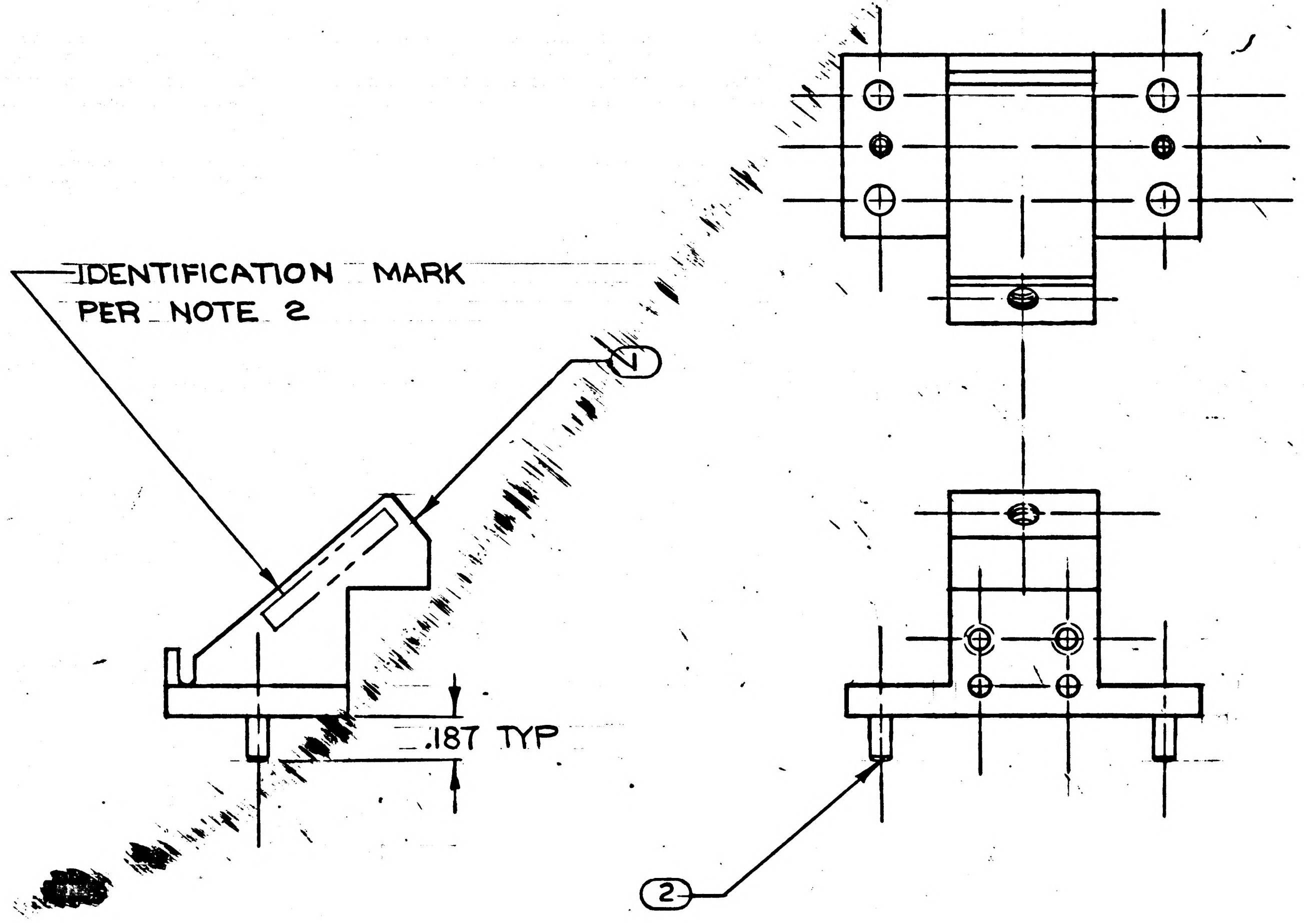
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

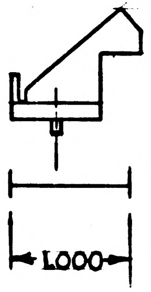
1011513

REVISIONS		TDRR 02322		
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY PER ND1002019 WITH NASA PART NO., REV LETTER AND MFRS SYM (KIC).





ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	2		MS16555-617	M444030017	-	PIN, DOWEL			
1	1		1011429	52387000110		SUPPORT, MIRROR			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011437	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — ; DECIMALS ± .005 ; ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85387000160
DRAWN R CARROLL DATE 7/17/63
CHECKED M Faswell 7-19-63
APPROVAL M. Werner 7-3-63
APPROVAL E. Dhong 7-30-63
NASA APPROVAL W J Rhine 7-31-63
MIT APPROVAL J Hafel 7/31/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SUPPORT, MIRROR
ASSY OF

CODE IDENT NO. | SIZE C | NASA NUMBER 1011515
SCALE 2:1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

1011515

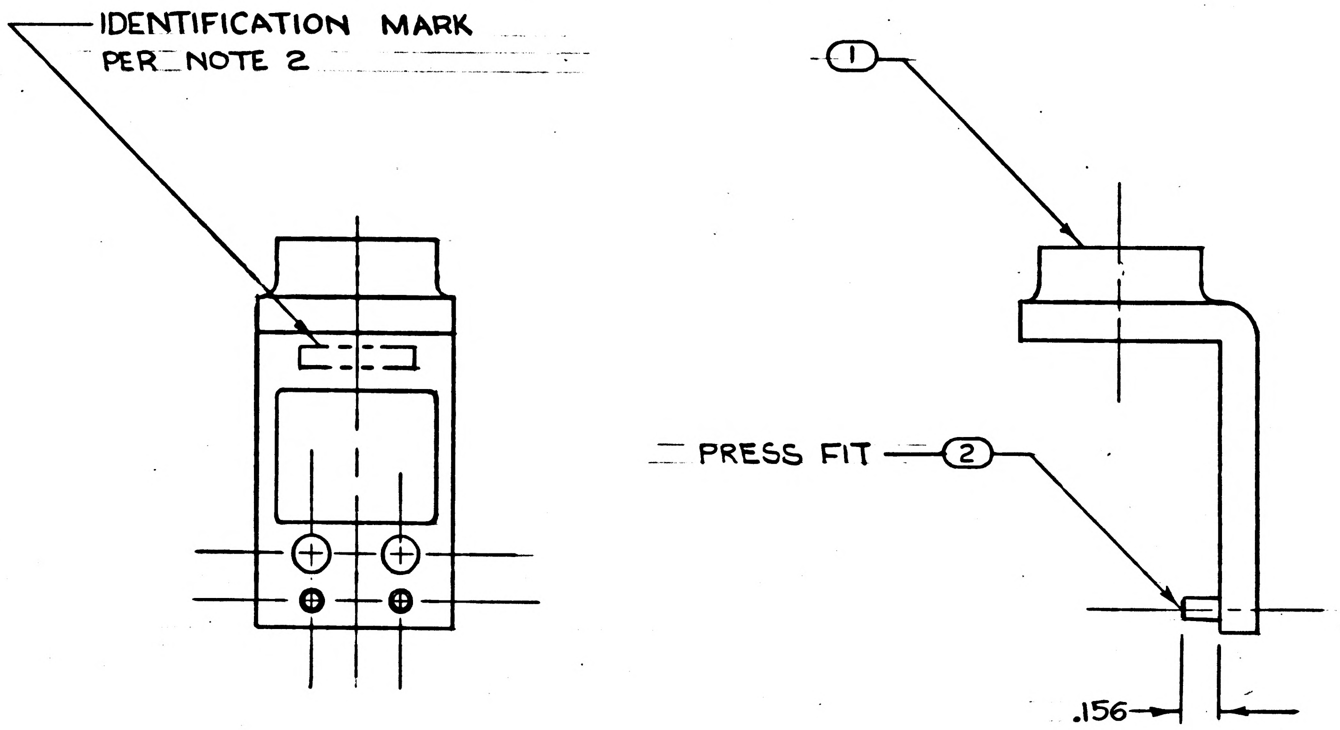
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

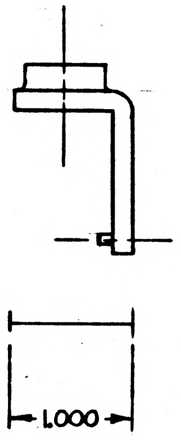
—	1011516

REVISIONS TD RR02322				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY PER ND1002019 WITH NASA PART NO., REV LETTER AND MFRS SYM (KIC).





ACTUAL SIZE

MASTER

1011437	1011559
NEXT ASSY	USED ON
APPLICATION	

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	2		MS16555-617	74444 03 0017		PIN, DOWEL			
1	1		1011510	52387000180		BRACKET, LENS			

LIST OF PARTS AND MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± —

DO NOT SCALE THIS DRAWING

MATERIAL —

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85387000170

DRAWN R CARROLL DATE 7/17/63
CHECKED McFarwell 7-19-63
APPROVAL M. Werner 7-30-63
APPROVAL E. Dhaup 7-30-63
NASA APPROVAL W J Rhine 7-31-63
MIT APPROVAL D Hagel 7/31/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BRACKET, LENS
ASSY OF

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011516

SCALE 2:1 WEIGHT CALC ACTUAL SHEET 1 OF 1

1011516

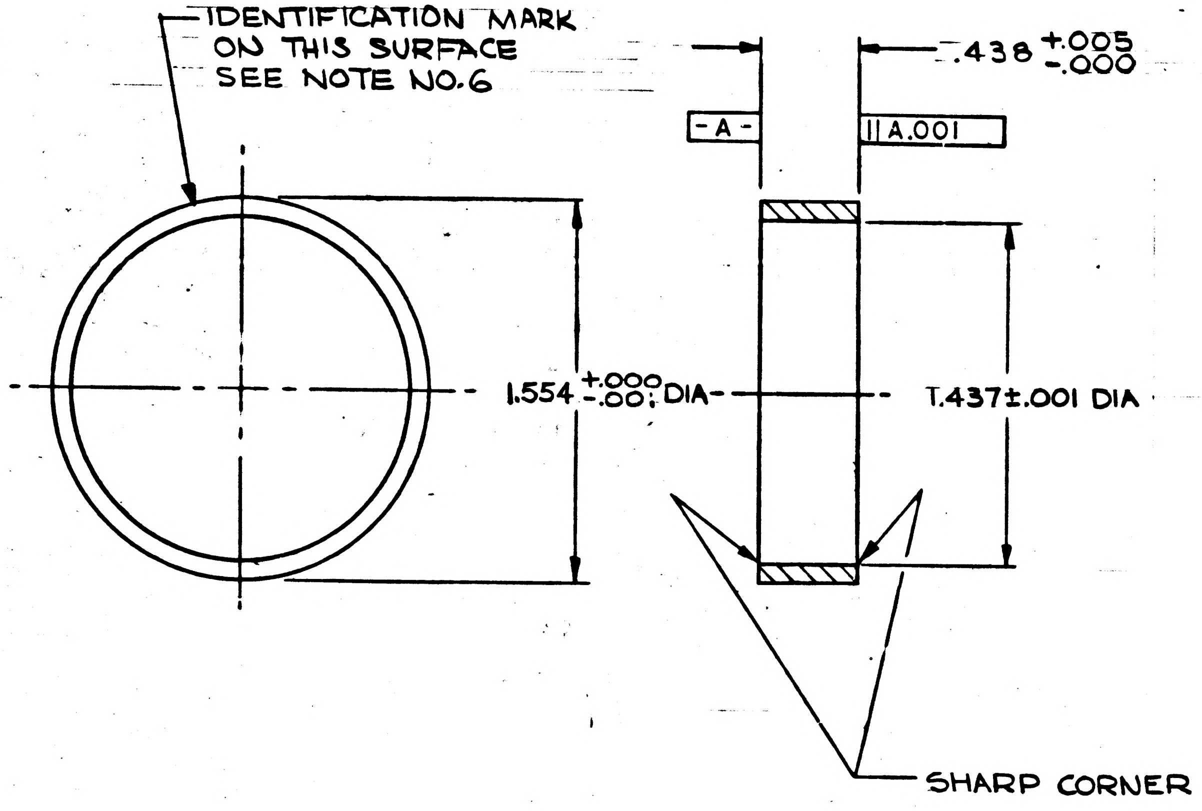
E-184

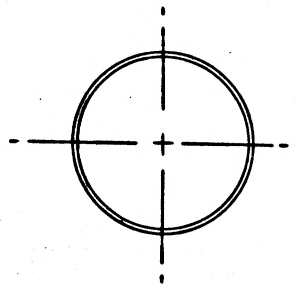
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011520

SYM	ZONE	REVISIONS TDRR 02322 DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 125√ FINISH ALL OVER
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. FINISH: BLACK ANODIZE PER MIL-A-8625 TYPE II (KPS-1005A.201)
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019





ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011473	1011559
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	±.005	± ~

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 2024 FED SPEC QQ-A-268 TEMPER T4

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 45387000020

DRAWN V. LOZITO DATE 7-13-63
CHECKED M. Farwell 7-17-63
APPROVAL M. Werner 7-30-63
APPROVAL E. Rhorys 7-30-63
NASA APPROVAL W J Rhine 7-31-63
MIT APPROVAL L Nag 7/31/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE SPACER, LENS

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011520

SCALE 2:1 WEIGHT CALC ACTUAL SHEET 1 OF 1

SPACER

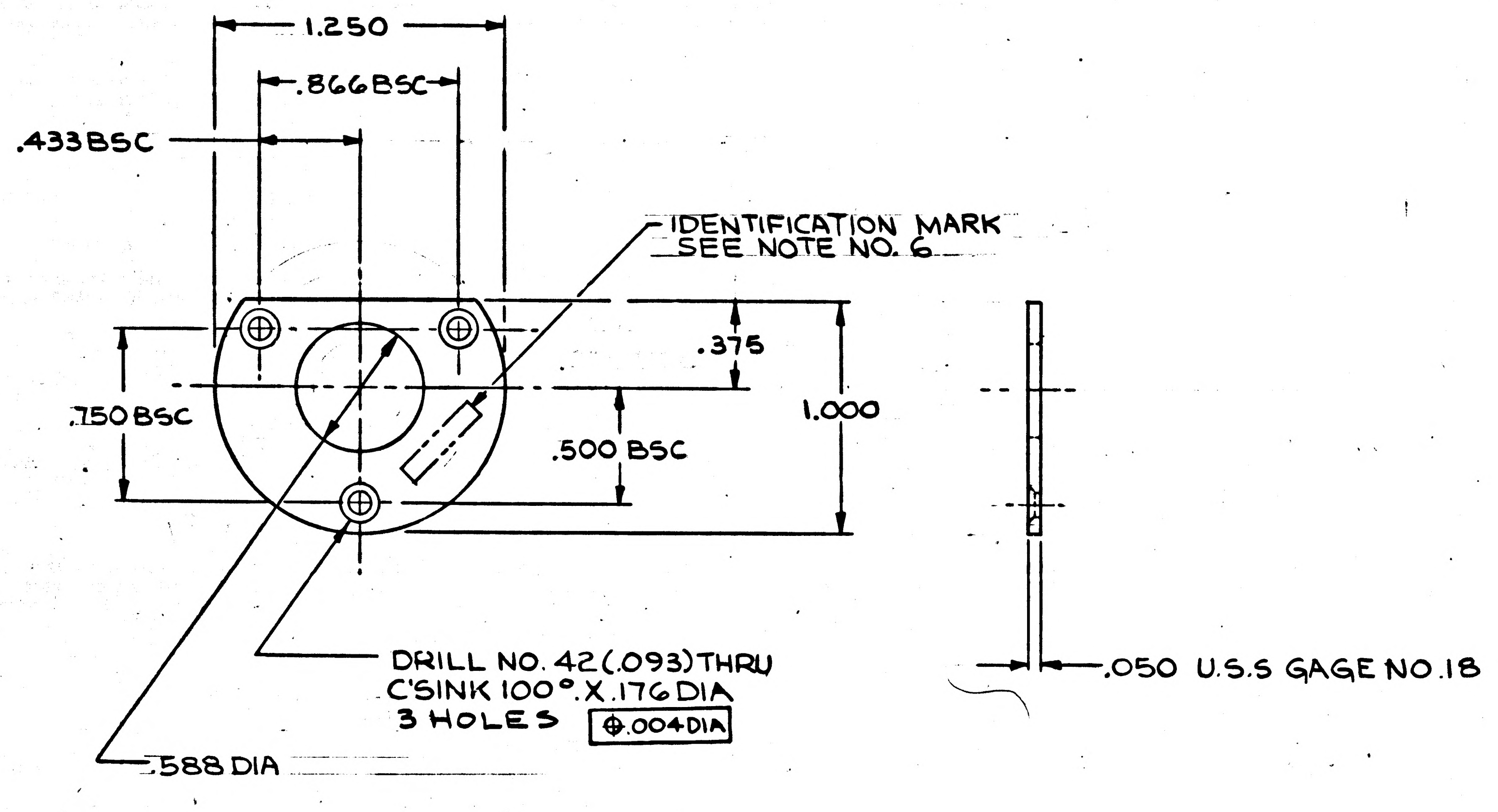
MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

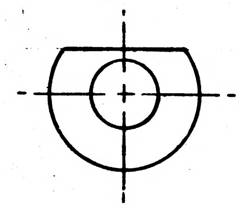
1011521

REVISIONS TDRR02322				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTE:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS PER ND1002078
3. a. $\sqrt{}^{125}$ FINISH ALL OVER
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: PASSIVATE PER MIL-STD-171 (KPS-10051.200)
6. IDENTIFY USING NASA DWG NO. REVISION LETTER AND AND MANUFACTURES SYMBOL PER ND1002019



1.250
.866BSC
.433BSC
IDENTIFICATION MARK SEE NOTE NO. 6
.375
.750 BSC
1.000
.500 BSC
DRILL NO. 42 (.093) THRU
C'SINK 100° X .176 DIA
3 HOLES
⌖.004DIA
.588 DIA
.050 U.S.S GAGE NO. 18



ACTUAL SIZE

MASTER

1011473	1011559
NEXT ASSY	USED ON
APPLICATION	

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	±	±.005	±

DO NOT SCALE THIS DRAWING

MATERIAL CORROSION RESISTANT STEEL FED. SPEC. QQ-S-766 CLASS 302 COND. "A"

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 56 387000060

DRAWN V. LOZITO DATE 7-16-63
CHECKED M Farwell 7-17-63
APPROVAL M. Werner 7-30-63
APPROVAL E. Dhorup 7-30-63
NASA APPROVAL W J Rhee 7-31-63
MIT APPROVAL J Valsh 7/31/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE RETAINER, LENS

CODE IDENT NO. | SIZE C | NASA NUMBER 1011521
SCALE 2:1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

E-184

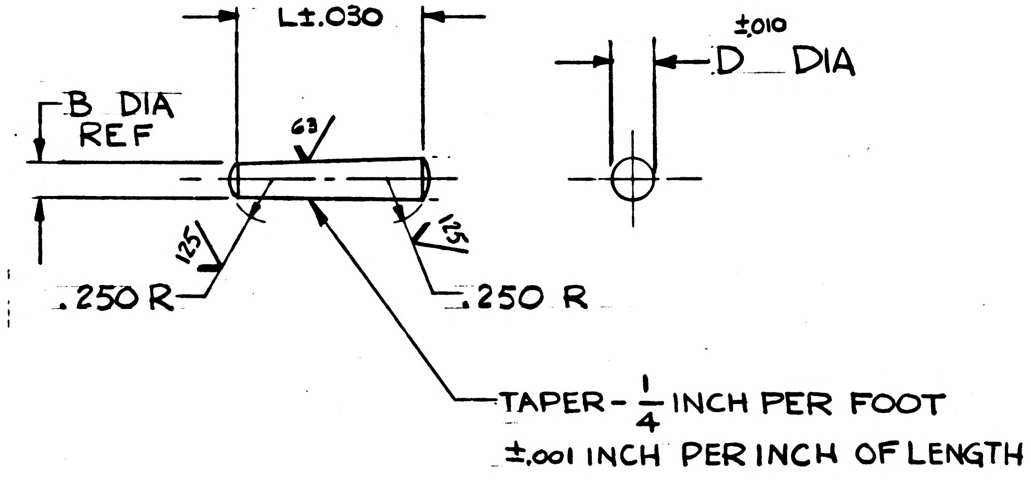
1011524

REVISIONS 03'46

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS PER ND 1002078
3. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
4. FINISH: PASSIVATE IN ACCORDANCE WITH MIL-STD-171 FINISH NO. 5.4
5. HARDEN TO ROCKWELL C 36-40 OR EQUIVALENT PER MIL-H-6875 (KPS 1001SS. 300)



NASA NO.	KIC NO.	SIZE	B	D	L
1011524-1	39387000050	7/0	.0537	.0628	.437
1011524-2	39387000051	8/0	.0406	.0471	.312

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011430	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± ~

DO NOT SCALE THIS DRAWING

MATERIAL CRES
FED. SPEC QQ-S-763
CLASS 416 COND. A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 3938700 0050 0051

DRAWN J. LOZITO DATE 7-18-63
CHECKED M. Fauwell 9-22-63
APPROVAL M. Kerner 9-9-63
APPROVAL E. Thorup 9-16-63
NASA APPROVAL Jack Barnard
MIT APPROVAL 9/17/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE PIN, PLAIN, TAPERED

CODE IDENT NO.
SIZE C
NASA NUMBER 1011524-
SCALE ~
WEIGHT CALC ACTUAL
SHEET 1 OF 1

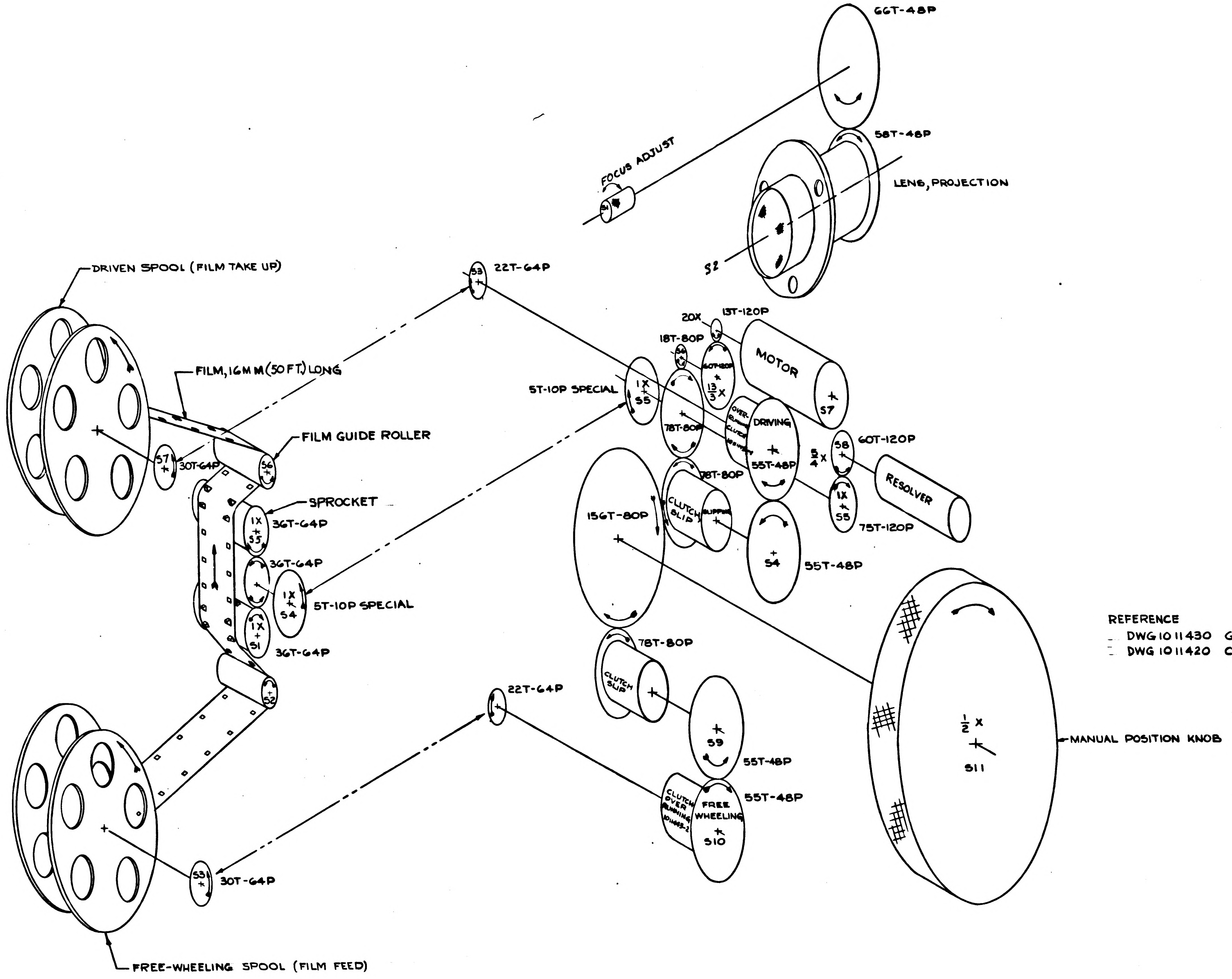
MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011527

SYM	ZONE	REVISIONS TDAR 03789 DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. DRIVE SYSTEM (MANUAL OR MOTOR) IS REVERSIBLE. FOR CLARIFICATION, SYSTEM INDICATES DRIVING IN ONE DIRECTION.


66T-48P
58T-48P
FOCUS ADJUST
LENS, PROJECTION
S2
DRIVEN SPOOL (FILM TAKE UP)
FILM, 16MM (50 FT.) LONG
S7
30T-64P
FILM GUIDE ROLLER
S6
SPROCKET
1X S5
36T-64P
36T-64P
1X S4
5T-10P SPECIAL
1X S1
36T-64P
S2
S3
22T-64P
5T-10P SPECIAL
1X S5
20X
13T-120P
18T-80P
S6
60T-120P
13/3 X
MOTOR
S7
78T-80P
OVER-RUNNING CLUTCH
DRIVING
55T-48P
5/4 X
S8
60T-120P
RESOLVER
1X S5
75T-120P
78T-80P
156T-80P
CLUTCH SLIP
SLIPPING
S4
55T-48P
78T-80P
CLUTCH SLIP
S9
55T-48P
CLUTCH OVER RUNNING 1011443-2
FREE WHEELING
S10
55T-48P
22T-64P
S3
30T-64P
1/2 X
S11
MANUAL POSITION KNOB
FREE-WHEELING SPOOL (FILM FEED)

REFERENCE
- DWG 1011430 GEARBOX ASSEMBLY
- DWG 1011420 CARTRIDGE ASSEMBLY

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 43387000010
DRAWN V LOZITO DATE 7-29-63
CHECKED MMW 10-7-63
APPROVAL M. Werner 10-7-63
APPROVAL E. Thomp 10-15-63
NASA APPROVAL 10/17/63
MIT APPROVAL 17 Oct 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
GEAR, SCHEMATIC
MAP & DATA VIEWER

CODE IDENT NO.
SIZE E
NASA NUMBER 1011527
SCALE
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

1011527

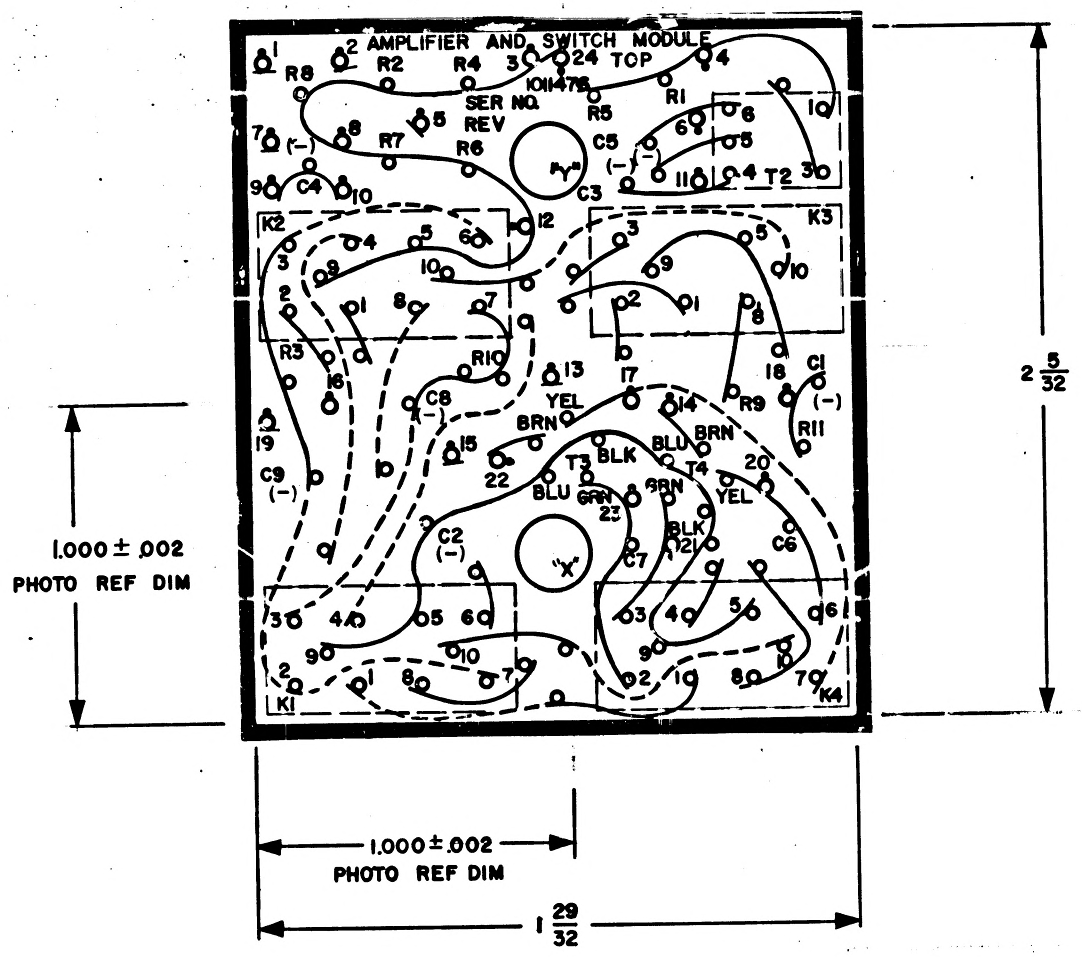
INCHES
PHOTOGRAPHIC SCALE ONLY

1011528

REVISIONS 03051				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. ORIGINAL OF THIS DWG OR REPRODUCTION MADE BY PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL VARIATION SHALL NOT EXCEED .001 INCH PER FOOT.
3. MAKE MASTER PATTERN POSITIVE FILMS TO DIMENSIONS SHOWN.
4. MATERIAL: .006/.008 THICK PLASTIC SHEET, SENSITIZED AND DIMENSIONALLY STABLE PER L-F-340, TYPE IB, CLASS 2 STYLE IA.
5. DASHED LINE INDICATES SLEEVING.


AMPLIFIER AND SWITCH MODULE
1011476
TOP
SER NO.
REV
R1 R2 R3 R4 R5 R6 R7 R8 R9 R10 R11
C1 C2 C3 C4 C5 C6 C7 C8 C9
T2 T3 T4
K1 K2 K3 K4
YEL BRN BLU BLK GRN
(−)
2 5/32
1.000 ± .002
PHOTO REF DIM
1.000 ± .002
PHOTO REF DIM
1 29/32

1011528

ITEM	QTY REQD	SYM	GOVERNMENT / NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011476	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ±; ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 4

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN

DRAWN A. CARROLL DATE 8/6/63
CHECKED W. [illegible] 8-16-63
APPROVAL [illegible] 8/27/63
APPROVAL [illegible] 8-30-63
NASA APPROVAL [illegible]
MIT APPROVAL [illegible] 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
WIRING BOARD TOP
PHOTOGRAPHIC MASTER

CODE IDENT NO.
SIZE R
NASA NUMBER 1011528
SCALE 4:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-198

MASTER

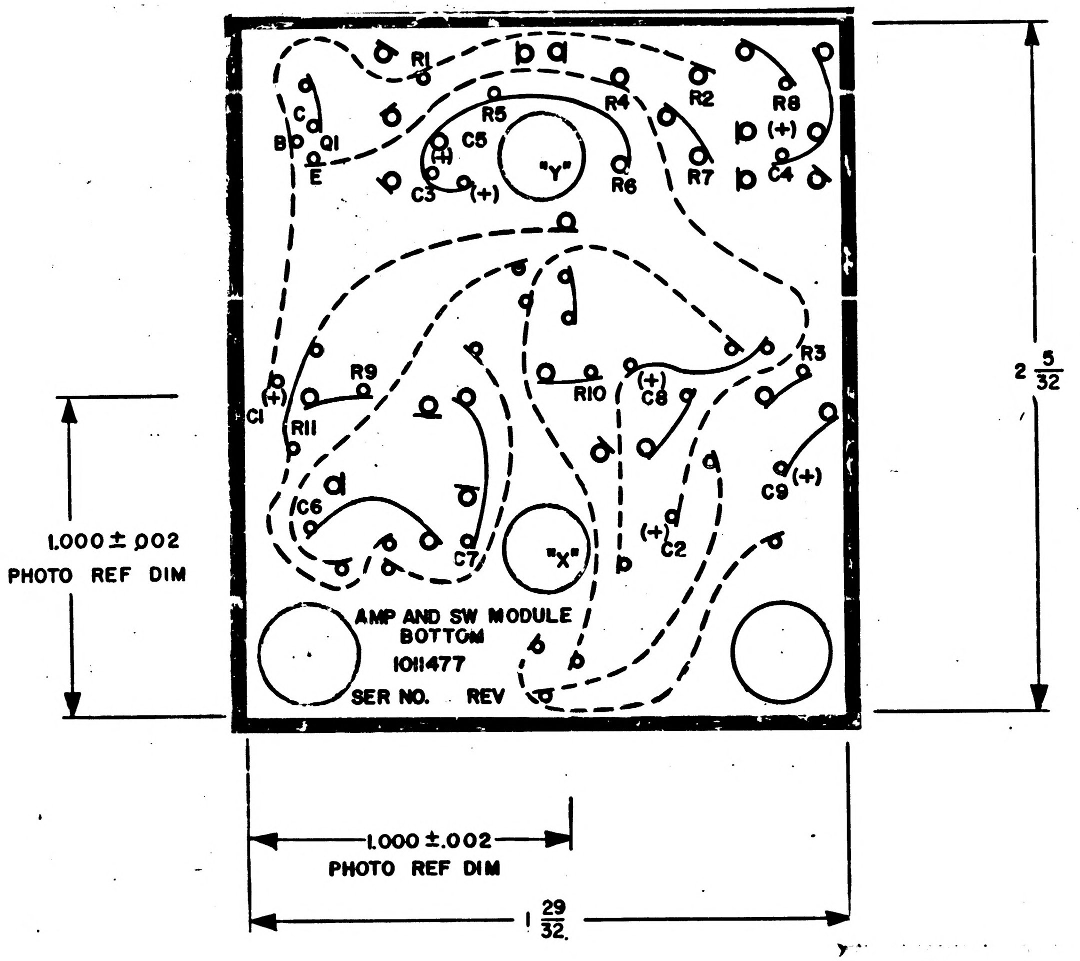
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011529

SYM	ZONE	REVISIONS 03051 DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. ORIGINAL OF THIS DWG OR REPRODUCTION MADE BY PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL VARIATION SHALL NOT EXCEED .001 INCH PER FOOT.
3. MAKE MASTER PATTERN POSITIVE FILMS TO DIMENSIONS SHOWN.
4. MATERIAL: .006/.008 THICK PLASTIC SHEET, SENSITIZED AND DIMENSIONALLY STABLE PER L-F-340, TYPE IB, CLASS 2 STYLE IA.
5. DASHED LINE INDICATES SLEEVING.


R1
C
B
Q1
E
R5
C5
H
C3
(+)
"Y"
R4
R6
R2
R7
R8
(+)
C4
R9
C1
(+)
R11
R10
(+)
C8
R3
C9
(+)
C6
C7
"X"
(+)
C2
AMP AND SW MODULE
BOTTOM
1011477
SER NO.
REV
2 5/32
1.000 ± .002
PHOTO REF DIM
1.000 ± .002
PHOTO REF DIM
1 29/32

ITEM	QTY REQD	SYM	GOVERNMENT / NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011477	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ±; ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE 4
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN
DRAWN R. CARROLL DATE 8/14/63
CHECKED W. Henderson 8/16/63
APPROVAL M. Werner 8/27/63
APPROVAL E. Thomas 8-30-63
NASA APPROVAL 9/9/63
MIT APPROVAL W. Kupfer 16 Sept 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
WIRING BOARD BOTTOM
PHOTOGRAPHIC MASTER

CODE IDENT NO.
SIZE R
NASA NUMBER 1011529
SCALE 4:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-198

MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011529

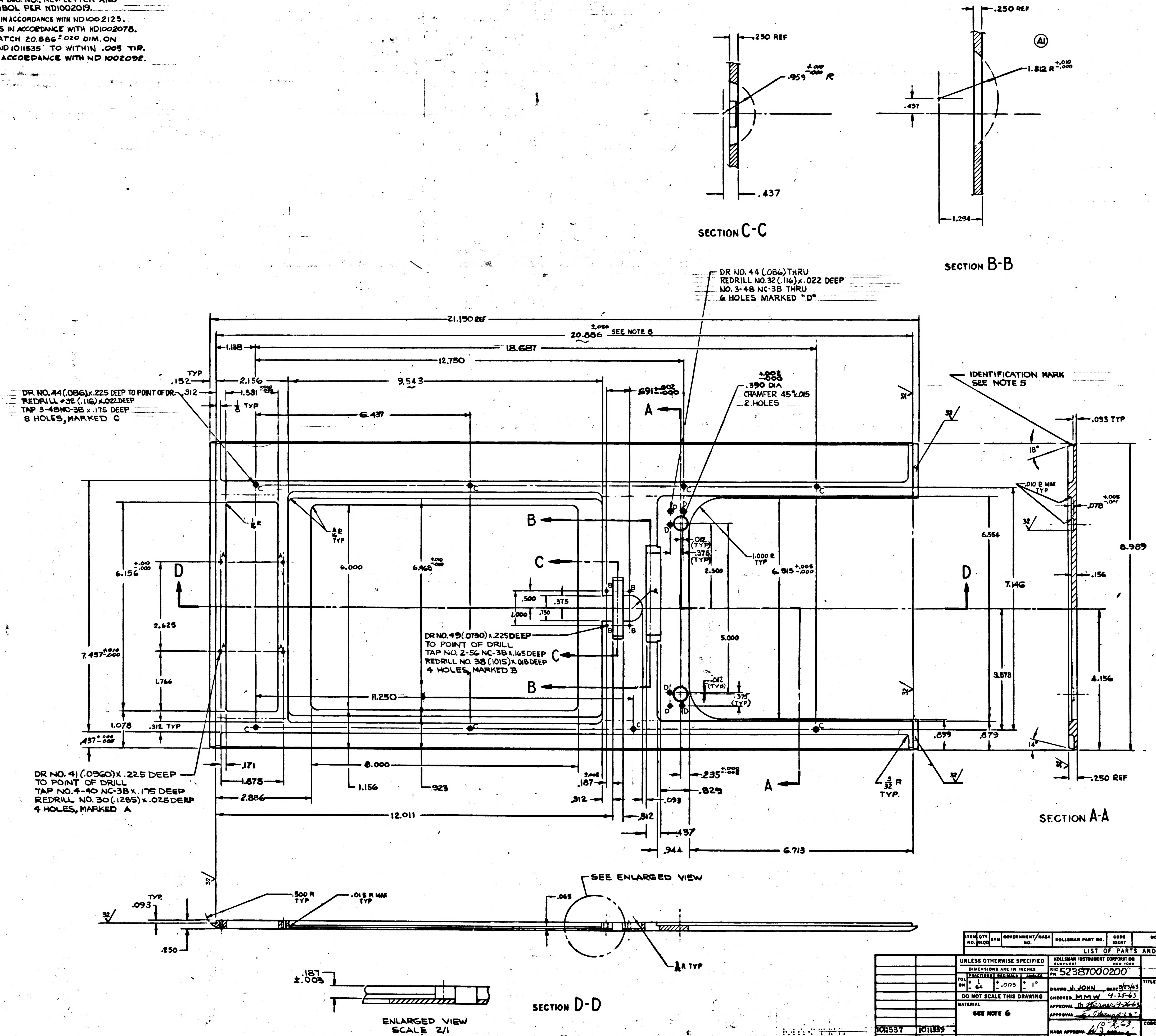
A 1011530

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A1		REVISED PER TDRR NO. 07678	4/21/64	WK

REVISIONS C3576

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED 125√ FINISH ALL OVER.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. IDENTIFY USING NASA DWG. NO., REV. LETTER AND MANUFACTURERS SYMBOL PER ND1002019.
6. MATERIAL: BERYLLIUM IN ACCORDANCE WITH ND1002125.
7. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
8. THIS DIMENSION TO MATCH 20.886 ±.020 DIM. ON PARTS NO. 1011536. AND 1011535 TO WITHIN .005 TIR.
9. STRESS RELIEVE IN ACCORDANCE WITH ND 1002092.


SECTION C-C
.250 REF
.959 +.010 -.000 R
.437
SECTION B-B
.250 REF
Ⓐ1
1.812 R +.010 -.000
.437
1.294
DR NO. 44 (.086) THRU
REDRILL NO. 32 (.116) x .022 DEEP
NO. 3-48 NC-3B THRU
6 HOLES MARKED "D"
21.150 REF
20.886 ±.020 SEE NOTE 8
1.138
18.687
12.750
9.543
2.156
.152 TYP
.312
1.531 +.010 -.000
1/8 TYP
6.437
.691 +.002 -.000
+.002 -.000 .390 DIA
CHAMFER 45° x .015
2 HOLES
IDENTIFICATION MARK SEE NOTE 5
.093 TYP
DR NO. 44 (.086) x .225 DEEP TO POINT OF DR.
REDRILL #32 (.116) x .022 DEEP
TAP 3-48NC-3B x .175 DEEP
8 HOLES, MARKED C
A
B
C
D
1/8 R TYP
6.000
6.468 +.010 -.000
6.156 +.010 -.000
2.625
7.437 +.010 -.000
1.766
1.078
.437 +.002 -.000
.312 TYP
.500
.375
1.000
.750
DR NO. 49 (.0730) x .225 DEEP
TO POINT OF DRILL
TAP NO. 2-56 NC-3B x .165 DEEP
REDRILL NO. 38 (.1015) x .018 DEEP
4 HOLES, MARKED B
11.250
.012 (TYP)
.375 (TYP)
2.500
1.000 R TYP
6.515 +.005 -.000
5.000
6.564
7.146
3.573
8.989
4.156
.899
.879
.010 R MAX TYP
.078 +.002 -.000
.156
18°
14°
.250 REF
SECTION A-A
DR NO. 41 (.0960) x .225 DEEP
TO POINT OF DRILL
TAP NO. 4-40 NC-3B x .175 DEEP
REDRILL NO. 30 (.1285) x .025 DEEP
4 HOLES, MARKED A
.171
1.875
2.886
8.000
1.156
.923
.187 ±.002
.312
.295 +.002 -.003
.093
.829
.312
.497
.944
12.011
6.713
3/32 R TYP.
SEE ENLARGED VIEW
.500 R TYP
.015 R MAX TYP
.065
TYP .093
.250
1/8 R TYP
.187 ±.003
ENLARGED VIEW SCALE 2/1
SECTION D-D

MASTER

1011537	1011559
NEXT ASSY	USED ON
APPLICATION	

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ± .005; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL: SEE NOTE 6
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52387000200
DRAWN J. JOHN DATE 5/23/63
CHECKED MMW 9-25-63
APPROVAL M Werner 9-26-63
APPROVAL E. Thomas 10-2-63
NASA APPROVAL W. J. 10-3-63
MIT APPROVAL W. Riggie

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PANEL, FRONT

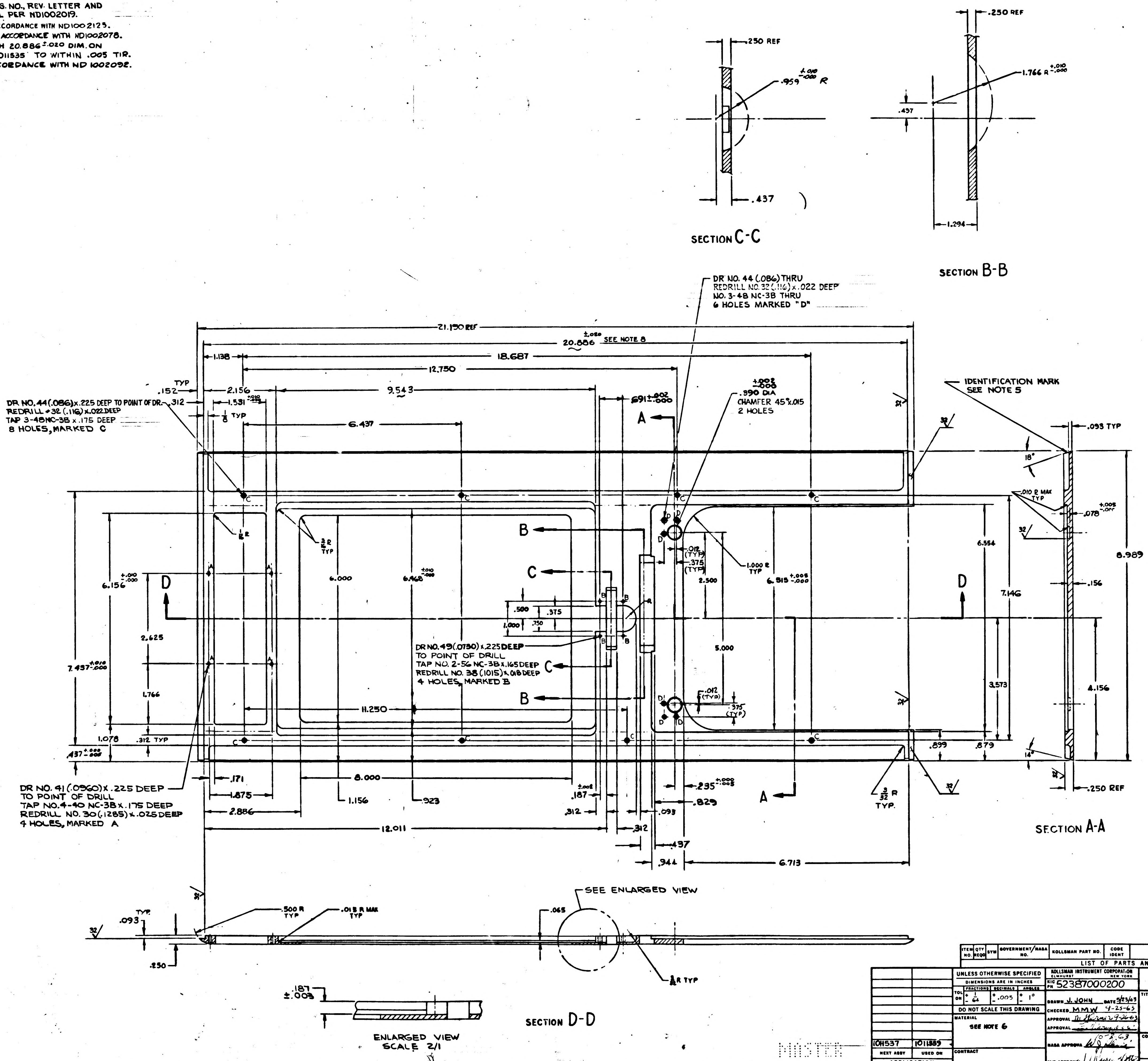
CODE IDENT NO.
SIZE E
NASA NUMBER 1011530
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011530

SYM	ZONE	REVISIONS DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED $\overset{125}{\checkmark}$ FINISH ALL OVER.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. IDENTIFY USING NASA DWG. NO., REV. LETTER AND MANUFACTURERS SYMBOL PER ND1002019.
6. MATERIAL: BERYLLIUM IN ACCORDANCE WITH ND1002125.
7. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
8. THIS DIMENSION TO MATCH 20.886 $\pm$.020 DIM. ON PARTS NO. 1011536. AND 1011535 TO WITHIN .005 TIR.
9. STRESS RELIEVE IN ACCORDANCE WITH ND 1002092.



SECTION C-C
.250 REF
.959 +.010 -.000 R
.437
SECTION B-B
.250 REF
1.766 R +.010 -.000
.437
1.294
DR NO. 44 (.086) THRU
REDRILL NO. 32 (.116) x .022 DEEP
NO. 3-48 NC-3B THRU
6 HOLES MARKED "D"
21.150 REF
20.886 ±.020 SEE NOTE 8
18.687
12.750
9.543
6.437
1.138
2.156
1.531
.152
TYP
DR NO. 44 (.086) x .225 DEEP TO POINT OF DR.
REDRILL #32 (.116) x .022 DEEP
TAP 3-48 NC-3B x .175 DEEP
8 HOLES, MARKED C
.312
1/8 TYP
.691 +.002 -.000
.990 +.002 -.000 DIA
CHAMFER 45° x .015
2 HOLES
IDENTIFICATION MARK
SEE NOTE 5
A
B
C
D
1/8 R
3/8 R TYP
6.000
6.468 +.010 -.000
6.156 +.010 -.000
7.457 +.010 -.000
2.625
1.766
1.078
.437 +.000 -.005
.312 TYP
.500
1.000
.750
.375
DR NO. 49 (.0730) x .225 DEEP
TO POINT OF DRILL
TAP NO. 2-56 NC-3B x .165 DEEP
REDRILL NO. 38 (.1015) x .018 DEEP
4 HOLES, MARKED B
11.250
.012 (TYP)
.375 (TYP)
1.000 R TYP
2.500
5.000
6.815 +.005 -.000
6.554
7.146
3.573
.899
.879
.093 TYP
18°
.010 R MAX TYP
.078 +.005 -.000
8.989
.156
4.156
14°
.250 REF
SECTION A-A
32
DR NO. 41 (.0960) x .225 DEEP
TO POINT OF DRILL
TAP NO. 4-40 NC-3B x .175 DEEP
REDRILL NO. 30 (.1285) x .025 DEEP
4 HOLES, MARKED A
.171
1.875
2.886
8.000
1.156
.923
.187 ±.005
.312
12.011
.235 +.000 -.005
.829
.093
.312
.497
.944
6.713
3/32 R TYP.
SEE ENLARGED VIEW
.093 TYP
.500 R TYP
.018 R MAX TYP
.065
.250
1/8 R TYP
SECTION D-D
.187 ±.003
ENLARGED VIEW
SCALE 2/1

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011537	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	$\pm\frac{1}{64}$	$\pm$.005	$\pm$1°

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52387000200

DRAWN J. JOHN DATE 5/23/63
CHECKED MMW 9-25-63
APPROVAL M. Werner 9-26-63
APPROVAL
NASA APPROVAL W. J. 10-3-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PANEL, FRONT

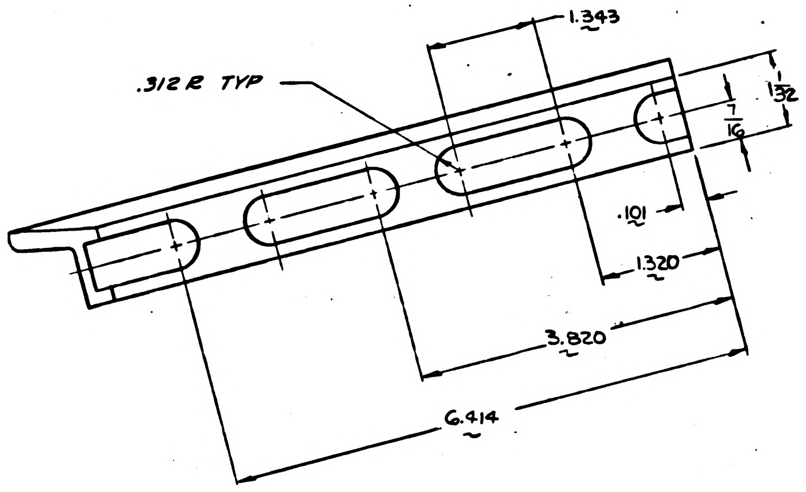
CODE IDENT NO.
SIZE E
NASA NUMBER 1011530
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

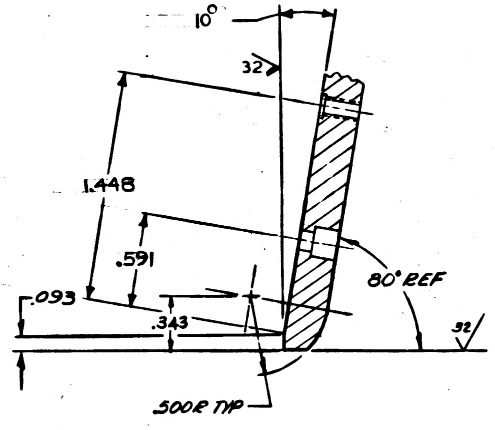
1011531

SYM	ZONE	REVISIONS 63576 DESCRIPTION	DATE	APPROVAL

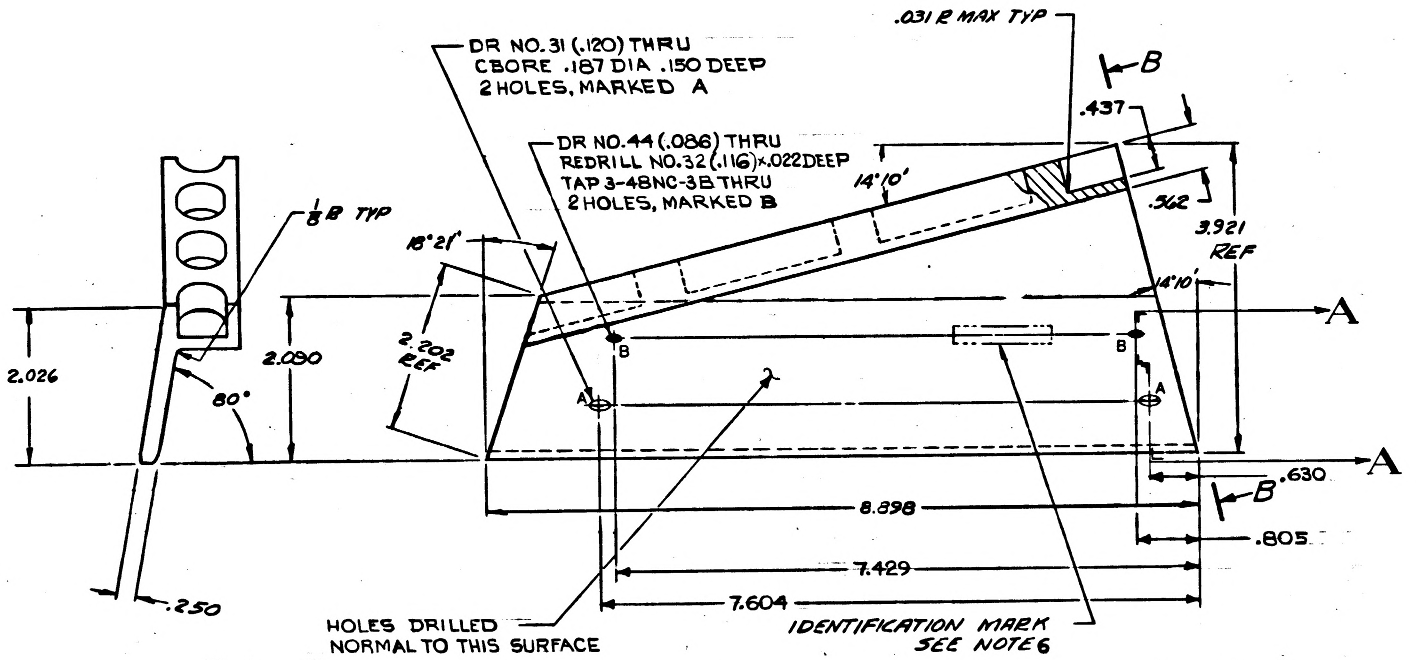
NOTES:

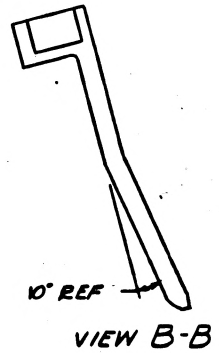
1. INTERPRET DWG. IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 125√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. MATERIAL: BERYLLIUM IN ACCORDANCE WITH ND 1002125.
6. IDENTIFY USING NASA DWG. NO., REV. LETTER AND MFR'S SYM. PER ND 1002019.
7. STRESS RELIEVE IN ACCORDANCE WITH ND 1002092.


1.343
.312 R TYP
1 3/32
7/16
.101
1.320
3.820
6.414


10°
32
1.448
.591
.093
.343
80° REF
32
.500 R TYP

PARTIAL SECTION AA
SCALE 2/1


1/8 R TYP
2.026
2.090
80°
.250
DR NO. 31 (.120) THRU
CBORE .187 DIA .150 DEEP
2 HOLES, MARKED A
DR NO. 44 (.086) THRU
REDRILL NO. 32 (.116) x .022 DEEP
TAP 3-48NC-3B THRU
2 HOLES, MARKED B
.031 R MAX TYP
B
.437
14°10'
.562
3.921 REF
18°21'
2.202 REF
14°10'
A
A
B
B
A
A
.630
B
8.898
.805
7.429
7.604
HOLES DRILLED NORMAL TO THIS SURFACE
IDENTIFICATION MARK SEE NOTE 6



VIEW B-B

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011537	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ± .005; ANGLES ± 0°30'
DO NOT SCALE THIS DRAWING
MATERIAL: SEE NOTE 5
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52387000210
DRAWN RTYLS DATE 7AUG63
CHECKED MMW 9-24-63
APPROVAL M. Werner 9-25-63
APPROVAL E. Whomp 10-2-63
NASA APPROVAL W J [illegible] 10-2-63
MIT APPROVAL W Clyfe 30 Oct 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
FLANGE MOUNTING (RIGHT SIDE)

CODE IDENT NO. | SIZE D | NASA NUMBER 1011531
SCALE 1:1 | WEIGHT | CALC ACTUAL | SHEET 1 OF 1

1011531

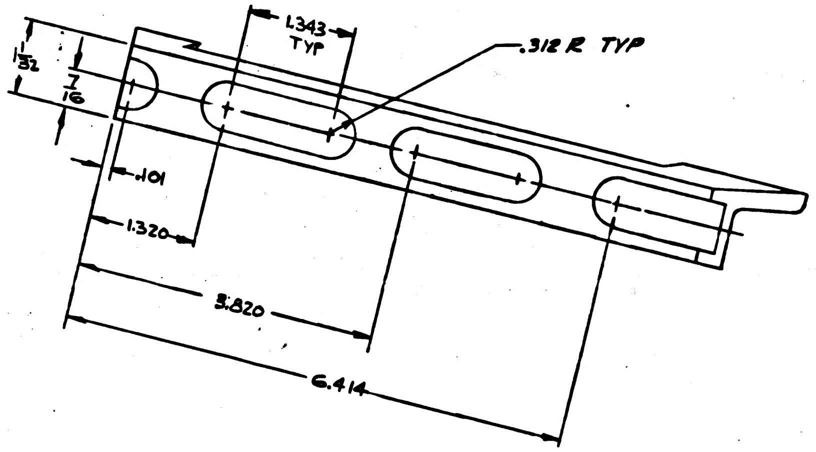
A	1011532

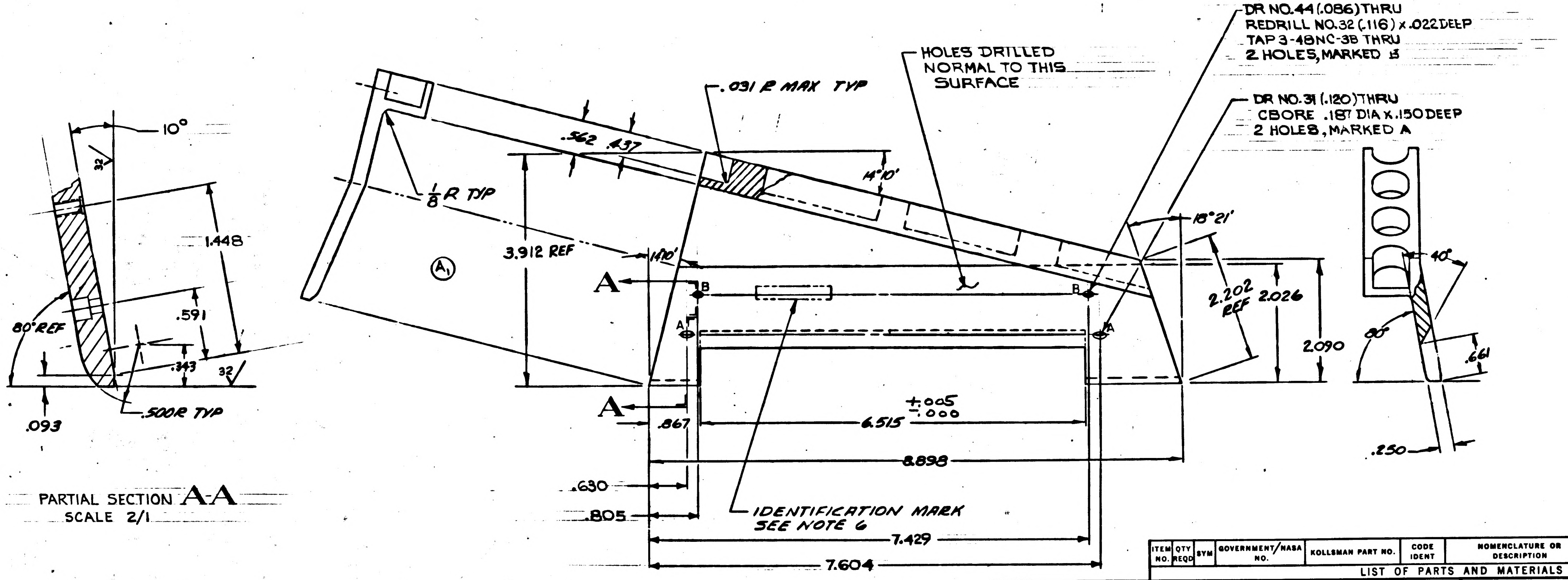
REVISIONS 03576

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A1		REVISED PER TDRR NO. 06130	11 FEB 64	WK

NOTES:

1. INTERPRET DWG. IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 125√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. MATERIAL: BERYLLIUM IN ACCORDANCE WITH ND1002125.
6. IDENTIFY USING NASA DWG. NO, REV. LETTER AND MFR'S. SYM. PER ND1002019
7. STRESS RELIEVE IN ACCORDANCE WITH ND1002092.


1.343 TYP
.312 R TYP
1 1/32
7/16
.101
1.320
3.820
6.414


10°
32
1.448
.591
80° REF
.343
32
.093
.500R TYP
.031 R MAX TYP
.362
.437
1/8 R TYP
14°10'
A1
3.912 REF
14°0'
A
A
B
B
A
A
HOLES DRILLED NORMAL TO THIS SURFACE
DR NO.44 (.086) THRU
REDRILL NO.32 (.116) x .022 DEEP
TAP 3-48NC-3B THRU
2 HOLES, MARKED B
DR NO.31 (.120) THRU
CBORE .187 DIA x .150 DEEP
2 HOLES, MARKED A
18°21'
2.202 REF
2.026
2.090
40°
80°
.661
.250
.867
6.515 +.005 -.000
8.898
.630
.805
7.429
7.604
IDENTIFICATION MARK SEE NOTE 6

PARTIAL SECTION A-A
SCALE 2/1

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011537	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 0° 30'

DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 5
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52387000220
DRAWN R. TYLS DATE 27 MAY 63
CHECKED MMW 9-24-63
APPROVAL M. Werner 9-25-63
APPROVAL E. Thorup 10-2-63
NASA APPROVAL W J 10-3-63
MIT APPROVAL W Buffer 3 Oct 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE FLANGE, MOUNTING (LEFT SIDE)

CODE IDENT NO.
SIZE D
NASA NUMBER 1011532
SCALE 1/1
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

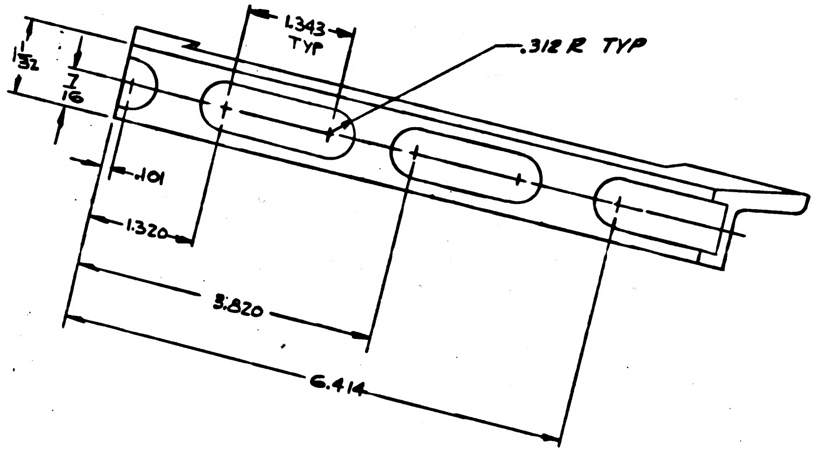
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

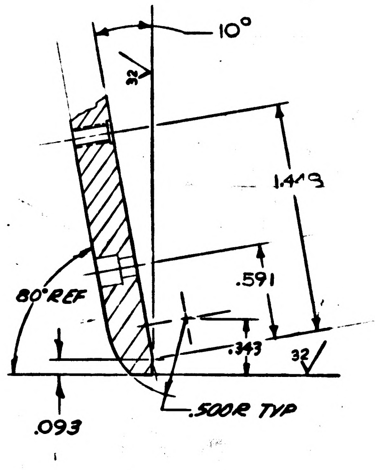
1011532

REVISIONS 03576				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

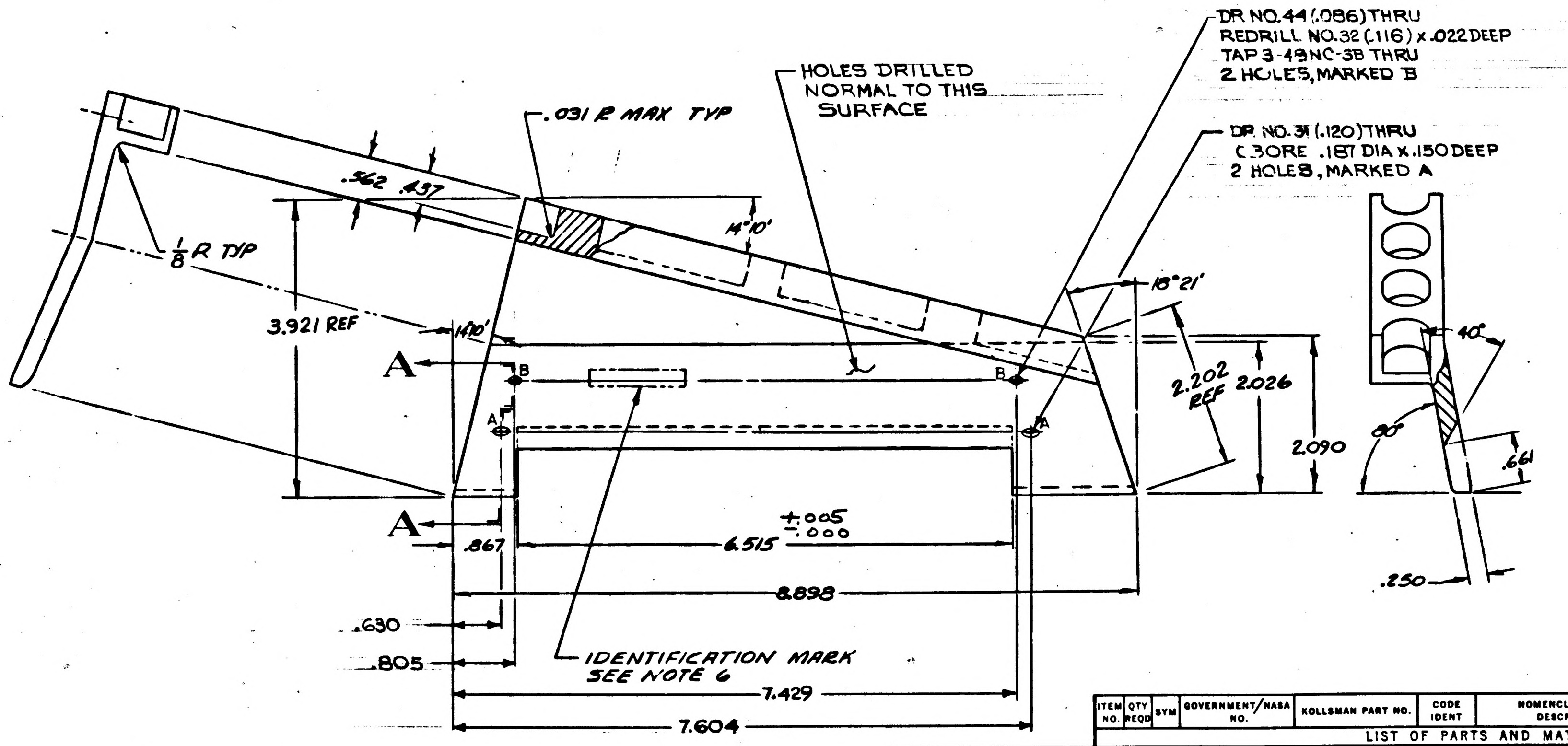
NOTES:

1. INTERPRET DWG. IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 125√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. MATERIAL: BERYLLIUM IN ACCORDANCE WITH ND1002125.
6. IDENTIFY USING NASA DWG. NO., REV. LETTER AND MFR'S. SYM. PER ND1002019
7. STRESS RELIEVE IN ACCORDANCE WITH ND1002092.


1.343 TYP
.312 R TYP
1/32
7/16
.101
1.320
3.820
6.414


10°
32
1.449
.591
80° REF
.343
32
.093
.500R TYP

PARTIAL SECTION A-A
SCALE 2/1


HOLES DRILLED NORMAL TO THIS SURFACE
DR NO.44 (.086) THRU
REDRILL NO.32 (.116) x .022 DEEP
TAP 3-48NC-3B THRU
2 HOLES, MARKED B
DR. NO.31 (.120) THRU
C'BORE .187 DIA x .150 DEEP
2 HOLES, MARKED A
.031 R MAX TYP
.562
.437
14°10'
1/8 R TYP
3.921 REF
14°10'
18°21'
A
A
B
B
A
A
2.202 REF
2.026
2.090
40°
90°
.661
.250
+.005 -.000
6.515
.867
8.898
.630
.805
IDENTIFICATION MARK SEE NOTE 6
7.429
7.604

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011537	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ± .005; ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL: SEE NOTE 5
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52387000220
DRAWN R. TYLS DATE 29 MAY 63
CHECKED MMW 9-24-63
APPROVAL M. Werner 9-25-63
APPROVAL 10-2-63
NASA APPROVAL 10-3-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
FLANGE, MOUNTING (LEFT SIDE)

CODE IDENT NO.
SIZE D
NASA NUMBER 1011532
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

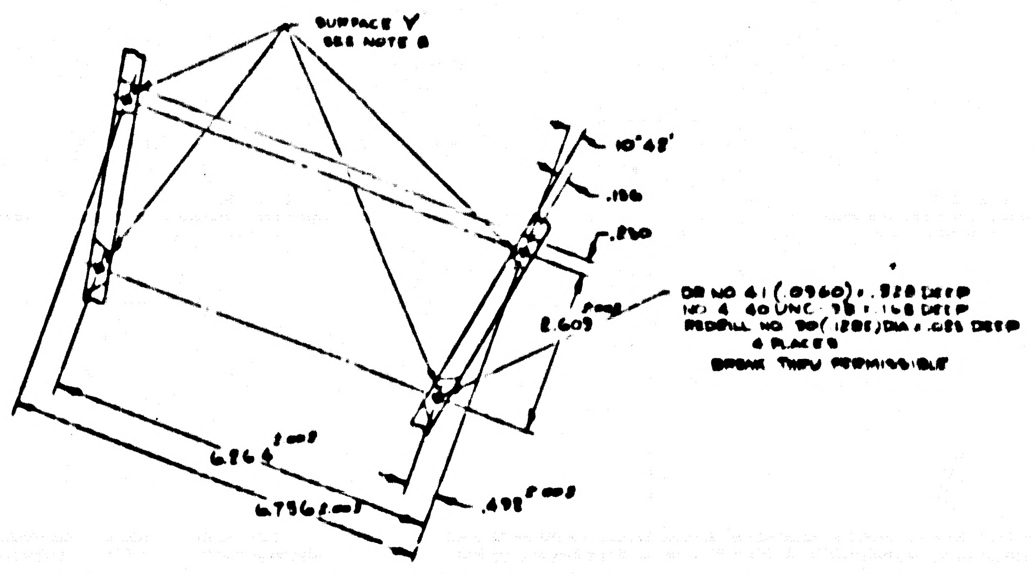
MASTER

1011532

NOTES:

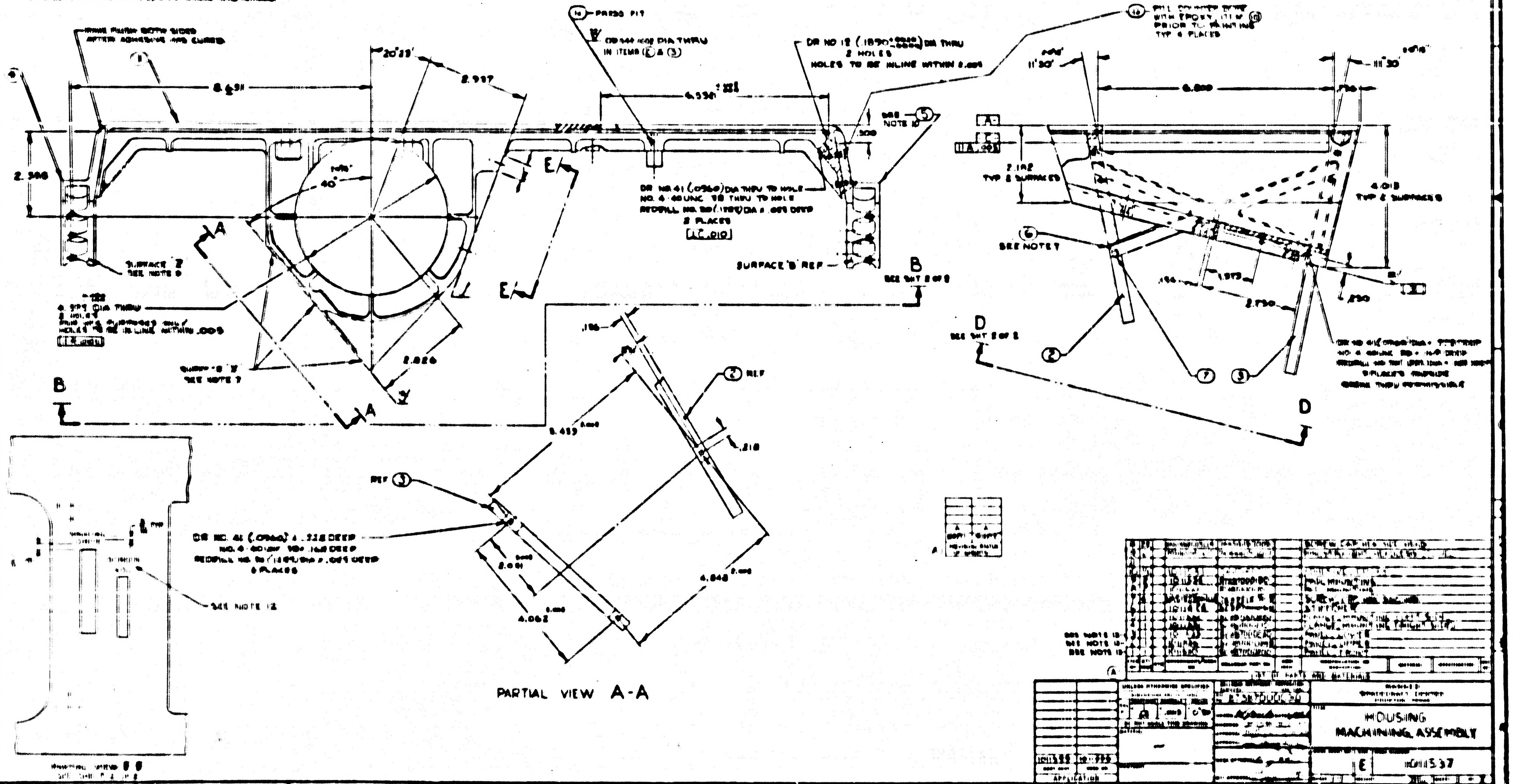
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   - FINISH ALL OVER
   - BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. AFTER [illegible] ITEM [illegible] DRILL AND REAM [illegible] APPLY [illegible] ADHESIVE ITEM [illegible] TO ALL MATING SURFACES WHILE ADHESIVE IS IN PLASTIC STATE [illegible] PRESS IN ITEM [illegible] AND [illegible] WITH ITEM [illegible].
6. [illegible]
6.A IDENTIFY [illegible] DWG NO, REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019

7. SURFACES MARKED "X" TO BE IN PLANE WITHIN .0005 / PARALLEL TO ℄ OF 4.375 DIA WITHIN .001 AFTER INSTALLATION OF ITEM NO 6.
8. SURFACES MARKED "Y" TO BE IN PLANE WITHIN .005 / PARALLEL TO ℄ OF 4.375 DIA WITHIN .007.
9. SURFACE MARKED Z TO BE IN PLANE WITH [illegible] WITHIN .001.
10. EDGES OF [illegible] IN ITEM 6 TO BE IN LINE WITH EDGES OF PANEL OPENING (ITEM 1) WITHIN ±.005
11. FINISH: APPLY ZINC CHROMATE PRIMER PER MIL-P-8585 APPLY [illegible] LUSTERLESS ENAMEL (GREY) COLOR NO [illegible] OF FED-STD-595 TO FRONT AND SIDES OF ITEMS [illegible] PER [illegible]
12. CHARACTERS TO BE SILK SCREENED PER [illegible] USING [illegible] WHITE ENAMEL, COLOR NO [illegible] OF FED STD 595. [illegible] AS SHOWN IN VIEW "F-F"
13. ITEMS [illegible] AND [illegible] TO MEET REQUIREMENTS OF NOTE [illegible] AND NOTE [illegible]



SURFACE Y SEE NOTE 8
10°48'
.196
.250
2.609
6.264
6.756
.498
DR NO 41 (.0960) × .328 DEEP
NO 4-40 UNC-2B × .148 DEEP
REDRILL NO 30 (.1285) DIA × .025 DEEP
4 PLACES
BREAK THRU PERMISSIBLE

PARTIAL VIEW E-E



MACHINE FLUSH BOTH SIDES AFTER ADHESIVE HAS CURED
PRESS FIT
DR NO 12 (.1890) DIA THRU 2 HOLES HOLES TO BE INLINE WITHIN .005
FILL COUNTERSINK WITH EPOXY ITEM PRIOR TO PAINTING TYP 4 PLACES
8.631
20°23'
2.937
4.536
11°30'
6.800
.750
2.386
40°
2.182 TYP 2 SURFACES
4.013 TYP 2 SURFACES
SEE NOTE 10
.300
DR NO 41 (.0960) DIA THRU TO HOLE NO 4-40 UNC-2B THRU TO HOLE REDRILL NO 30 (.1285) DIA × .025 DEEP 2 PLACES
SURFACE Z SEE NOTE 9
4.375 DIA THRU 2 HOLES
SURFACE X SEE NOTE 7
SURFACE B REF
SEE NOTE 7
SEE SHT 2 OF 2
1.973
2.750
.250
2.826
A
B
D
E
.196
.218
8.453
REF
DR NO 41 (.0960) × .328 DEEP NO 4-40 UNC-2B × .148 DEEP REDRILL NO 30 (.1285) DIA × .025 DEEP 8 PLACES
2.011
4.062
4.848
SEE NOTE 12

PARTIAL VIEW A-A

PARTIAL VIEW F-F

1	1			1	BRACKET MOUNTING
2	1				CLAMP MOUNTING LEFT
3	1				CLAMP MOUNTING RIGHT

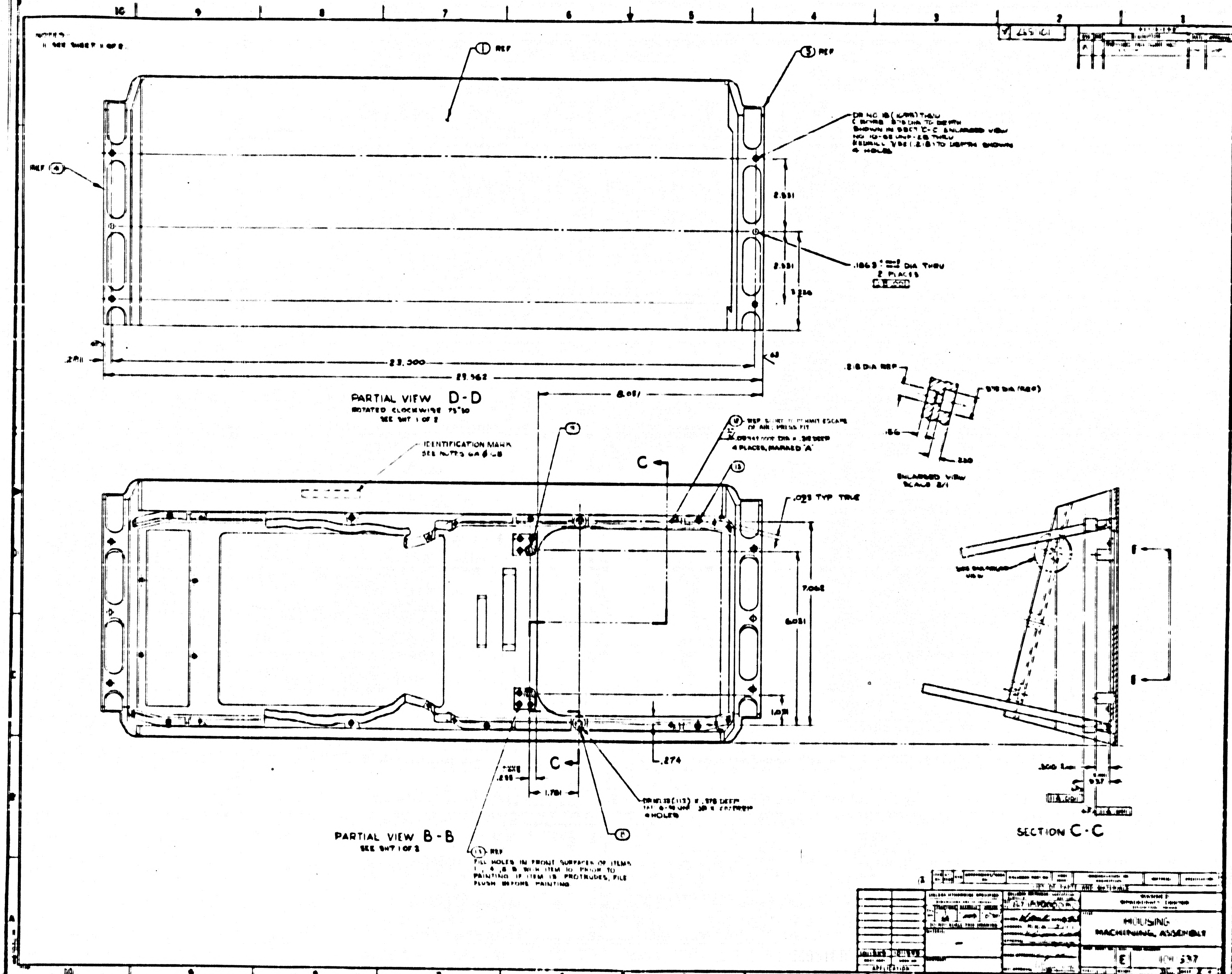
LIST OF PARTS AND MATERIALS

HOUSING
MACHINING ASSEMBLY

E 1011537

APPLICATION

NOTES:
1. SEE SHEET 1 OF 2.


① REF
⑤ REF
REF ④
DR NO 18 (.1695) THRU
C BORE .375 DIA TO DEPTH
SHOWN IN SECT C-C ENLARGED VIEW
NO 10-32 UNF-2B THRU
REDRILL 7/32 (.218) TO DEPTH SHOWN
4 HOLES
2.531
2.531
1.250
.1863 DIA THRU
2 PLACES
.281
23.300
23.562
PARTIAL VIEW D-D
ROTATED CLOCKWISE 73°30
SEE SHT 1 OF 2
8.031
.218 DIA REF
.375 DIA (REF)
.156
.250
ENLARGED VIEW
SCALE 2/1
IDENTIFICATION MARK
SEE NOTES 6A & 6B
⑫ REF SHORT TO PERMIT ESCAPE
OF AIR; PRESS FIT
.09341 DIA x .312 DEEP
4 PLACES, MARKED "A"
⑬
.023 TYP TRUE
C
7.062
6.031
1.031
.274
C
TYPE
.218
1.781
DR NO 33 (.113) x .375 DEEP
TAP 6-32 UNF-2B x .250 DEEP
4 HOLES
⑧
PARTIAL VIEW B-B
SEE SHT 1 OF 2
⑪ REF
FILL HOLES IN FRONT SURFACES OF ITEMS
1, 4, 5 & 8 WITH ITEM 10 PRIOR TO
PAINTING. IF ITEM 10 PROTRUDES, FILE
FLUSH BEFORE PAINTING
SEE ENLARGED VIEW
.300
.937
SECTION C-C
DO NOT SCALE THIS DRAWING
APPLICATION
10
9
8
7
6
5
4
3
2
1

HOUSING
MACHINING, ASSEMBLY

E 10H 537

1011537 C

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR NO. 04632	11/1/63	do
B4		REVISED PER TDRR NO. 10485	30 JUNE 64	
C6		REVISED PER TDRR NO. 10505	30 JUNE 64	

REVISIONS 0357C

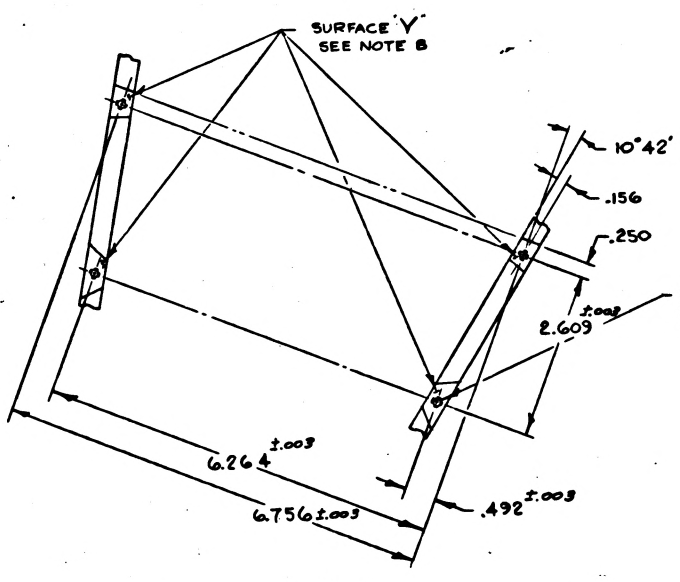
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a) 125/ FINISH ALL OVER.
   b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. AFTER ALIGNING ITEMS ①,②,③,④ & ⑤, DRILL AND REAM ITEMS ①,② & ③ FOR ITEM ⑫. SEPARATE ITEMS AND APPLY EPOXY ADHESIVE, ITEM ⑩, TO ALL MATING SURFACES PER ND1002219. WHILE ADHESIVE IS IN PLASTIC STATE, REALIGN ITEMS, PRESS IN ITEM ⑫ AND FASTEN WITH ITEM ⑬. (C4)

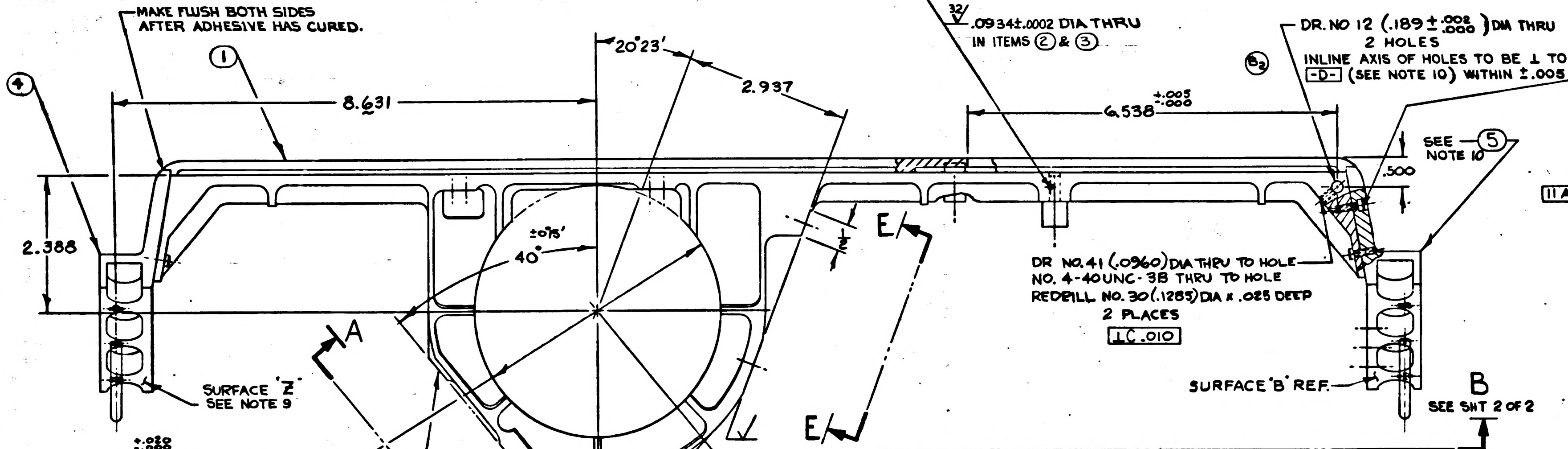
6A. SERIALIZE PER ND1002023.

6B. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019

7. SURFACES MARKED "X" TO BE IN PLANE WITHIN .0005 & PARALLEL TO ℄ OF 4.375 DIA WITHIN .001 AFTER INSTALLATION OF ITEM NO. 6.
8. SURFACES MARKED "Y" TO BE IN PLANE WITHIN .005 & PARALLEL TO ℄ OF 4.375 DIA WITHIN .005.
9. SURFACE MARKED "Z" TO BE IN PLANE WITH -B- WITHIN .001.
10. LOWER EDGE OF 6.515 RECESS IN ITEM 5 TO BE FLUSH TO .002 OVER FLUSH WITH LOWER EDGE OF PANEL OPENING (ITEM 1) (B1)
11. FINISH- APPLY ZINC CHROMATE PRIMER PER MIL-P-6808
    APPLY TT-E-527 LUSTERLESS ENAMEL (GREY), COLOR NO. 36231 OF FED-STD-595 TO FRONT AND SIDES OF ITEMS ①,④ & ⑤ PER ND1002110.
12. CHARACTERS TO BE SILK SCREENED PER ND1002112 USING ND1002111 LUSTERLESS WHITE ENAMEL, COLOR NO. 37875 OF FED. STD-595. CHARACTERS TO BE 1/8 HIGH FUTURA DEMIBOLD PER ND1002122. CENTRALIZE AS SHOWN IN VIEW "F-F".
13. ITEMS ①, ② AND ③ TO MEET REQUIREMENTS OF NOTE 8, DWG. 1011530 AND NOTE 7, DWG 1011535 AND 1011536.
14. BOND ITEM ⑭ TO ITEM ① USING ITEM ⑩, PER ND 1002219. (C3)


SURFACE "Y" SEE NOTE 8
10°42'
.156
.250
±.002 2.609
DR. NO. 41 (.0960) x .328 DEEP
NO. 4-40 UNC-3B x .168 DEEP
REDRILL NO. 30 (.1285) DIA x .025 DEEP
4 PLACES
BREAK THRU PERMISSIBLE
6.264 ±.003
6.756 ±.003
.492 ±.003

PARTIAL VIEW E-E

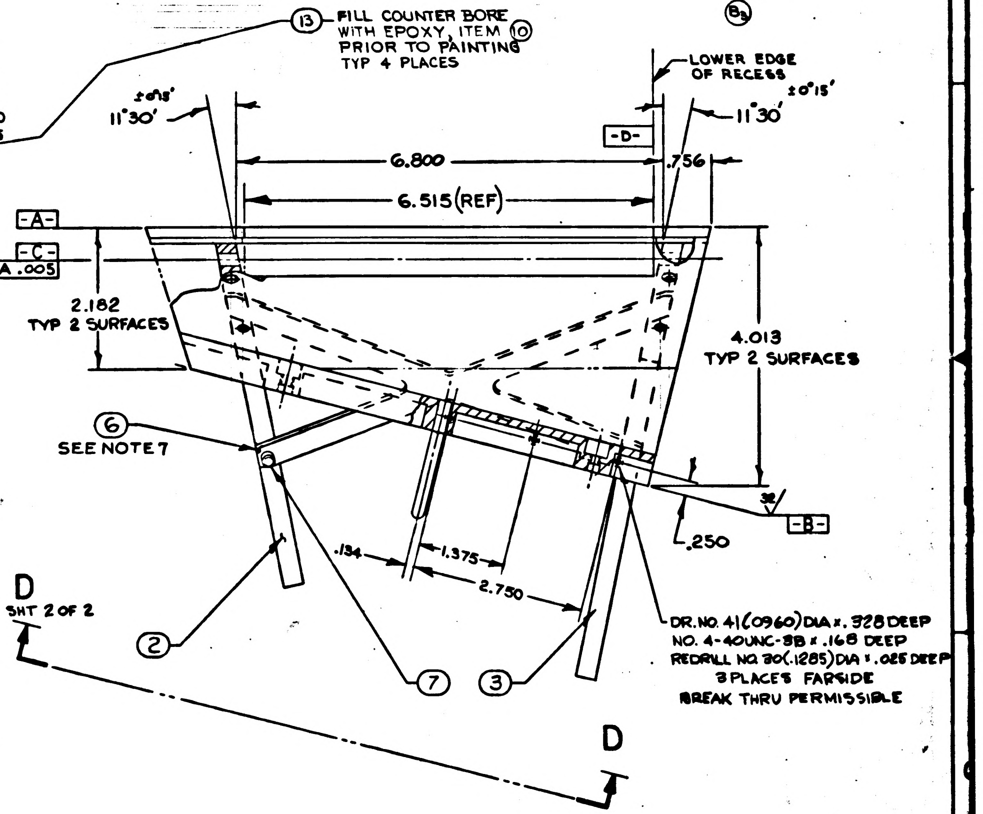

MAKE FLUSH BOTH SIDES AFTER ADHESIVE HAS CURED.
①
④
8.631
20°23'
2.937
2.388
40° ±0°15'
E
E
A
SURFACE "Z" SEE NOTE 9
⑫ PRESS FIT
.0934 ±.0002 DIA THRU IN ITEMS ② & ③
6.538 +.005 -.000
DR. NO. 12 (.189 +.002 -.000) DIA THRU
2 HOLES
INLINE AXIS OF HOLES TO BE ⊥ TO -D- (SEE NOTE 10) WITHIN ±.005
(B4) (B2)
SEE NOTE 10 ⑤
.500
DR NO. 41 (.0960) DIA THRU TO HOLE
NO. 4-40 UNC-3B THRU TO HOLE
REDRILL NO. 30 (.1285) DIA x .025 DEEP
2 PLACES
⊥ C .010
SURFACE 'B' REF.
B
SEE SHT 2 OF 2

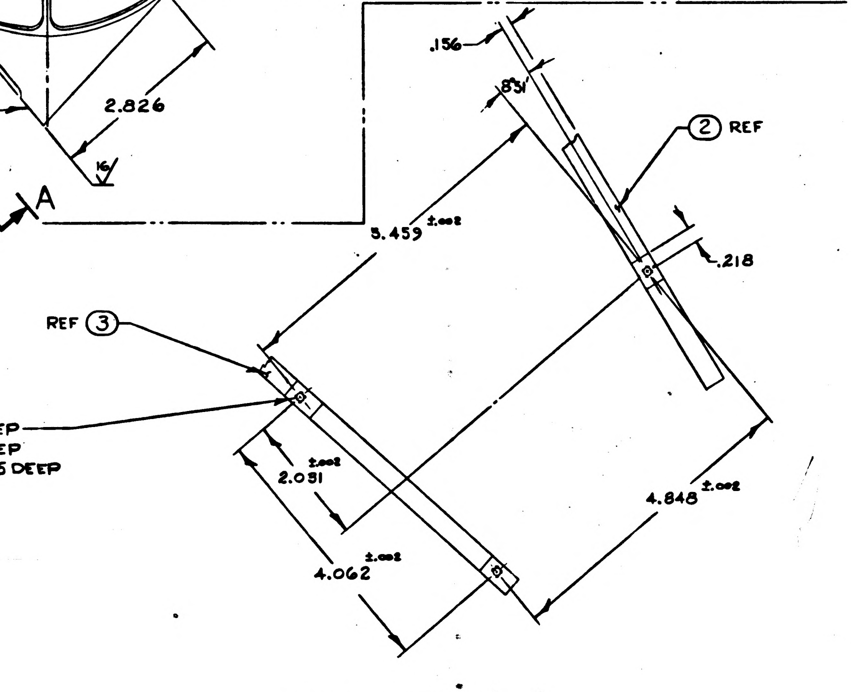
4.375 +.020 -.000 DIA THRU
2 HOLES
FOR MFG PURPOSES ONLY
HOLES TO BE IN LINE WITHIN .005
11 A .001

SURFACE "X" SEE NOTE 7

2.826

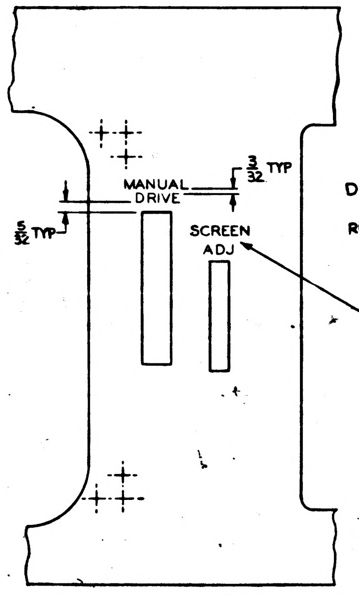
B


⑬ FILL COUNTER BORE WITH EPOXY, ITEM ⑩ PRIOR TO PAINTING TYP 4 PLACES
(B3)
LOWER EDGE OF RECESS
±0°15' 11°30'
11°30' ±0°15'
-D-
6.800
6.515 (REF)
.756
-A-
-C-
11 A .005
2.182 TYP 2 SURFACES
4.013 TYP 2 SURFACES
⑥ SEE NOTE 7
.134
1.375
2.750
32/
-B-
.250
②
⑦
③
DR. NO. 41 (.0960) DIA x .328 DEEP
NO. 4-40 UNC-3B x .168 DEEP
REDRILL NO. 30 (.1285) DIA x .025 DEEP
3 PLACES FARSIDE
BREAK THRU PERMISSIBLE
D
SEE SHT 2 OF 2
D


.156
.83
② REF
.218
5.459 ±.002
REF ③
2.031 ±.002
4.848 ±.002
4.062 ±.002

DR NO. 41 (.0960) x .328 DEEP
NO. 4-40 UNC-3B x .168 DEEP
REDRILL NO. 30 (.1285) DIA x .025 DEEP
3 PLACES

PARTIAL VIEW A-A


3/32 TYP
MANUAL DRIVE
5/32 TYP
SCREEN ADJ

SEE NOTE 12

PARTIAL VIEW F-F
SEE SHEET 2 OF 2

C	C
B	—
A	A
SHEET 1	SHEET 2

Ⓐ REVISION STATUS OF SHEETS

(C1)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
15	2		1011446	39387000010		PIN, ALIGNMENT			
14	5		1012170	52387000320		PAD, CLAMP			
13	22		NAS1352C03LL4	74455157009		SCREW, CAP, HEX SOC HEAD			
12	6		MS16555-617	74444030017		PIN, STRAIGHT, HEADLESS (DOWEL)			
11									
10	A/R		1011541	74471435001		ADHESIVE, EPOXY			
9	2		1011534	57387000180		PAD, MOUNTING			
8	2		1011533	57387000170		PAD, MOUNTING			
7	4		[illegible]	[illegible]		~~SCREW, CAP, HEX. SOC. HD.~~			
6	1		1011424	52387000060		STIFFENER			
5	1		1011532	52387000220	—	FLANGE, MOUNTING (LEFT SIDE)			
4	1		1011531	52387000210	—	FLANGE, MOUNTING (RIGHT SIDE)			
3	1		1011535	52387000230		PANEL, LOWER			
2	1		1011536	52387000240		PANEL, UPPER			
1	1		1011530	52387000200		PANEL, FRONT			

SEE NOTE 13 — items 3, 2, 1

Ⓐ

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1012136	1012136
1011559	1011559

APPLICATION (C5)

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ± .005; ANGLES ± 0°30'
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 87387000090
DRAWN Wysocki DATE 6/4/63
CHECKED MMW 9-25-63
APPROVAL N. Werner 9-26-63
APPROVAL [illegible] 9-26
NASA APPROVAL W. J. [illegible] 10-3-63
MIT APPROVAL [illegible] 3 Oct 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING
MACHINING, ASSEMBLY

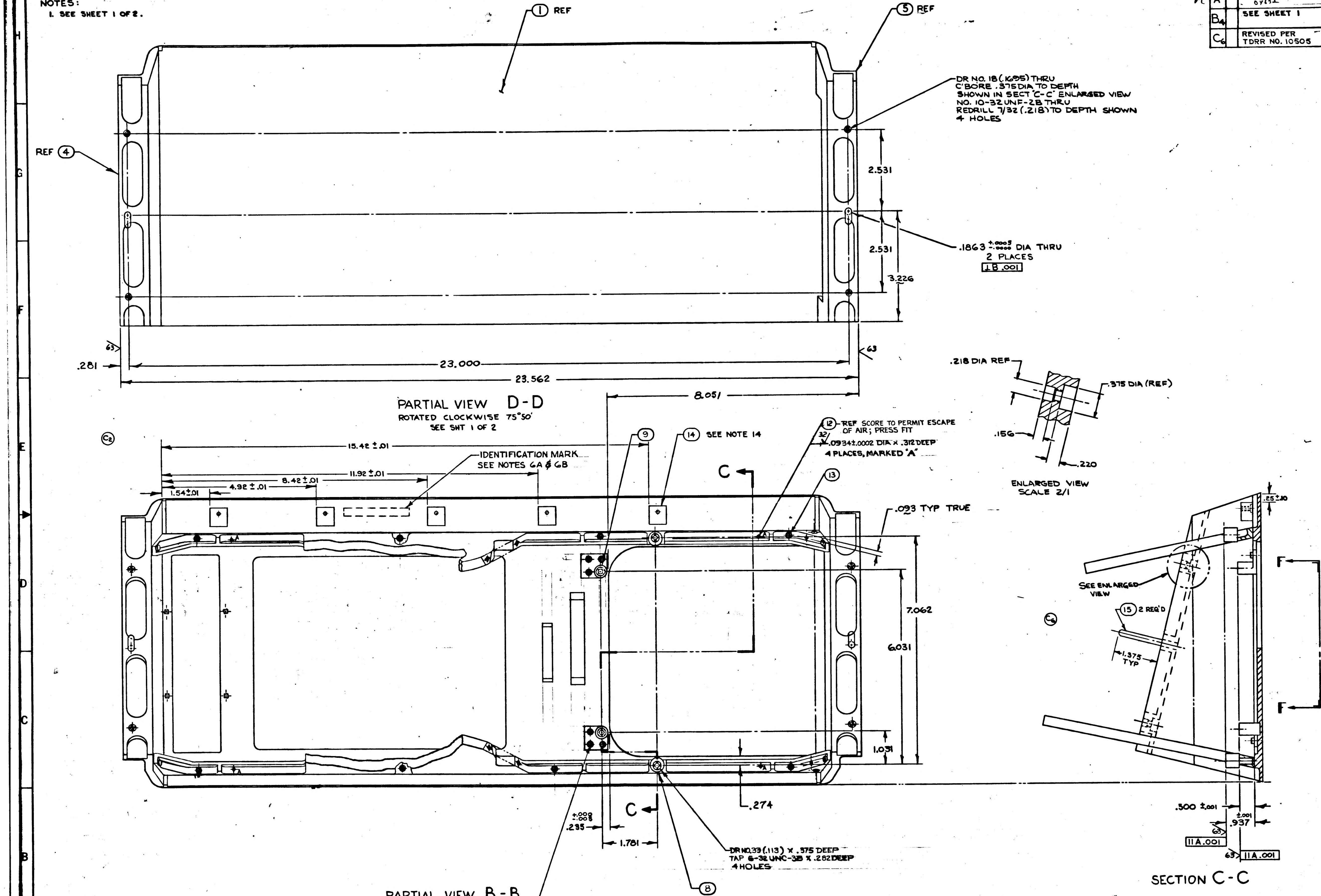
CODE IDENT NO.
SIZE E
NASA NUMBER 1011537
SCALE 1:1
WEIGHT CALC ACTUAL
SHEET 1 OF 2

MASTER

		REVISIONS	03576	
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR NO. 04632		
B4		SEE SHEET 1	30 JUNE 64	WK
C6		REVISED PER TDRR NO. 10505	30 JUNE 64	WK

1011537 C

NOTES:
1. SEE SHEET 1 OF 2.



① REF
⑤ REF
REF ④
DR NO. 18 (.1695) THRU
C'BORE .375 DIA TO DEPTH
SHOWN IN SECT 'C-C' ENLARGED VIEW
NO. 10-32 UNF-2B THRU
REDRILL 7/32 (.218) TO DEPTH SHOWN
4 HOLES
2.531
2.531
3.226
.1863 +.0005 -.0000 DIA THRU
2 PLACES
⊥ B .001
.281
63
23.000
23.562
PARTIAL VIEW D-D
ROTATED CLOCKWISE 75°50'
SEE SHT 1 OF 2
8.051
.218 DIA REF
.375 DIA (REF)
.156
.220
ENLARGED VIEW
SCALE 2/1
15.42 ±.01
IDENTIFICATION MARK
SEE NOTES 6A & 6B
8.42 ±.01
11.92 ±.01
4.92 ±.01
1.54 ±.01
⑨
⑭ SEE NOTE 14
⑫ REF SCORE TO PERMIT ESCAPE OF AIR; PRESS FIT
32
.0934 ±.0002 DIA x .312 DEEP
4 PLACES, MARKED "A"
C
⑬
.093 TYP TRUE
7.062
6.031
1.031
.274
C
+.005 -.005
.235
1.781
DR NO. 33 (.113) x .375 DEEP
TAP 6-32 UNC-3B x .282 DEEP
4 HOLES
⑧
PARTIAL VIEW B-B
SEE SHT 1 OF 2
.25 ±.10
F
F
SEE ENLARGED VIEW
⑮ 2 REQ'D
1.375 TYP
.300 ±.001
±.001
.937
63
⊥ A .001
63
⊥ A .001
SECTION C-C

⑬ REF
FILL HOLES IN FRONT SURFACES OF ITEMS 1, 4, & 5 WITH ITEM 10 PRIOR TO PAINTING. IF ITEM 13 PROTRUDES, FILE FLUSH BEFORE PAINTING.

Ⓐ

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1012136	1012136
1011559	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ±.005; ANGLES ±0°30'
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 87387C00090
DRAWN Wysocki DATE 6/4/63
CHECKED MMW 9-26-63
APPROVAL M Wesaul 9-26-63
APPROVAL E. Ohang 10-2-63
NASA APPROVAL W. J. Rohme 10-3-63
MIT APPROVAL W. Kupfer 3 Oct 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING
MACHINING, ASSEMBLY

CODE IDENT NO.
SIZE E
NASA NUMBER 1011537
SCALE 1:1
WEIGHT
CALC ACTUAL
SHEET 2 OF 2

MASTER

1011537 F

NOTES:

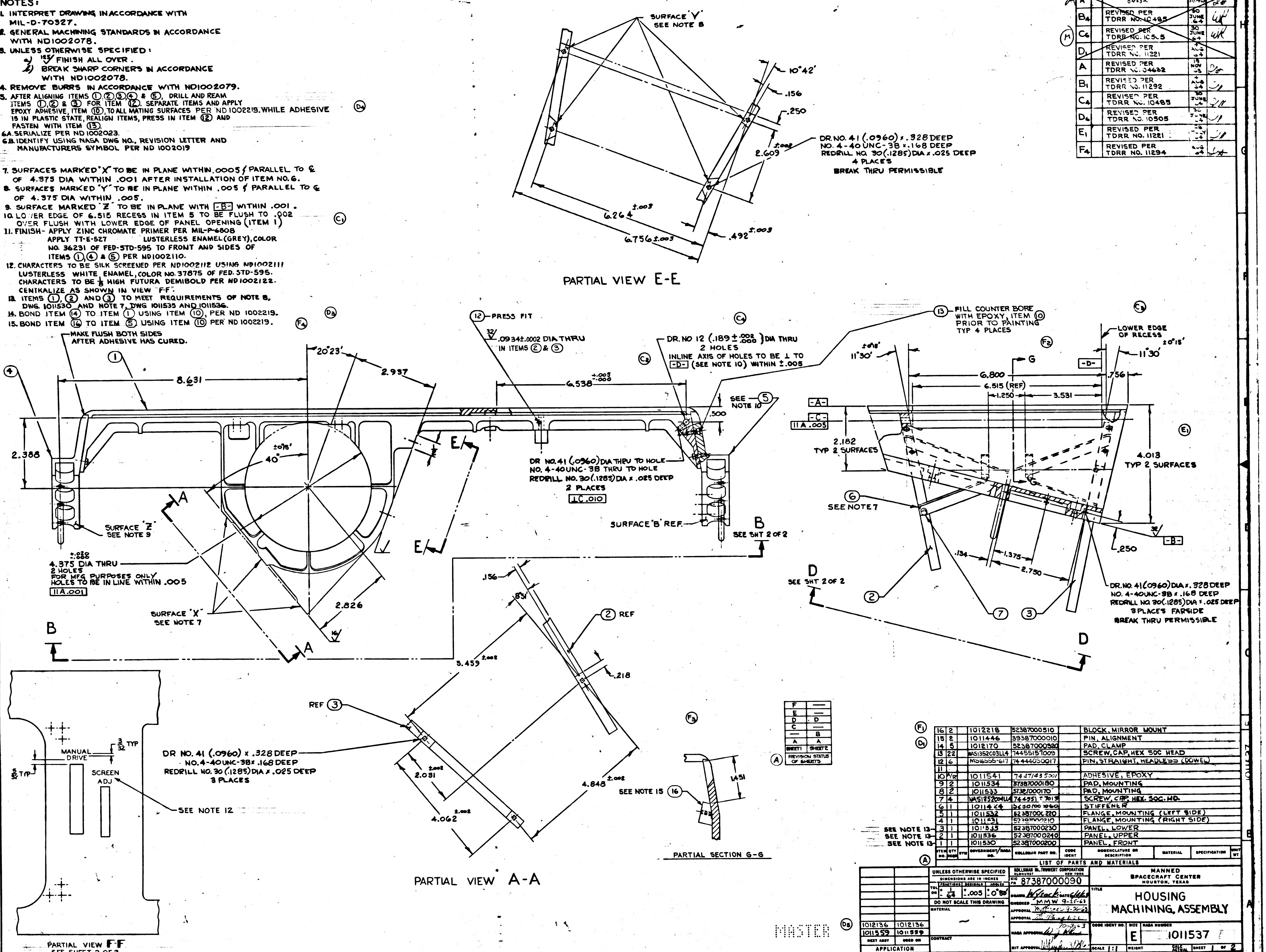
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a) 125/ FINISH ALL OVER.
   b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. AFTER ALIGNING ITEMS ①,②,③,④ & ⑤, DRILL AND REAM ITEMS ①,② & ③ FOR ITEM ⑫. SEPARATE ITEMS AND APPLY EPOXY ADHESIVE, ITEM ⑩, TO ALL MATING SURFACES PER ND 1002219. WHILE ADHESIVE IS IN PLASTIC STATE, REALIGN ITEMS, PRESS IN ITEM ⑫ AND FASTEN WITH ITEM ⑬. (D4)

6A. SERIALIZE PER ND 1002023.

6B. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019

7. SURFACES MARKED "X" TO BE IN PLANE WITHIN .0005 & PARALLEL TO ℄ OF 4.375 DIA WITHIN .001 AFTER INSTALLATION OF ITEM NO. 6.
8. SURFACES MARKED "Y" TO BE IN PLANE WITHIN .005 & PARALLEL TO ℄ OF 4.375 DIA WITHIN .005.
9. SURFACE MARKED "Z" TO BE IN PLANE WITH -B- WITHIN .001.
10. LOWER EDGE OF 6.515 RECESS IN ITEM 5 TO BE FLUSH TO .002 OVER FLUSH WITH LOWER EDGE OF PANEL OPENING (ITEM 1) (C1)
11. FINISH - APPLY ZINC CHROMATE PRIMER PER MIL-P-6808
    APPLY TT-E-527 LUSTERLESS ENAMEL (GREY), COLOR NO. 36231 OF FED-STD-595 TO FRONT AND SIDES OF ITEMS ①,④ & ⑤ PER ND1002110.
12. CHARACTERS TO BE SILK SCREENED PER ND1002112 USING ND1002111 LUSTERLESS WHITE ENAMEL, COLOR NO. 37875 OF FED. STD-595. CHARACTERS TO BE 1/8 HIGH FUTURA DEMIBOLD PER ND1002122. CENTRALIZE AS SHOWN IN VIEW "F-F".
13. ITEMS ①, ② AND ③ TO MEET REQUIREMENTS OF NOTE 8, DWG. 1011530 AND NOTE 7, DWG 1011535 AND 1011536.
14. BOND ITEM ⑭ TO ITEM ① USING ITEM ⑩, PER ND 1002219. (D3)
15. BOND ITEM ⑯ TO ITEM ⑤ USING ITEM ⑩ PER ND 1002219. (F4)

REVISIONS 03576				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
~~A~~		~~REVISED PER TDRR NO. 04632~~	~~11/19/63~~	
~~B4~~		~~REVISED PER TDRR NO. 10485~~	~~30 JUNE 64~~	WK
~~C6~~		~~REVISED PER TDRR NO. 10505~~	~~30 JUNE 64~~	WK
~~D1~~		~~REVISED PER TDRR NO. 11221~~	~~4 AUG 64~~	
A		REVISED PER TDRR NO. 04632	19 NOV 63	
B1		REVISED PER TDRR NO. 11292	4 AUG 64	
C4		REVISED PER TDRR NO. 10485	30 JUNE 64	
D6		REVISED PER TDRR NO. 10505	30 JUNE 64	
E1		REVISED PER TDRR NO. 11221	[illegible] 64	
F4		REVISED PER TDRR NO. 11294	AUG 64	


SURFACE "Y" SEE NOTE 8
10°42'
.156
.250
DR. NO. 41 (.0960) x .328 DEEP NO. 4-40 UNC-3B x .168 DEEP REDRILL NO. 30 (.1285) DIA x .025 DEEP 4 PLACES BREAK THRU PERMISSIBLE
2.609 ±.002
6.264 ±.003
6.756 ±.003
.492 ±.003
PARTIAL VIEW E-E
MAKE FLUSH BOTH SIDES AFTER ADHESIVE HAS CURED.
④
①
8.631
20°23'
2.937
⑫ PRESS FIT
32/ .0934±.0002 DIA THRU IN ITEMS ② & ③
6.538 +.003 -.000
DR. NO 12 (.189 +.002 -.000) DIA THRU 2 HOLES INLINE AXIS OF HOLES TO BE ⊥ TO -D- (SEE NOTE 10) WITHIN ±.005
SEE ⑤ NOTE 10
.500
2.388
±0°15'
40°
E
E
DR NO. 41 (.0960) DIA THRU TO HOLE NO. 4-40UNC-3B THRU TO HOLE REDRILL NO. 30 (.1285) DIA x .025 DEEP 2 PLACES
⊥C .010
SURFACE "Z" SEE NOTE 9
A
4.375 +.020 -.000 DIA THRU 2 HOLES FOR MFG PURPOSES ONLY HOLES TO BE IN LINE WITHIN .005
11A .001
SURFACE "X" SEE NOTE 7
2.826
16/
A
B
SURFACE "B" REF.
B SEE SHT 2 OF 2
⑬ FILL COUNTER BORE WITH EPOXY, ITEM ⑩ PRIOR TO PAINTING TYP 4 PLACES
11°30' ±0°15'
G
-D-
LOWER EDGE OF RECESS
±0°15' 11°30'
6.800
6.515 (REF)
1.250
3.531
.756
-A-
-C-
11 A .005
2.182 TYP 2 SURFACES
4.013 TYP 2 SURFACES
⑥ SEE NOTE 7
.134
1.375
2.750
32/ -B-
.250
D SEE SHT 2 OF 2
②
⑦
③
DR. NO. 41 (.0960) DIA x .328 DEEP NO. 4-40UNC-3B x .168 DEEP REDRILL NO. 30 (.1285) DIA x .025 DEEP 3 PLACES FARSIDE BREAK THRU PERMISSIBLE
D
.156
.831
② REF
5.459 ±.002
.218
REF ③
DR NO. 41 (.0960) x .328 DEEP NO. 4-40UNC-3B x .168 DEEP REDRILL NO. 30 (.1285) DIA x .025 DEEP 3 PLACES
2.031 ±.002
4.848 ±.002
4.062 ±.002
PARTIAL VIEW A-A
MANUAL DRIVE
3/32 TYP
5/32 TYP
SCREEN ADJ
SEE NOTE 12
PARTIAL VIEW F-F SEE SHEET 2 OF 2
SEE NOTE 15 ⑯
.1451
PARTIAL SECTION G-G

F	—
E	—
D	D
C	—
—	B
A	A
SHEET 1	SHEET 2

(A) REVISION STATUS OF SHEETS

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
16	2		1012218	52387000510		BLOCK, MIRROR MOUNT			
15	2		1011446	39387000010		PIN, ALIGNMENT			
14	5		1012170	52387000520		PAD, CLAMP			
13	22		NAS1352C03LL4	74455157009		SCREW, CAP, HEX SOC HEAD			
12	6		MS16555-617	74444030017		PIN, STRAIGHT, HEADLESS (DOWEL)			
11									
10	A/R		1011541	74471435001		ADHESIVE, EPOXY			
9	2		1011534	57387000180		PAD, MOUNTING			
8	2		1011533	51387000170		PAD, MOUNTING			
7	4		NAS1352C04LL4	74455157019		SCREW, CAP, HEX. SOC. HD.			
6	1		1011424	[illegible]		STIFFENER			
5	1		1011532	52387000220		FLANGE, MOUNTING (LEFT SIDE)			
4	1		1011531	52387000210		FLANGE, MOUNTING (RIGHT SIDE)			
SEE NOTE 13 — 3	1		1011535	52387000230		PANEL, LOWER			
SEE NOTE 13 — 2	1		1011536	52387000240		PANEL, UPPER			
SEE NOTE 13 — 1	1		1011530	52387000200		PANEL, FRONT			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1012136	1012136
1011559	1011559

APPLICATION (D5)

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ±.005; ANGLES ±0°30'
DO NOT SCALE THIS DRAWING
MATERIAL ~
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 87387000090
DRAWN Wysocki DATE 9/4/63
CHECKED MMW 9-25-63
APPROVAL M. Weaver 9-26-63
APPROVAL
NASA APPROVAL 10-3-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING
MACHINING, ASSEMBLY

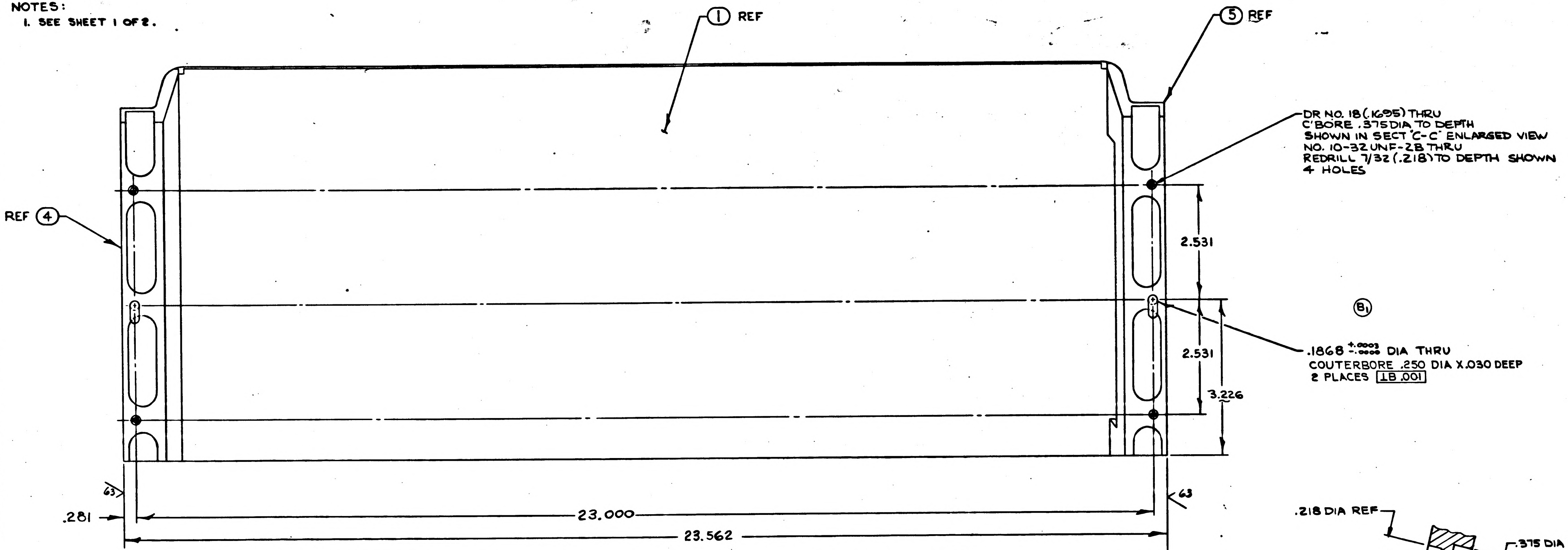
CODE IDENT NO.
SIZE E
NASA NUMBER 1011537
SCALE 1:1
WEIGHT CALC ACTUAL
SHEET 1 OF 2

MASTER

1011537 F

NOTES:
1. SEE SHEET 1 OF 2.

REVISIONS 05576				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
~~A~~		~~REVISED PER TDRR NO. 04632~~		
~~B4~~		~~SEE SHEET 1~~	~~30 JUNE 64~~	~~W.H.~~
~~C6~~		~~REVISED PER TDRR NO. 10505~~	~~30 JUNE 64~~	~~W.H.~~
~~D1~~		~~SEE SHEET 1 FOR REVISION~~	~~4 AUG 64~~	
A		REVISED PER TDRR NO. 04632	19 NOV 63	
B1		REVISED PER TDRR NO. 11292	4 AUG 64	
C4		SEE SHEET 1 FOR REVISION	23 JUNE 64	
D6		REVISED PER TDRR NO. 10505	30 JUNE 64	
E1		SEE SHEET 1 FOR REVISION	28 JULY 64	
F4		SEE SHEET 1 FOR REVISION	11 AUG 64	



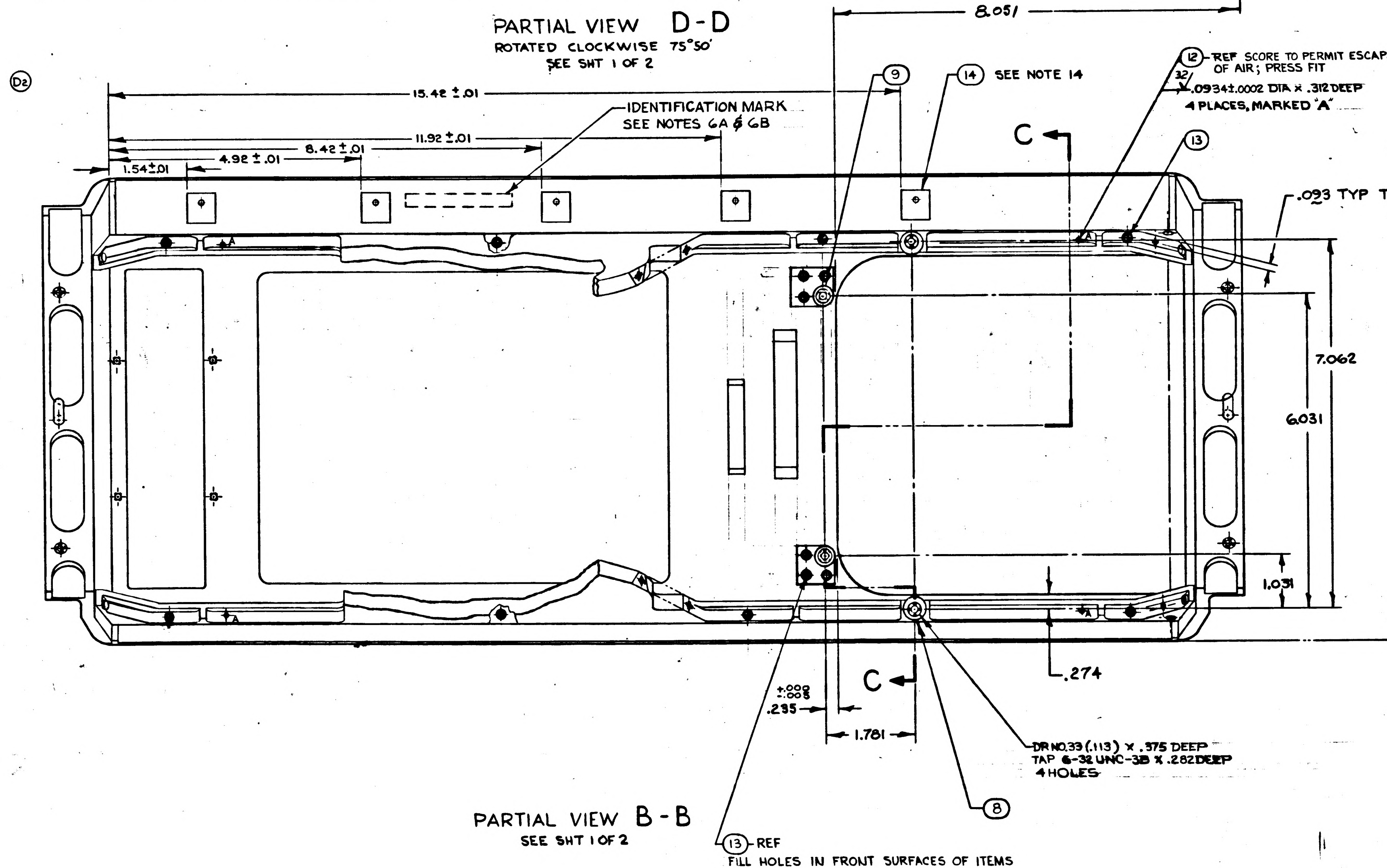
① REF
⑤ REF
REF ④
2.531
2.531
3.226
Ⓑ1
63
.281
23.000
23.562
63

DR NO. 18(.1695) THRU
C'BORE .375 DIA TO DEPTH
SHOWN IN SECT "C-C" ENLARGED VIEW
NO. 10-32 UNF-2B THRU
REDRILL 7/32 (.218) TO DEPTH SHOWN
4 HOLES

.1868 +.0003 -.0000 DIA THRU
COUTERBORE .250 DIA X .030 DEEP
2 PLACES ⊥B .001

PARTIAL VIEW D-D

ROTATED CLOCKWISE 75°50'
SEE SHT 1 OF 2



Ⓓ2
8.051
15.42 ±.01
11.92 ±.01
8.42 ±.01
4.92 ±.01
1.54 ±.01
⑨
⑭ SEE NOTE 14
C
⑬
7.062
6.031
1.031
.274
C
+.000 -.005
.295
1.781
⑧

IDENTIFICATION MARK
SEE NOTES 6A & 6B

⑫ REF SCORE TO PERMIT ESCAPE OF AIR; PRESS FIT
32
.0934±.0002 DIA x .312 DEEP
4 PLACES, MARKED "A"

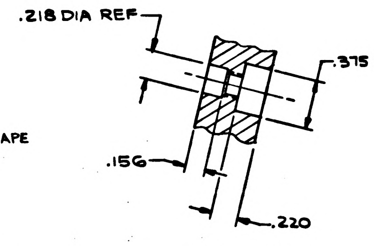
.093 TYP TRUE

DR NO.33 (.113) x .375 DEEP
TAP 6-32 UNC-3B x .282 DEEP
4 HOLES

PARTIAL VIEW B-B

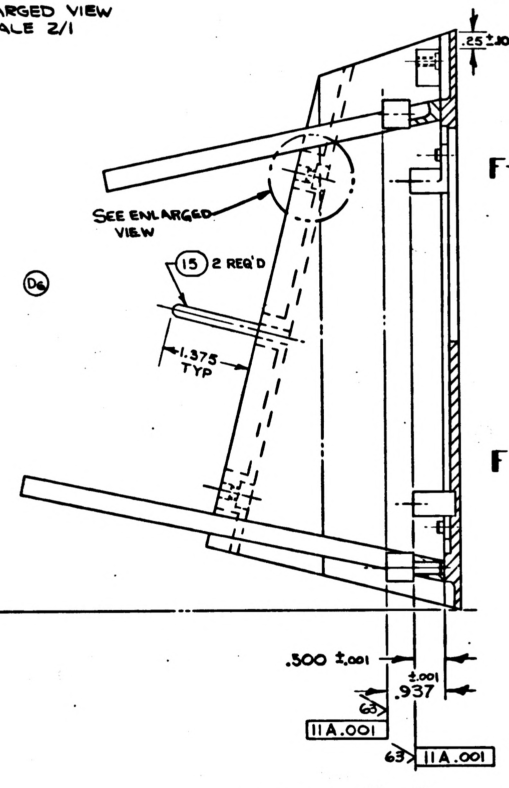
SEE SHT 1 OF 2

⑬ REF
FILL HOLES IN FRONT SURFACES OF ITEMS 1, 4, & 5 WITH ITEM 10 PRIOR TO PAINTING. IF ITEM 13 PROTRUDES, FILE FLUSH BEFORE PAINTING.



.218 DIA REF
.375 DIA (REF)
.156
.220

ENLARGED VIEW
SCALE 2/1



.25 ±.10
F
SEE ENLARGED VIEW
⑮ 2 REQ'D
1.375 TYP
Ⓓ6
F
.500 ±.001
±.001
.937
63
11A.001
63
11A.001

SECTION C-C

Ⓐ

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1012136	1012136
1011559	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 0°30'

DO NOT SCALE THIS DRAWING
MATERIAL ~
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 87387000090
DRAWN Wysocki DATE 6/4/63
CHECKED MMW 9-26-63
APPROVAL M. Vesquez 9-26-63
APPROVAL E. Ohsump 10-2-63
NASA APPROVAL 10-3-63
MIT APPROVAL 10/3/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING
MACHINING, ASSEMBLY

CODE IDENT NO.
SIZE E
NASA NUMBER 1011537
SCALE 1:1
WEIGHT
CALC ACTUAL
SHEET 2 OF 2

MASTER

1011537

SYM	ZONE	REVISIONS DESCRIPTION	DATE	APPROVAL

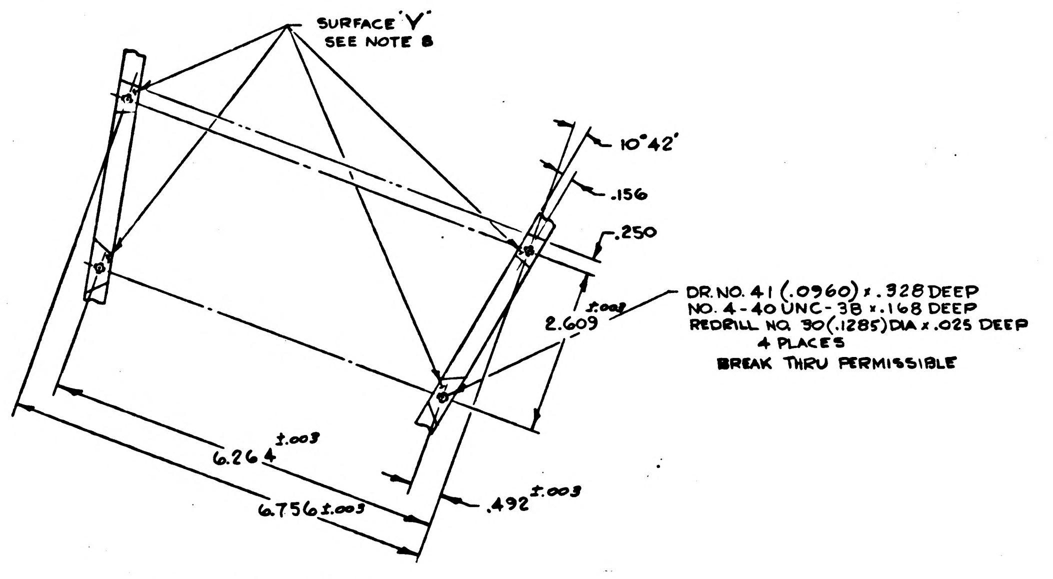
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   - a) 125 ✓ FINISH ALL OVER.
   - b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. AFTER ALIGNING ITEMS ①,②,③,④ & ⑤, DRILL AND REAM ITEMS ①,② & ③ FOR ITEM ⑫. SEPARATE ITEMS AND APPLY EPOXY ADHESIVE, ITEM ⑩, TO ALL MATING SURFACES. WHILE ADHESIVE IS IN PLASTIC STATE, REALIGN ITEMS, PRESS IN ITEM ⑫ AND FASTEN WITH ITEM ⑬.

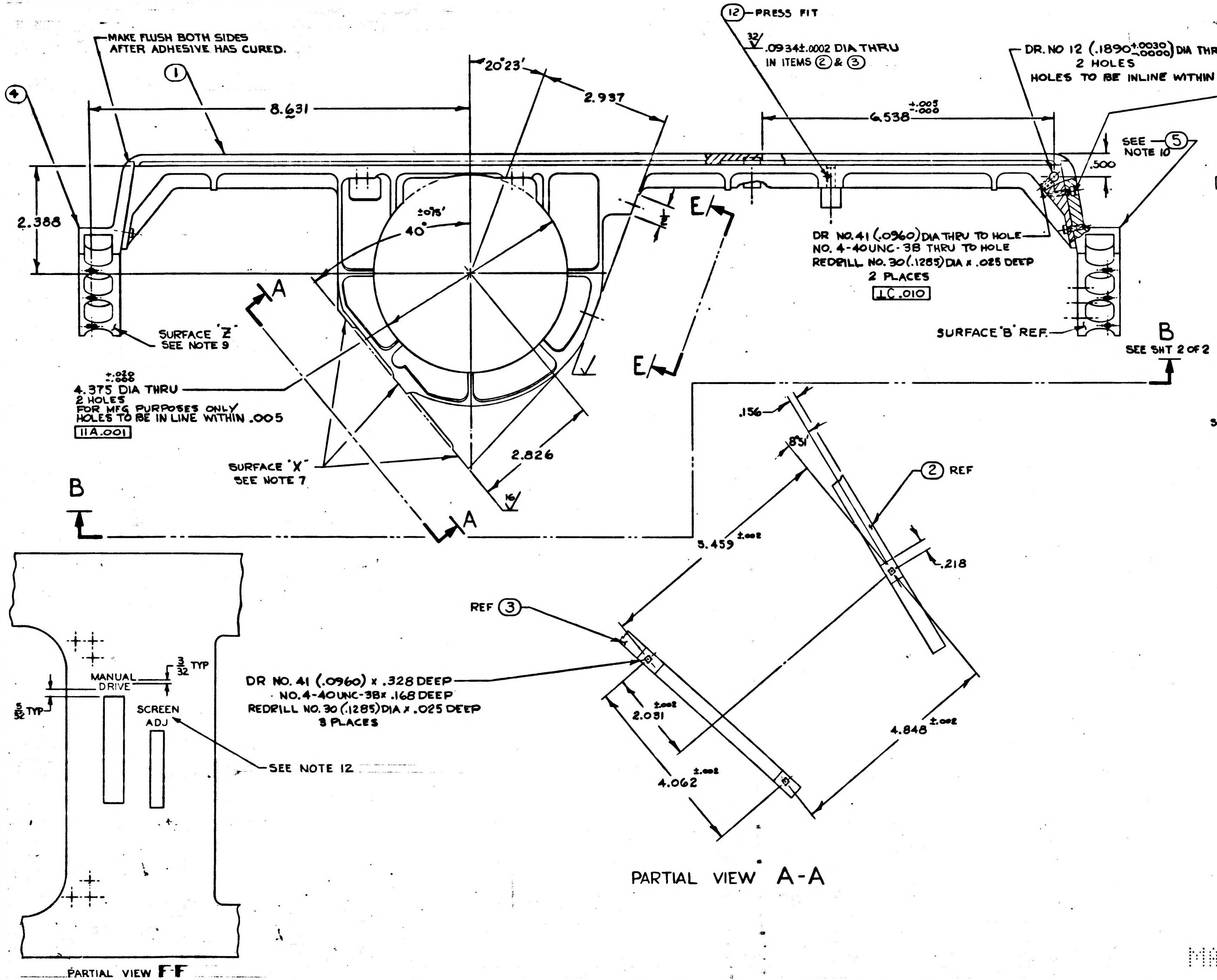
6A. SERIALIZE PER ND1002023.

6B. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019

7. SURFACES MARKED "X" TO BE IN PLANE WITHIN .0005 & PARALLEL TO ℄ OF 4.375 DIA WITHIN .001 AFTER INSTALLATION OF ITEM NO. 6.
8. SURFACES MARKED "Y" TO BE IN PLANE WITHIN .005 & PARALLEL TO ℄ OF 4.375 DIA WITHIN .005.
9. SURFACE MARKED "Z" TO BE IN PLANE WITH -B- WITHIN .001.
10. EDGES OF 6.515 RECESS IN ITEM 5 TO BE IN LINE WITH EDGES OF PANEL OPENING (ITEM 1) WITHIN ±.003
11. FINISH - APPLY ZINC CHROMATE PRIMER PER MIL-P-6808
    APPLY TT-E-527 LUSTERLESS ENAMEL (GREY), COLOR NO. 36231 OF FED-STD-595 TO FRONT AND SIDES OF ITEMS ①,④ & ⑤ PER ND1002110.
12. CHARACTERS TO BE SILK SCREENED PER ND1002112 USING ND1002111 LUSTERLESS WHITE ENAMEL, COLOR NO. 37875 OF FED. STD-595. CHARACTERS TO BE 1/8 HIGH FUTURA DEMIBOLD PER ND1002122. CENTRALIZE AS SHOWN IN VIEW "F-F".
13. ITEMS ①, ② AND ③ TO MEET REQUIREMENTS OF NOTE 8, DWG. 1011530 AND NOTE 7, DWG 1011535 AND 1011536.

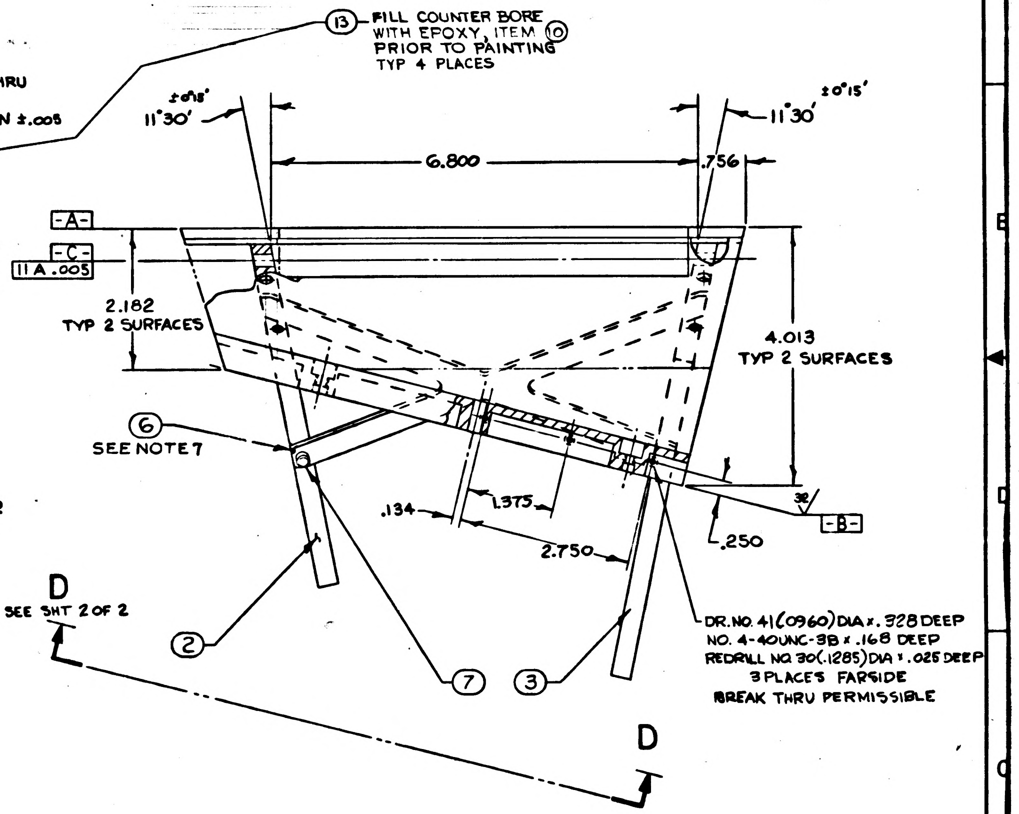

SURFACE "Y" SEE NOTE 8
10°42'
.156
.250
2.609 ±.002
DR. NO. 41 (.0960) x .328 DEEP
NO. 4-40 UNC-3B x .168 DEEP
REDRILL NO. 30 (.1285) DIA x .025 DEEP
4 PLACES
BREAK THRU PERMISSIBLE
6.264 ±.003
6.756 ±.003
.492 ±.003

PARTIAL VIEW E-E


MAKE FLUSH BOTH SIDES AFTER ADHESIVE HAS CURED.
①
④
8.631
20°23'
2.937
2.388
40° ±0°15'
E
E
A
A
SURFACE "Z" SEE NOTE 9
4.375 +.020 -.000 DIA THRU
2 HOLES
FOR MFG PURPOSES ONLY
HOLES TO BE IN LINE WITHIN .005
11 A .001
SURFACE "X" SEE NOTE 7
2.826
B
⑫ PRESS FIT
32 .0934±.0002 DIA THRU IN ITEMS ② & ③
6.538 +.003 -.000
DR. NO 12 (.1890 +.0030 -.0000) DIA THRU
2 HOLES
HOLES TO BE INLINE WITHIN ±.005
SEE ⑤ NOTE 10
.500
DR NO. 41 (.0960) DIA THRU TO HOLE
NO. 4-40UNC-3B THRU TO HOLE
REDRILL NO. 30 (.1285) DIA x .025 DEEP
2 PLACES
⊥ C .010
SURFACE "B" REF.
B
SEE SHT 2 OF 2
.156
.851
② REF
.218
5.459 ±.002
REF ③
DR NO. 41 (.0960) x .328 DEEP
NO. 4-40UNC-3B x .168 DEEP
REDRILL NO. 30 (.1285) DIA x .025 DEEP
3 PLACES
2.031 ±.002
4.062 ±.002
4.848 ±.002
MANUAL DRIVE
SCREEN ADJ
3/32 TYP
5/32 TYP
SEE NOTE 12

PARTIAL VIEW A-A

PARTIAL VIEW F-F
SEE SHEET 2 OF 2


⑬ FILL COUNTER BORE WITH EPOXY, ITEM ⑩ PRIOR TO PAINTING TYP 4 PLACES
11°30' ±0°15'
11°30' ±0°15'
6.800
.756
-A-
-C-
11 A .005
2.182 TYP 2 SURFACES
4.013 TYP 2 SURFACES
⑥ SEE NOTE 7
.134
1.375
2.750
.250
-B-
D
SEE SHT 2 OF 2
D
②
⑦
③
DR. NO. 41 (.0960) DIA x .328 DEEP
NO. 4-40UNC-3B x .168 DEEP
REDRILL NO. 30 (.1285) DIA x .025 DEEP
3 PLACES FARSIDE
BREAK THRU PERMISSIBLE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
13	22		NAS1352C03LL4	74455157009		SCREW, CAP, HEX SOC HEAD			
12	6		MS16555-617	74444030017		PIN, STRAIGHT, HEADLESS (DOWEL)			
11									
10	A/R		1011541	74471435001		ADHESIVE, EPOXY			
9	2		1011534	57387000180		PAD, MOUNTING			
8	2		1011533	57387000170		PAD, MOUNTING			
7	4		NAS1352C04LL4	74455157019		SCREW, CAP, HEX. SOC. HD.			
6	1		1011424	52387000060		STIFFENER			
5	1		1011532	52387000220		FLANGE, MOUNTING (LEFT SIDE)			
4	1		1011531	52387000210		FLANGE, MOUNTING (RIGHT SIDE)			
3	1		1011535	52387000230		PANEL, LOWER			
2	1		1011536	52387000240		PANEL, UPPER			
1	1		1011530	52387000200		PANEL, FRONT			

SEE NOTE 13 (items 3, 2, 1)

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011559	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ±.005; ANGLES ±0°30'
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 87387000080
DRAWN Wysocki DATE
CHECKED MMW 9-25-63
APPROVAL M. Werner 9-26-63
APPROVAL
NASA APPROVAL 10-3-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

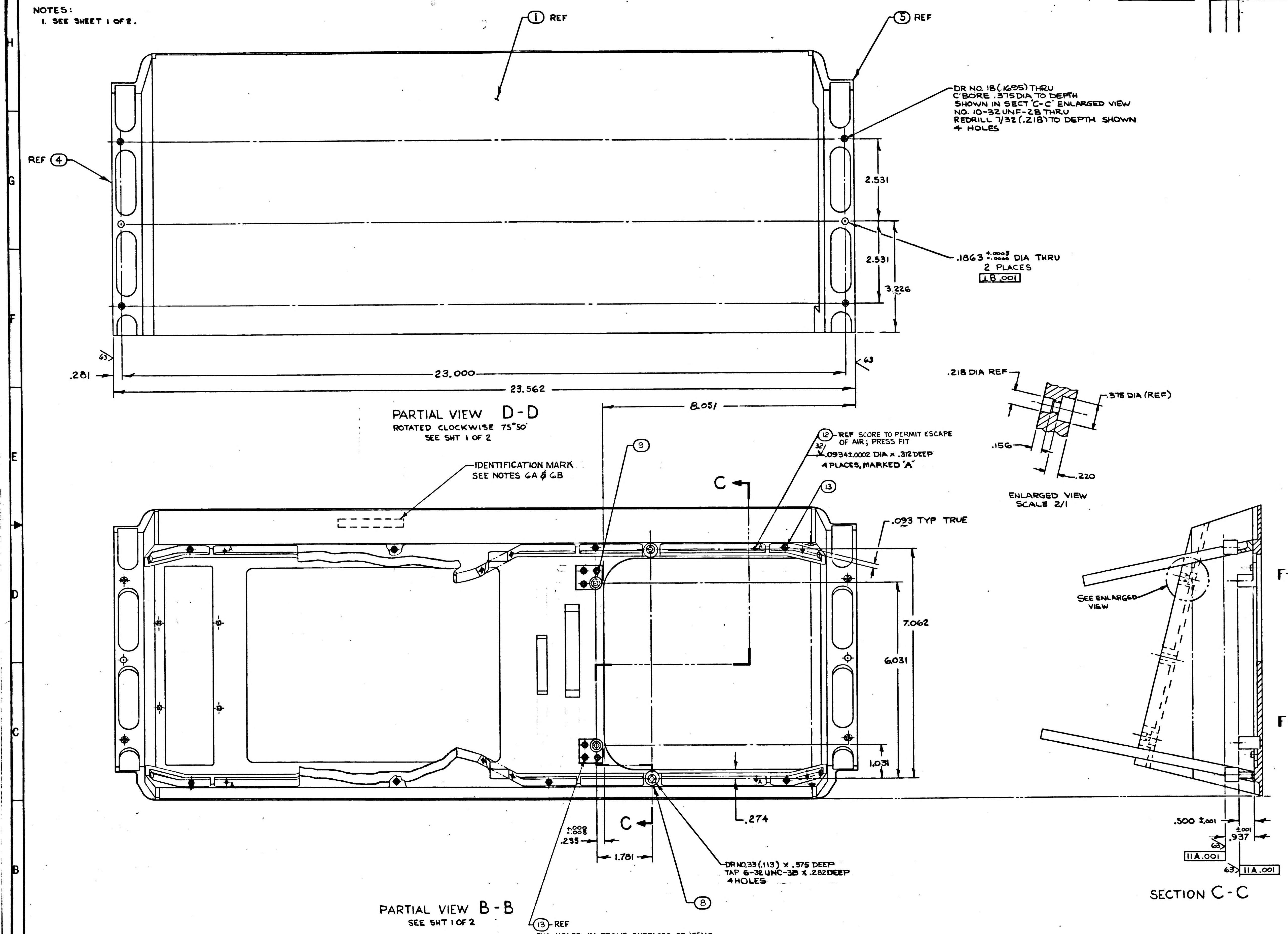
TITLE
HOUSING
MACHINING, ASSEMBLY

CODE IDENT NO.
SIZE E
NASA NUMBER 1011537
SCALE 1:1
WEIGHT CALC ACTUAL
SHEET 1 OF 2

MASTER

NOTES:
1. SEE SHEET 1 OF 2.

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL



1 REF
5 REF
REF 4
DR NO. 18 (.1695) THRU
C'BORE .375 DIA TO DEPTH
SHOWN IN SECT "C-C" ENLARGED VIEW
NO. 10-32 UNF-2B THRU
REDRILL 7/32 (.218) TO DEPTH SHOWN
4 HOLES
2.531
2.531
3.226
.1863 +.0005 -.0000 DIA THRU
2 PLACES
⊥B .001
63
.281
23.000
23.562
8.051
.218 DIA REF
.375 DIA (REF)
.156
.220
ENLARGED VIEW
SCALE 2/1
9
12 REF SCORE TO PERMIT ESCAPE OF AIR; PRESS FIT
32
.0934±.0002 DIA x .312 DEEP
4 PLACES, MARKED "A"
13
IDENTIFICATION MARK
SEE NOTES 6A & 6B
C
.093 TYP TRUE
7.062
6.031
1.031
A
SEE ENLARGED VIEW
F
F
.274
+.008 -.005
.235
1.781
C
DR NO. 33 (.113) x .375 DEEP
TAP 6-32 UNC-3B x .282 DEEP
4 HOLES
8
.500 ±.001
±.001
.937
63
11A .001
63
11A .001

PARTIAL VIEW D-D
ROTATED CLOCKWISE 75°50'
SEE SHT 1 OF 2

PARTIAL VIEW B-B
SEE SHT 1 OF 2

SECTION C-C

13 - REF
FILL HOLES IN FRONT SURFACES OF ITEMS 1, 4, & 5 WITH ITEM 10 PRIOR TO PAINTING. IF ITEM 13 PROTRUDES, FILE FLUSH BEFORE PAINTING.

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011559	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 0°30'

DO NOT SCALE THIS DRAWING
MATERIAL ~
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC P/N 8738700080
DRAWN Wysocki DATE 6/4/63
CHECKED MMW 9-26-63
APPROVAL M Wagner 9-26-63
APPROVAL
NASA APPROVAL 10-3-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING
MACHINING, ASSEMBLY

CODE IDENT NO.
SIZE E
NASA NUMBER 1011537
SCALE 1:1
WEIGHT CALC ACTUAL
SHEET 2 OF 2

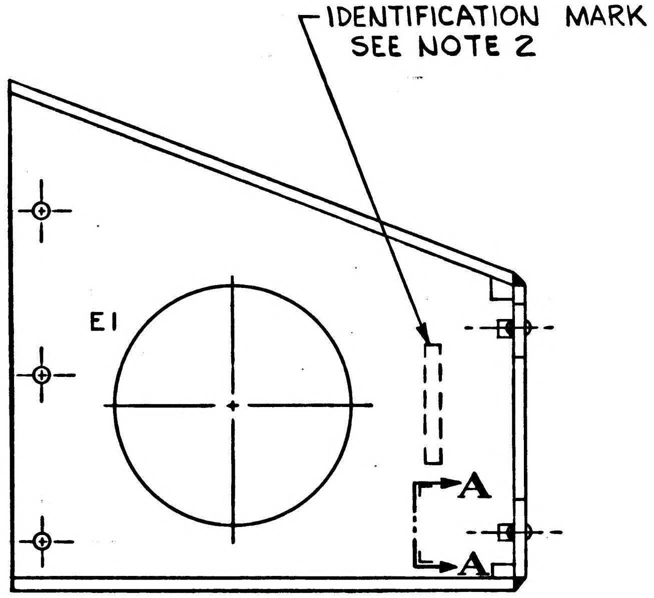
1011537

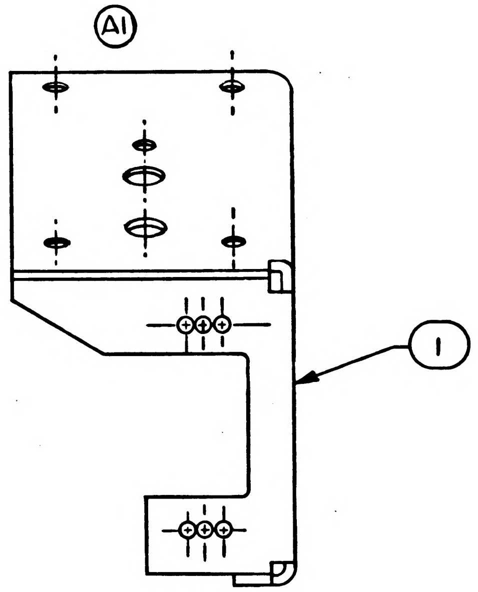
1011538 A

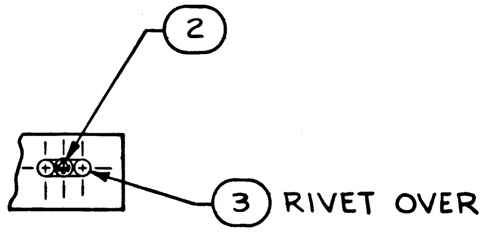
NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA DWG NO. REVISION LETTER AND MANUFACTURES SYMBOL PER ND1002019.

REVISIONS 03/46

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A1		REVISED PER TDRR NO. 03801	10 Oct 63	WK







PARTIAL VIEW A-A

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
3	4		MS20470DD2-4			RIVET, SOLID-UNIVERSAL HD			
2	2		NAS697C04M			NUT, PLATE,			
1	1		1011467	59387000050		BRACKET, CONNECTOR			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011559	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	± ~	± ~

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 38700 0200

DRAWN V. AMATO DATE 9-16-63
CHECKED MMW 9-16-63
APPROVAL M. Werner 9-16-63
APPROVAL E. Thomp 9-16-63
NASA APPROVAL
MIT APPROVAL 9/17/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BRACKET, CONNECTOR, ASSY OF

CODE IDENT NO.
SIZE C
NASA NUMBER 1011538
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

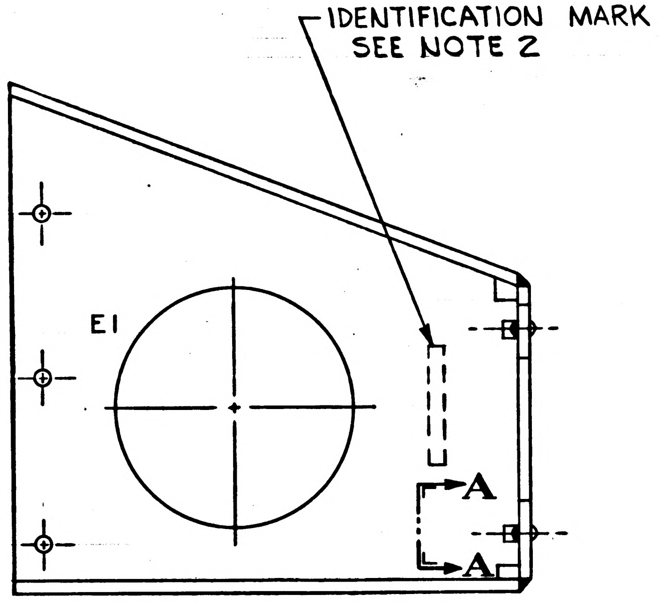
E-184

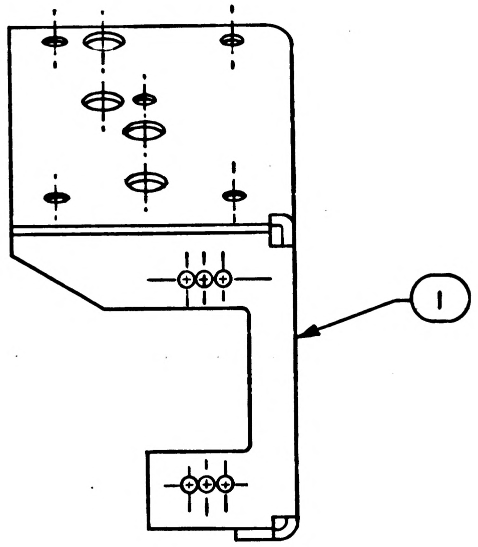
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

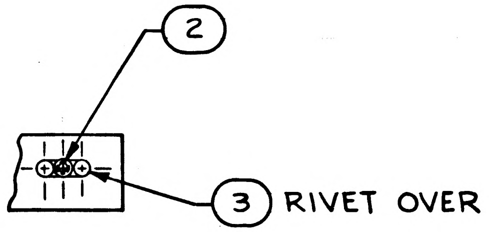
1011538

REVISIONS 03/46				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA DWG NO. REVISION LETTER AND MANUFACTURES SYMBOL PER ND1002019.







PARTIAL VIEW A-A

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
3	4		MS20470DD2-4			RIVET, SOLID-UNIVERSAL HD			
2	2		NAS697C04M			NUT, PLATE,			
1	1		1011467	59387000050		BRACKET, CONNECTOR			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011559	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 38700 0200

DRAWN V. AMATO DATE 9-16-63
CHECKED MMW 9-16-63
APPROVAL M. Werner 9-16-63
APPROVAL E. Dhoup 9-16-63
NASA APPROVAL
MIT APPROVAL L. Nabel 9/17/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BRACKET, CONNECTOR, ASSY OF

CODE IDENT NO.
SIZE C
NASA NUMBER 1011538
SCALE 1/1
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

MASTER

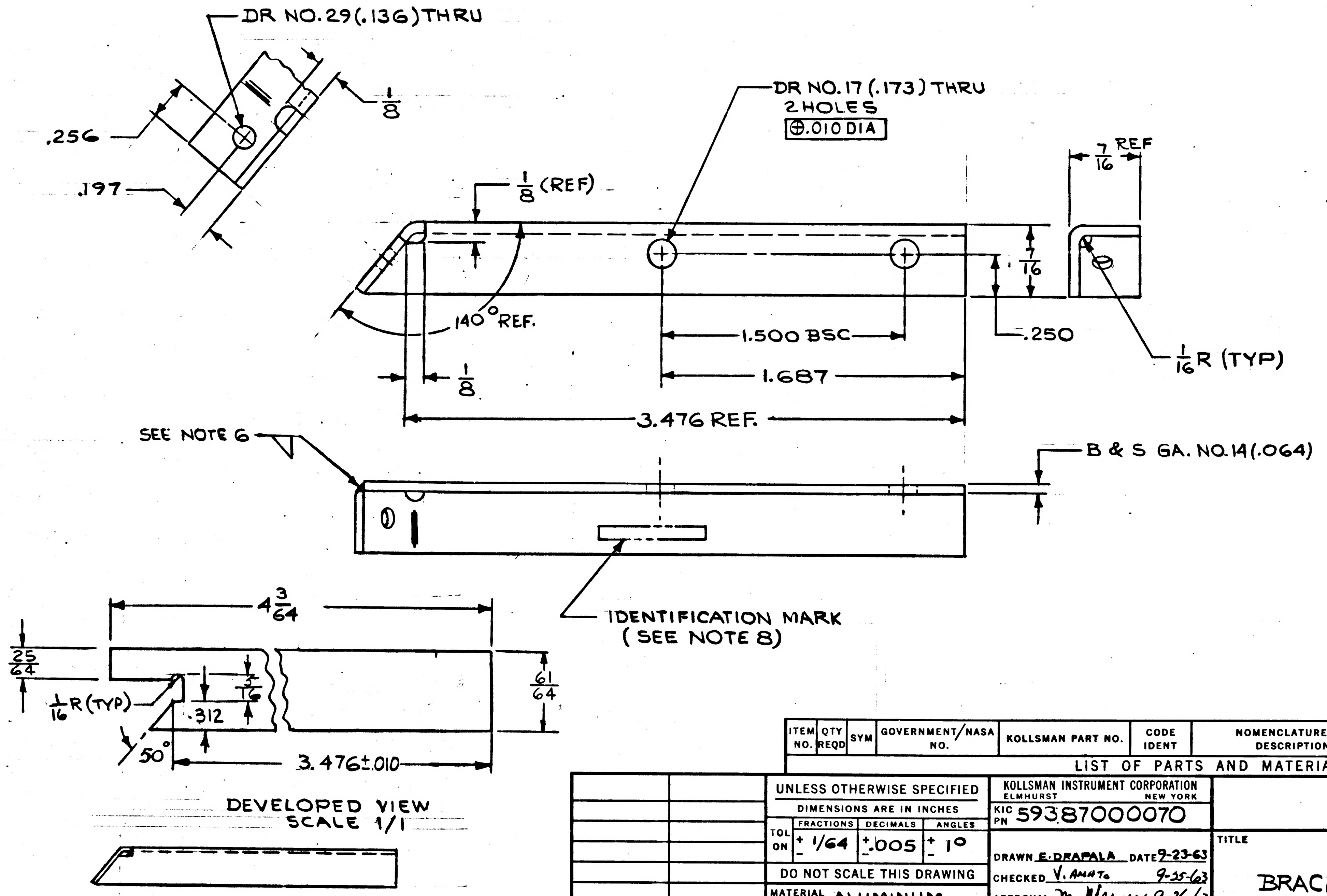
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

E-154

1011540

SYM	ZONE	REVISIONS 03576 DESCRIPTION	DATE	APPROVAL

OTES:
1. INTERPRET DWG. IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   63√ FINISH ALL OVER
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: ANODIZE BLACK PER MIL-A-8625 TYPE II (KPS 1005A.201).
6. WELD IN ACCORDANCE WITH MIL-W-8604 (KPS 1006W.200).
8. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019.


DR NO.29(.136) THRU
.256
.197
1/8
DR NO.17 (.173) THRU
2 HOLES
⊕.010 DIA
1/8 (REF)
7/16 REF
7/16
.250
140° REF.
1.500 BSC
1.687
1/8
3.476 REF.
1/16 R (TYP)
SEE NOTE 6
B & S GA. NO.14(.064)
IDENTIFICATION MARK
(SEE NOTE 8)
4 3/64
25/64
61/64
3/16
1/16 R (TYP)
.312
50°
3.476±.010
DEVELOPED VIEW
SCALE 1/1
ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011559	1011559

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM
ALLOY 5052 - H32
FED. SPEC QQ-A-318
TEMPER H32

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 59387000070

DRAWN E. DRAPALA DATE 9-23-63
CHECKED V. AMATO 9-25-63
APPROVAL M. Werner 9-26-63
APPROVAL E. Thomp 10-2-63
NASA APPROVAL W J [illegible] 10-3-63
MIT APPROVAL W Kupfer 3 Oct 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BRACKET, SUPPORT

CODE IDENT NO. SIZE C NASA NUMBER 1011540

SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

E-184

1011540

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1011541

REVISIONS TDRR 05006			
SYM	DESCRIPTION	DATE	APPROVAL

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN IN ND 1015404, CLASS 3.
   - C. PACKAGING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III.
2. INSPECTION AND ACCEPTANCE:
   - A. PACKAGES AND SHIPPING CONTAINER SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER, DASH NUMBER, MANUFACTURER'S IDENTIFICATION, DATE OF MANUFACTURE AND SHELF LIFE PER MIL-STD-129.
   - B. THE PRODUCT SHALL CONSIST OF THE FOLLOWING:
     BASE
     HARDENER
3. DESIGN REQUIREMENTS:
   - A. DESCRIPTION
     MATERIAL - IS A FLEXIBLE TWO-PART HIGH-STRENGTH EPOXY ADHESIVE. THIS PRODUCT IS MANUFACTURED IN CONFORMANCE WITH WEAPONS SPECIFICATION WS-3309 (ALLEGHENY BALLISTICS LABORATORY).
   - B. MATERIAL

	B (BASE)	A (HARDENER)
B.1 COLOR	OFF WHITE	MEDIUM GRAY
B.2 BASE	EPOXY RESIN	MODIFIED AMINE
B.3 WEIGHT-GALLON	10.9-11.3 LBS.	10.3-10.7 LBS.
B.4 CONSISTENCY	SOFT PASTE	SOFT PASTE

   - C. MIXING RATIOS

	WEIGHT	VOLUME
PARTS BASE (B)	100	100
PARTS HARDENER (A)	140	150

     NOTE: WHEN MIXED, THE COMPONENTS BLEND TO UNIFORM MEDIUM GRAY COLOR.
   - D. WORK LIFE
     THE WORK LIFE OF MIXED ADHESIVE IS APPROXIMATELY TWO (2) HOURS IN A MASS OF 100 GRAMS AT AN AMBIENT TEMPERATURE OF 75°F. THE WORK LIFE WILL BE LENGTHENED BY REDUCING THE TEMPERATURE OR AMOUNT OF ADHESIVE AND SHORTENED BY HIGHER TEMPERATURES OR LARGER AMOUNTS OF ADHESIVE.
   - E. CURE CYCLE:
     THE FOLLOWING CURE TIMES AND TEMPERATURES ARE RECOMMENDED TO OBTAIN MAXIMUM BOND STRENGTH:
     3-7 DAYS AT 75° ± 2°F
     2 HOURS AT 150° ± 3°F
     30-60 MIN AT 200° ± 5°F
   - F. BOND STRENGTH:
     FOR BONDS CURED IN ACCORDANCE WITH PARA. 3.E:

TEST TEMPERATURE	SHEAR STRENGTH (PSI)	PEEL STRENGTH (LBS-IN. OF WIDTH)
-67°F	2,000 (MIN)	3-4
75°F	3,000 (MIN)	20 (MIN)
180°F	500 (MIN)	3-4

   - G. MATERIAL SHALL BE SUPPLIED IN QUANTITIES AS SPECIFIED ON PURCHASE ORDER.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

K.I.C. NO. 74471435001

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

HEAT TREATMENT

FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN M.NEILL DATE 10-23-63
CHECKED 10-23-63
APPROVAL 10-29-63
APPROVAL E. Morg 12-9-63
NASA APPROVAL 12/10/63
MIT APPROVAL 12/10/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ADHESIVE, EPOXY
SOURCE CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011541
SCALE
WT
SHEET 1 OF 1

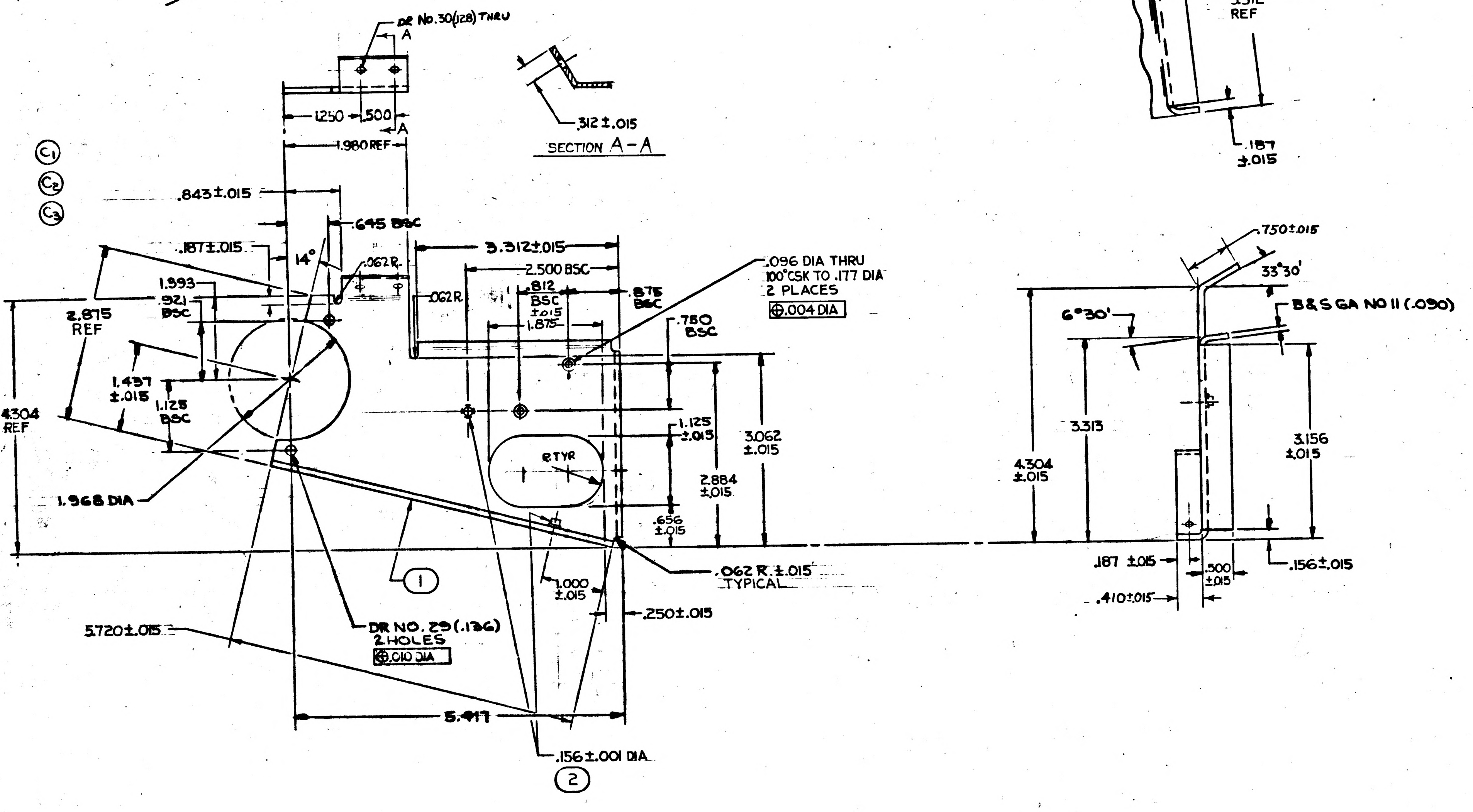
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. 125/√ FINISH ~~ON~~ ALL MACHINED SURFACES
4. REMOVE ~~BURRS~~ IN ACCORDANCE WITH ND 1002079
5. FINISH: ANODIZE IN ACCORDANCE WITH MIL-A-8625, TYPE I, DYED BLACK. (KPS-1005A.200)
6. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019

A	1011547

REVISIONS TCRR 09640

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO. 11233	4 AUG 64	WK



DR No.30(.128) THRU
A
1.250
.500
1.980 REF
SECTION A-A
.312±.015
C1
C2
C3
.843±.015
.645 BSC
.187±.015
14°
.062R
3.312±.015
2.500 BSC
.812 BSC ±.015
1.875
.875 BSC
.062R
.096 DIA THRU 100°CSK TO .177 DIA 2 PLACES
⊕.004 DIA
.750 BSC
1.993
.921 BSC
2.875 REF
1.437 ±.015
1.125 BSC
4.304 REF
1.125 ±.015
3.062 ±.015
2.884 ±.015
.656 ±.015
.8 TYR
1.968 DIA
1
.062 R ±.015 TYPICAL
1.000 ±.015
.250±.015
5.720±.015
DR NO. 29 (.136) 2 HOLES
⊕.010 DIA
5.417
.156±.001 DIA
2
.500±.015
3.312 REF
.187 ±.015
.750±.015
33°30'
B&S GA NO 11 (.090)
6°30'
3.313
4.304 ±.015
3.156 ±.015
.187 ±.015
.500 ±.015
.156±.015
.410±.015

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	2		1000076-3			NUT, CLINCH FLUSH MOUNTED			
1	1		1011547-1	59387000090		BRACKET			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011549	1012136

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± -	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
ALUMINUM ALLOY
5052-H32
FED SPEC QQ-A-318
TEMPER H32

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 59387000090

DRAWN R. BRUNELLE DATE 3-16-64
CHECKED E.R. SHELTON 3-27-64
APPROVAL H. S. Campbell 3-30-64
APPROVAL 4/2/64
NASA APPROVAL
MIT APPROVAL 5/27/64

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BRACKET & NUT ASSEMBLY

CODE IDENT NO.	SIZE	NASA NUMBER
	D	1011547

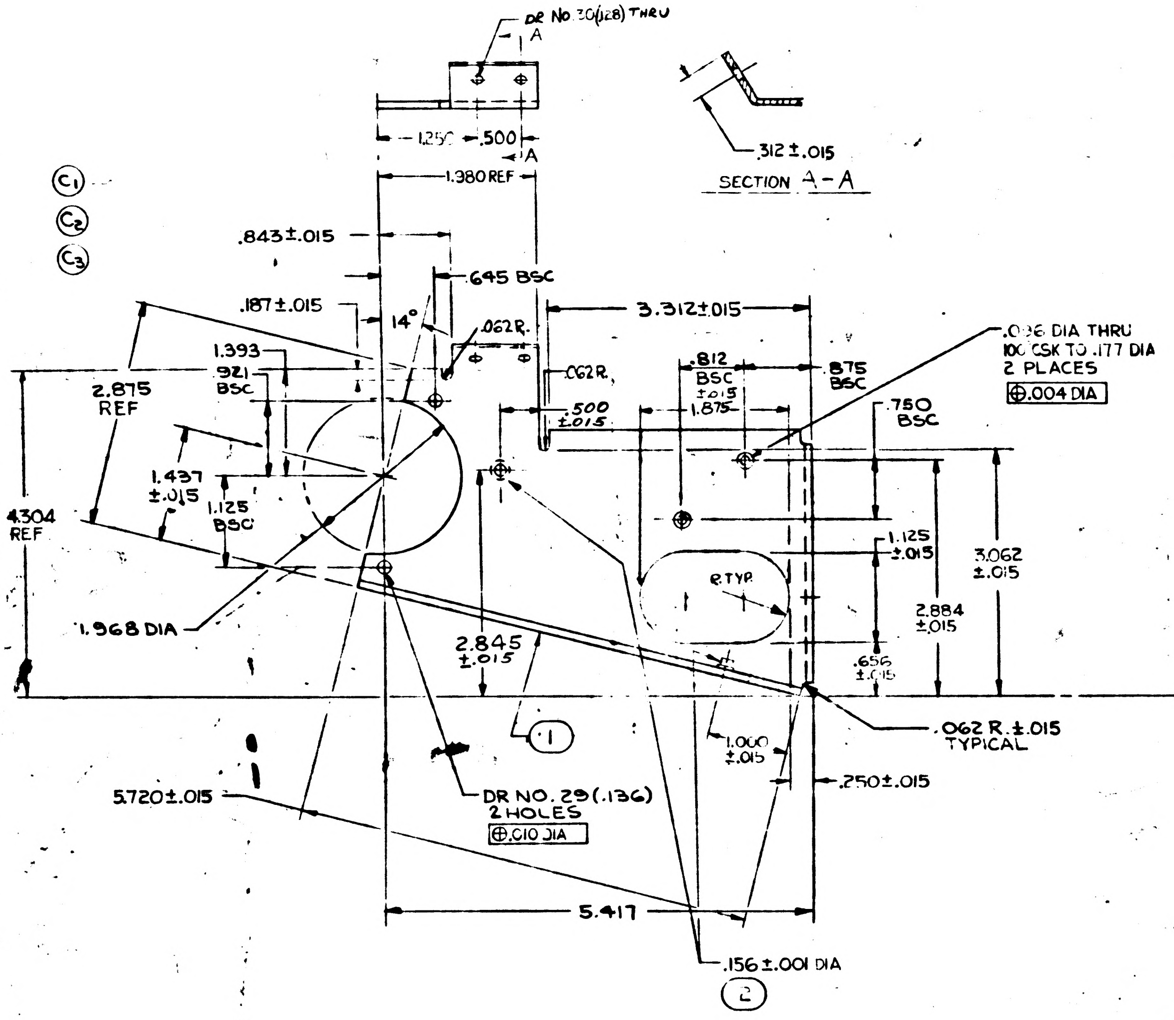
SCALE 1/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

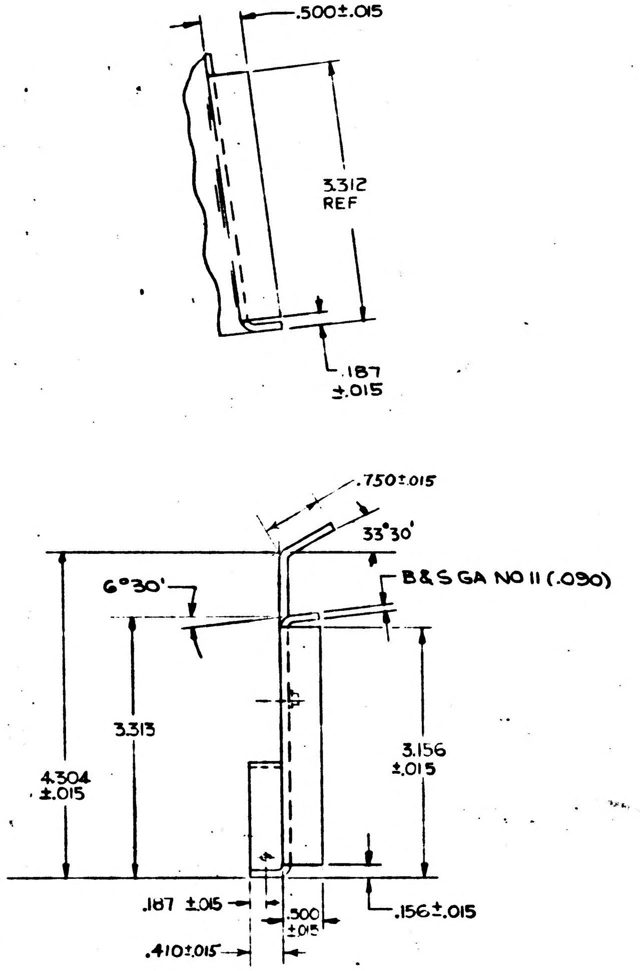
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

B 1011547

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. 125/√ FINISH ON ALL MACHINED SURFACES
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. FINISH: ANODIZE IN ACCORDANCE WITH MIL-A-8625, TYPE I, DYED BLACK. (KPS-1005A.200)
6. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO. 11233	4 AUG 64	WK
B		REVISED PER TDRR 15201	12 JUL 67	JK / JAC


DR No 30(.128) THRU
A
1.250
.500
A
1.380 REF
SECTION A-A
.312 ±.015
C1
C2
C3
.843±.015
.645 BSC
.187±.015
14°
.062R.
3.312±.015
1.393
.921 BSC
2.875 REF
.062R.
.812 BSC ±.015
.875 BSC
.036 DIA THRU
100° CSK TO .177 DIA
2 PLACES
⊕.004 DIA
.500 ±.015
1.875
.750 BSC
1.437 ±.015
1.125 BSC
4.304 REF
1.125 ±.015
3.062 ±.015
R TYP
2.884 ±.015
1.968 DIA
2.845 ±.015
.656 ±.015
.062 R. ±.015 TYPICAL
1
1.000 ±.015
.250±.015
5.720±.015
DR NO. 29 (.136)
2 HOLES
⊕.010 DIA
5.417
.156±.001 DIA
2


.500±.015
3.312 REF
.187 ±.015
.750±.015
33°30'
6°30'
B&S GA NO 11 (.090)
4.304 ±.015
3.313
3.156 ±.015
.187 ±.015
.500 ±.015
.410±.015
.156±.015

2	2		1000076-3			NUT, CLINCH FLUSH MOUNTED			
1	1		1011547-1	59387000090		BRACKET			
ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011548	1012136

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — ; DECIMALS ± .005 ; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL
ALUMINUM ALLOY
5052-H32
FED SPEC QQ-A-318
TEMPER H32
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 59387000090
DRAWN R. BRUNELLE DATE 3-16-64
CHECKED E.R. SHELTON 3-27-64
APPROVAL
APPROVAL 4/7/64
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BRACKET & NUT ASSEMBLY

CODE IDENT NO.
SIZE D
NASA NUMBER 1011547
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET OF

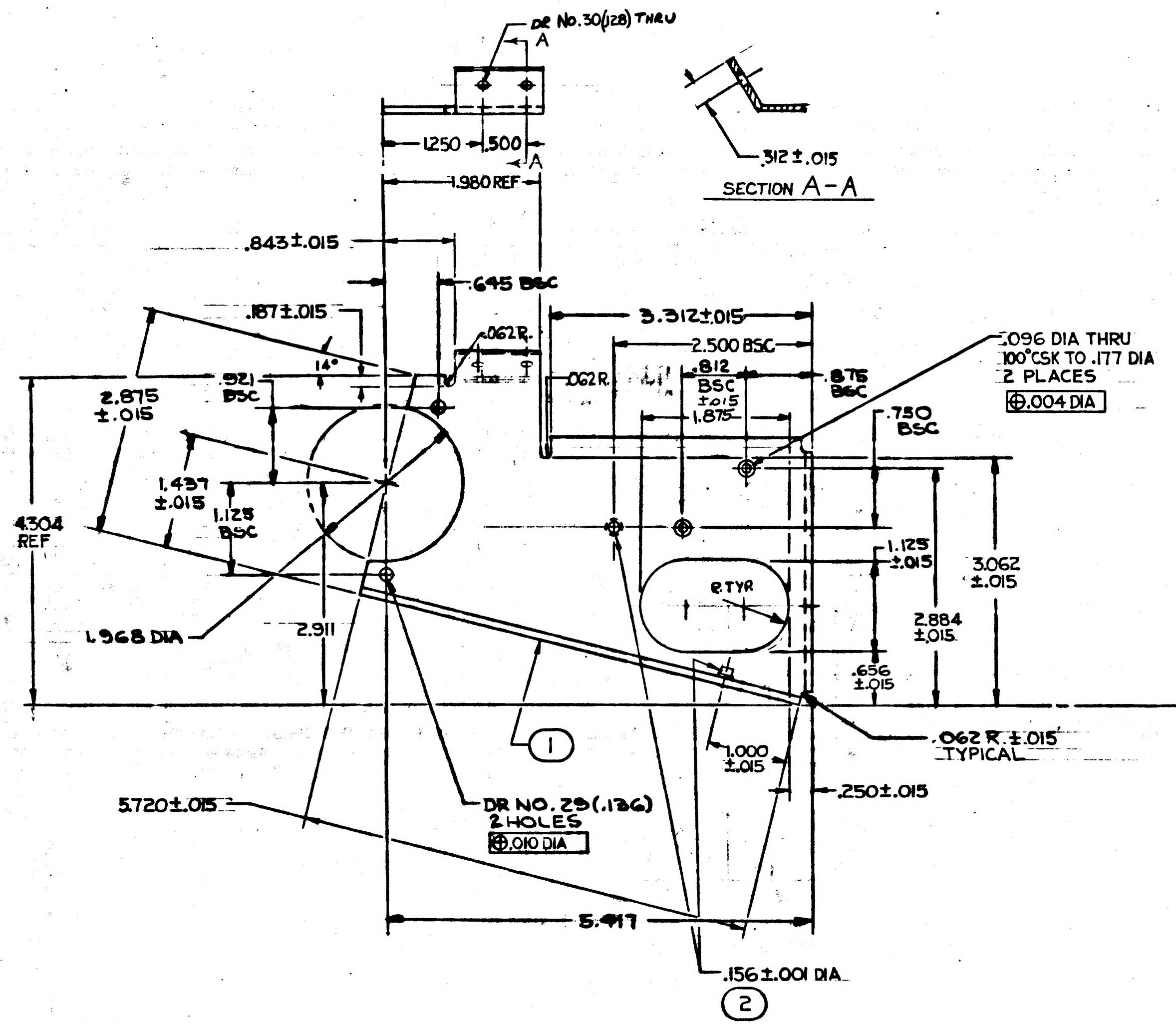
MPV

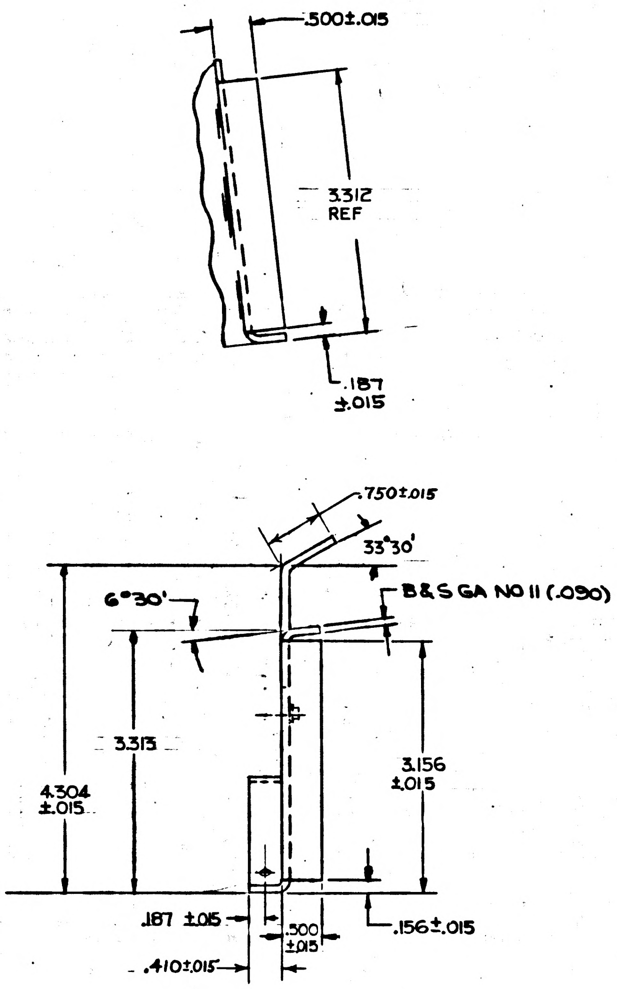
1011547 B

1011547

SYM	ZONE	REVISIONS TORR 096 DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. 125/ √ FINISH ON ALL MACHINED SURFACES
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. FINISH: ANODIZE IN ACCORDANCE WITH MIL-A-8625, TYPE I, DYED BLACK. (KPS-1005A.200)
6. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019


DR No. 30 (.128) THRU
A
1.250
.500
A
1.980 REF
.312 ± .015
SECTION A-A
.843 ± .015
.645 BSC
.187 ± .015
.062 R.
14°
.921 BSC
2.875 ± .015
1.437 ± .015
1.125 BSC
4.304 REF
1.968 DIA
2.911
3.312 ± .015
2.500 BSC
.062 R.
.812 BSC ±.015
1.875
.875 BSC
.096 DIA THRU
100° CSK TO .177 DIA
2 PLACES
⊕ .004 DIA
.750 BSC
R TYP
1.125 ± .015
3.062 ± .015
2.884 ± .015
.656 ± .015
1
.062 R. ± .015 TYPICAL
1.000 ± .015
.250 ± .015
5.720 ± .015
DR NO. 29 (.136)
2 HOLES
⊕ .010 DIA
5.417
.156 ± .001 DIA
2


.500 ± .015
3.312 REF
.187 ± .015
.750 ± .015
33°30'
6°30'
B&S GA NO 11 (.090)
3.313
4.304 ± .015
3.156 ± .015
.187 ± .015
.500 ± .015
.156 ± .015
.410 ± .015

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	2		1000076-3			NUT, CLINCH FLUSH MOUNTED			
1	1		1011547-1	59387000090		BRACKET			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011549	1012136

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± -	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
ALUMINUM ALLOY
5052-H32
FED SPEC QQ-A-318
TEMPER H32

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 59387000090

DRAWN R. BRUNELLE DATE 3-16-64
CHECKED E.R. SHELTON 3-27-64
APPROVAL H. E. Campbell 3-30-64
APPROVAL 4/2/64
NASA APPROVAL
MIT APPROVAL 5/27/64

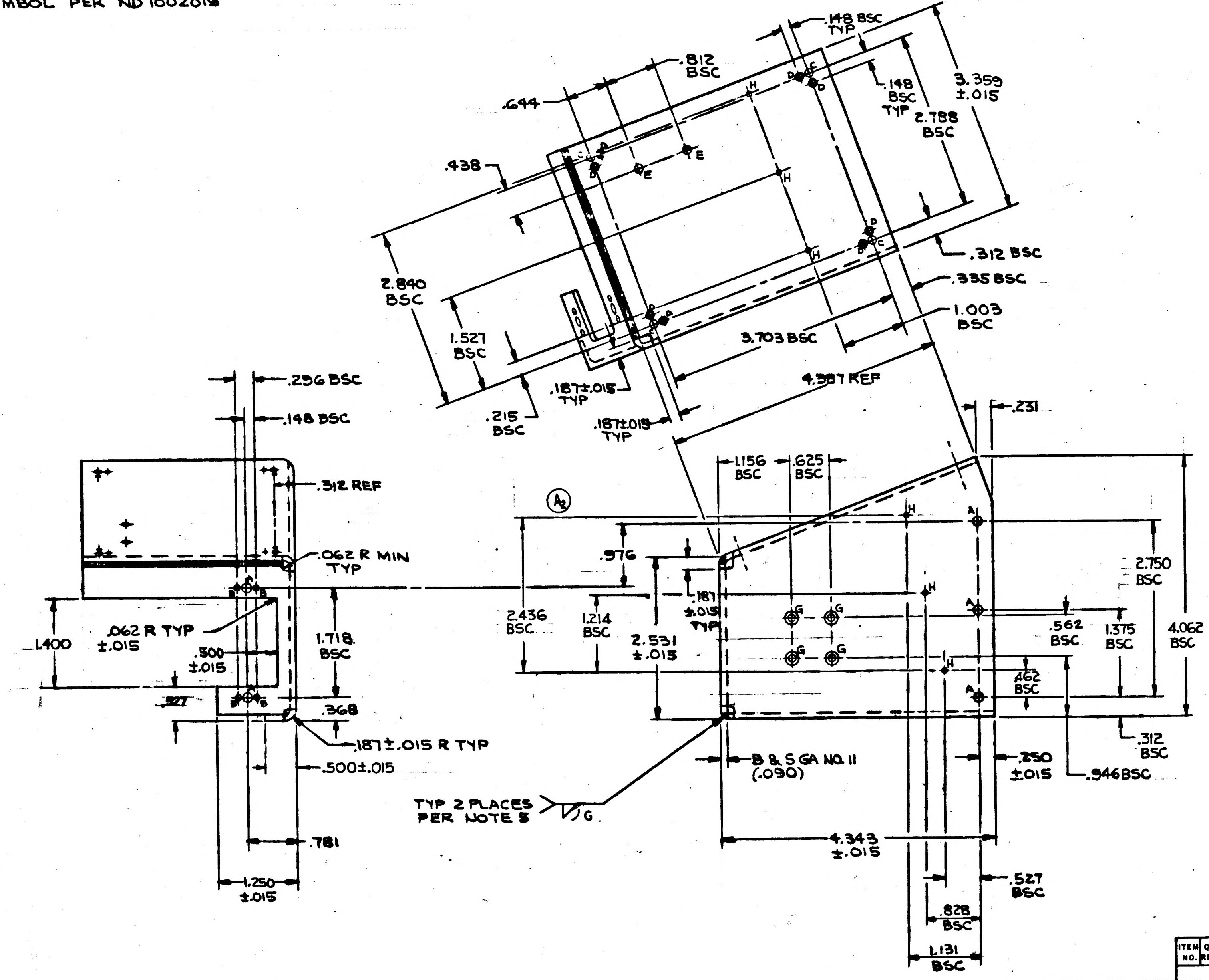
MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BRACKET & NUT ASSEMBLY

CODE IDENT NO.	SIZE	NASA NUMBER
	D	1011547

SCALE 1/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
4. $\sqrt{}^{125}$ FINISH ON ALL MACHINED SURFACES
5. WELD IN ACCORDANCE WITH MIL-W-8604 (KPS-1006W.200)
6. FINISH ANODIZE IN ACCORDANCE WITH MIL-A-8625, TYPE I, DYED BLACK. (KPS-1005A.200)
7. IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019


.148 BSC TYP
.812 BSC
.644
.148 BSC TYP
3.359 ±.015
2.788 BSC
.438
2.840 BSC
1.527 BSC
.312 BSC
.335 BSC
1.003 BSC
3.703 BSC
4.387 REF
.187±.015 TYP
.215 BSC
.187±.015 TYP
.231
.256 BSC
.148 BSC
.312 REF
.062 R MIN TYP
1.400
.062 R TYP ±.015
.500 ±.015
1.718 BSC
.327
.368
.187±.015 R TYP
.500±.015
.781
1.250 ±.015
A2
1.156 BSC
.625 BSC
.976
2.436 BSC
1.214 BSC
2.531 ±.015
.187 ±.015 TYP
2.750 BSC
.562 BSC
1.375 BSC
4.062 BSC
.462 BSC
.312 BSC
.946 BSC
B & S GA NO. 11 (.090)
.250 ±.015
TYP 2 PLACES PER NOTE 5
G
4.343 ±.015
.527 BSC
.828 BSC
1.131 BSC
A
B
C
D
E
G
H

A1

HOLE CHART			
HOLE	DESCRIPTION	QUANTITY	
A	DR NO. 29 (.136) THRU	5	⊕ .010 DIA
B	DR NO. 51 (.067) THRU	4	⊕ .004 DIA
C	DR $\frac{9}{64}$ (.1406) THRU	4	⊕ .010 DIA
D	DR NO. 50 (.070) THRU CSK 100° INCLUDED ANGLE TO .113 DIA	8	⊕ .010 DIA
E	DR NO. 41 (.096) THRU	2	⊕ .010 DIA
G	DR NO. 29 (.136) THRU CSK 100° INCLUDED ANGLE TO .234 DIA	4	⊕ .010 DIA
H	DR NO. 55 (.052) THRU (PILOT HOLE)	6	⊕ .010 DIA

A 1011548

REVISIONS TDRR 09640

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A2		REVISED PER TDRR NO. 12122	1 SEPT 64	

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011549	1012136

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± —

DO NOT SCALE THIS DRAWING

MATERIAL
ALUMINUM ALLOY
5052-H32
FED SPEC QQ-A-318
TEMPER H32

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 59387000100

DRAWN R BRUNELLE DATE 3-4-64
CHECKED E R SHELTON 3-27-64
APPROVAL F. B. Canfield 3-30-64
APPROVAL J. J. [illegible] 4/2/64
NASA APPROVAL
MIT APPROVAL [illegible] 5/6/64

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BRACKET, CONNECTOR

CODE IDENT NO. | SIZE D | NASA NUMBER 1011548

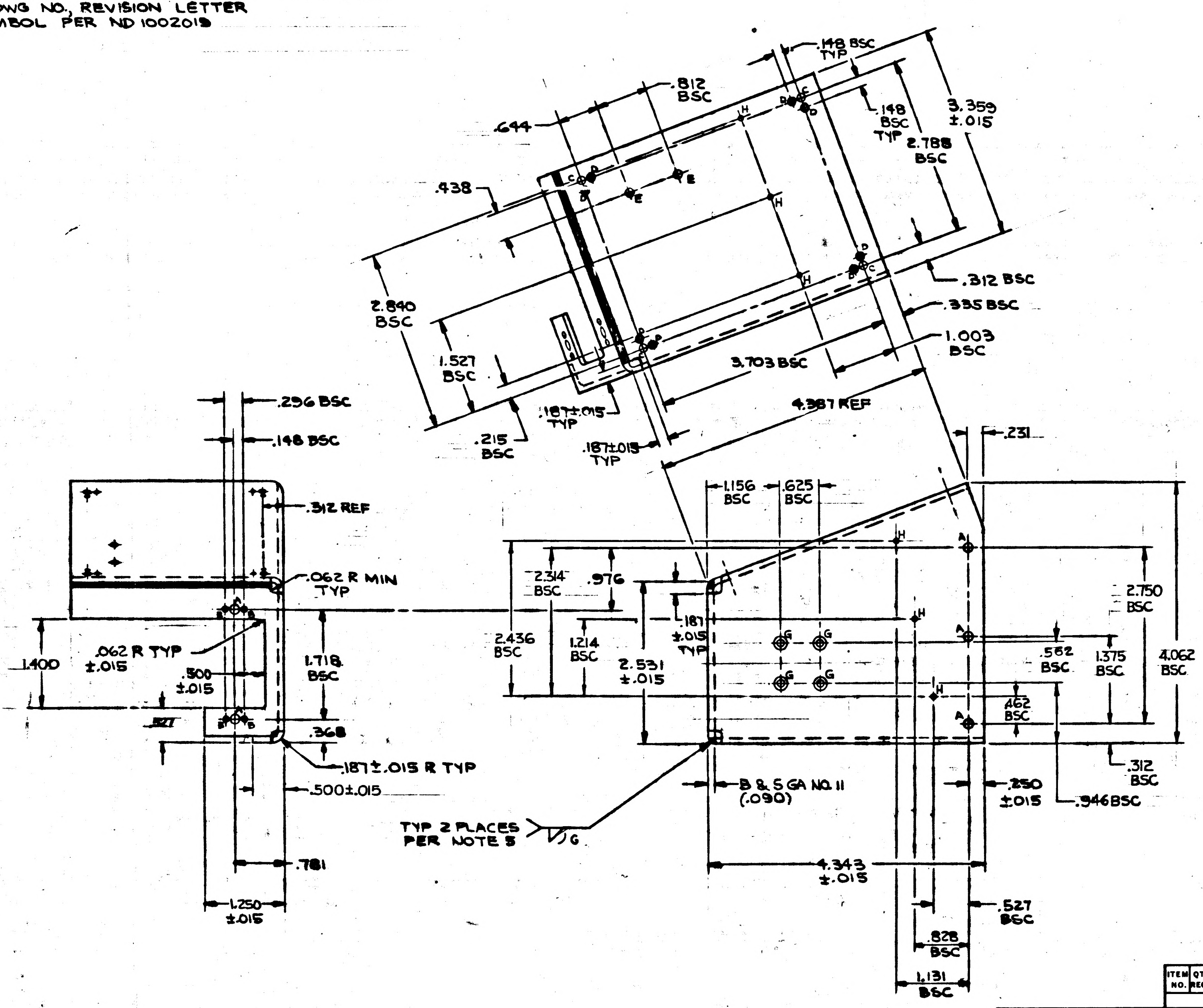
SCALE 1/1 | WEIGHT | CALC ACTUAL | SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011548

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
4. $\sqrt{}^{125}$ FINISH ON ALL MACHINED SURFACES
5. WELD IN ACCORDANCE WITH MIL-W-8604 (KPS-1006W.200)
6. FINISH: ANODIZE IN ACCORDANCE WITH MIL-A-8625, TYPE I, DYED BLACK. (KPS-1005A.200)
7. IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019



.148 BSC TYP
.812 BSC
.644
.148 BSC TYP
3.359 ±.015
2.788 BSC
.438
2.840 BSC
1.527 BSC
.312 BSC
.335 BSC
1.003 BSC
3.703 BSC
4.387 REF
.187±.015 TYP
.215 BSC
.187±.015 TYP
.231
.296 BSC
.148 BSC
.312 REF
.062 R MIN TYP
1.400
.062 R TYP ±.015
.500 ±.015
1.718 BSC
.527
.368
.187±.015 R TYP
.500±.015
.781
1.250 ±.015
1.156 BSC
.625 BSC
2.314 BSC
.976
2.436 BSC
1.214 BSC
.187 ±.015 TYP
2.531 ±.015
2.750 BSC
.562 BSC
1.375 BSC
4.062 BSC
.462 BSC
.312 BSC
B & S GA NO. 11 (.090)
.250 ±.015
.946 BSC
TYP 2 PLACES PER NOTE 5
G
4.343 ±.015
.527 BSC
.828 BSC
1.131 BSC
A
B
C
D
E
G
H

HOLE CHART			
HOLE	DESCRIPTION	QUANTITY	
A	DR NO. 29 (.136) THRU	5	⊕ .010 DIA
B	DR NO. 51 (.067) THRU	4	⊕ .004 DIA
C	DR $\frac{9}{64}$ (.1406) THRU	4	⊕ .010 DIA
D	DR NO. 50 (.070) THRU CSK 100° INCLUDED ANGLE TO .113 DIA	8	⊕ .010 DIA
E	DR NO. 41 (.096) THRU	2	⊕ .010 DIA
F	DR NO. 21 (.159) THRU	1	
G	DR NO. 29 (.136) THRU CSK 100° INCLUDED ANGLE TO .234 DIA	4	⊕ .010 DIA
H	DR NO. 55 (.052) THRU (PILOT HOLE)	6	⊕ .010 DIA

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011549	1012136

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
ALUMINUM ALLOY 5052-H32
FED SPEC QQ-A-318
TEMPER H32
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 59387000100
DRAWN R BRUNELLE DATE 3-4-64
CHECKED E R SHELTON 3-27-64
APPROVAL J.P. Co 3-30-64
APPROVAL J J Kane 4/2/64
NASA APPROVAL
MIT APPROVAL 0 Hafl 5/27/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BRACKET, CONNECTOR

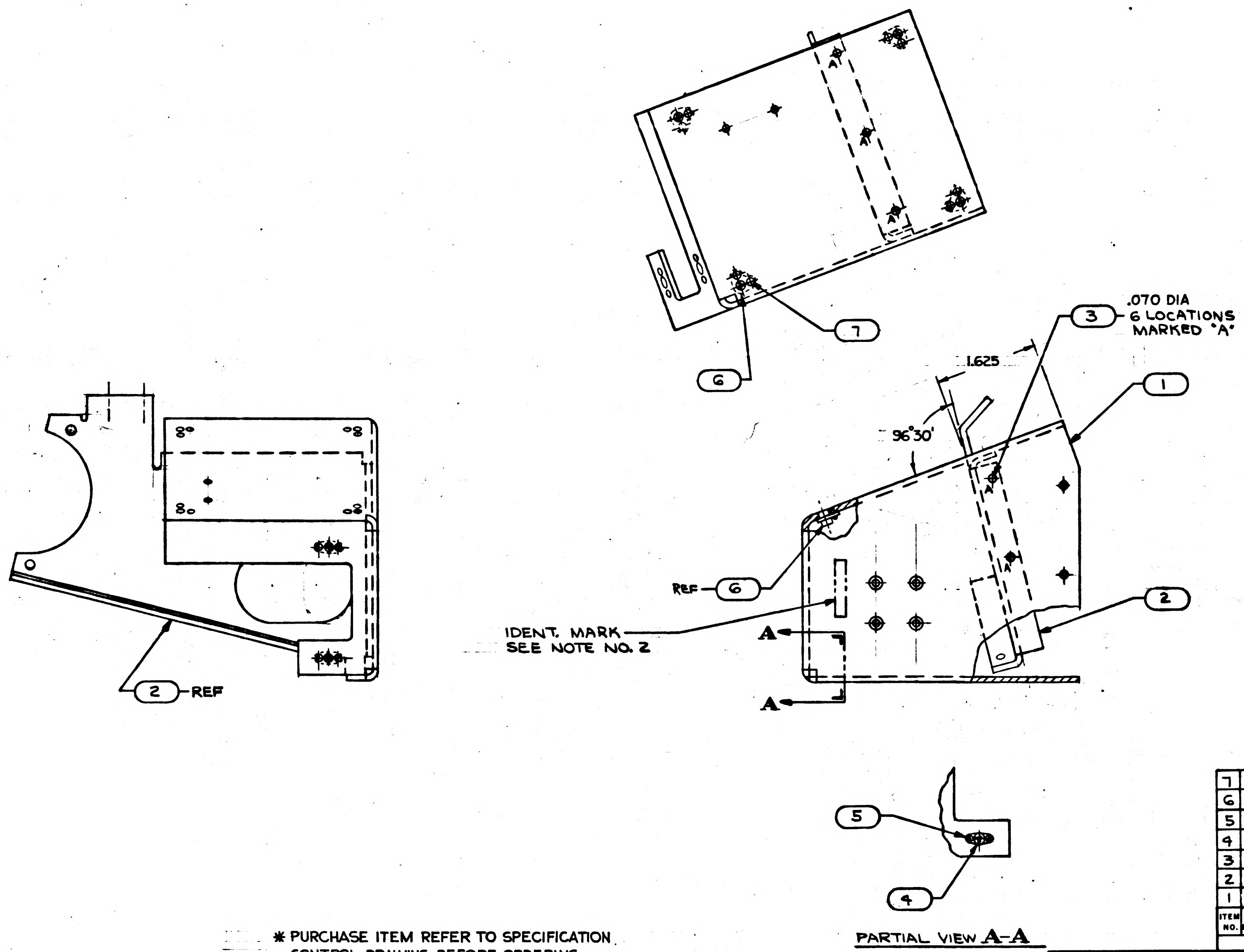
CODE IDENT NO.
SIZE D
NASA NUMBER 1011548
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011549

REVISIONS TDRR 0964

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019



✱ PURCHASE ITEM REFER TO SPECIFICATION CONTROL DRAWING BEFORE ORDERING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
7	8	✱	AN124953	74036000003		RIVET, FLAT HD 100° C'SINK			
6	4	✱	NAS698C04M			NUT, PLATE, CORNER, SELF-LOCKING (500°F)			
5	4	✱	MS20470DD2-4			RIVET, SOLID-UNIVERSAL HD			
4	2	✱	NAS697C04M			NUT, PLATE, TWO LUG, SELF-LOCKING (500°F)			
3	6	✱	AN124954	74036000004		RIVET, FLAT HD 100° C'SINK			
2	1		1011547	59387000090		BRACKET & NUT ASSEMBLY			
1	1		1011548	59387000100		BRACKET, CONNECTOR			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1012136	1012136

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85387000210
DRAWN R. BRUNELLE DATE 3-16-64
CHECKED E.R. SHELTON 3-27-64
APPROVAL M. S. Campbell 3-30-64
APPROVAL J. J. Kain 4/7/64
NASA APPROVAL
MIT APPROVAL 5/27/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BRACKET ASSEMBLY

CODE IDENT NO. | SIZE D | NASA NUMBER 1011549
SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

INCHES 0 1 2

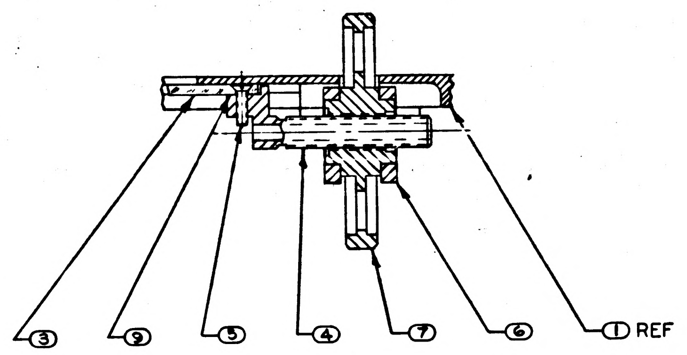
A		1011559

REVISIONS

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO. 05016	12/10/63	

NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA PART NO, REVISION LETTER & MANUFACTURERS SYMBOL PER ND1002019.
3. MARK CHARACTERS IN APPROX LOCATION SHOWN IN ACCORDANCE WITH ND1002019.
4. ALL SCREWS WHICH ARE NOT SECURED BY LOCKING DEVICES SHALL BE SECURED PER MIL-S-40083 (ORD) CLASS 20 PER ND1002211.
5. ASSEMBLE AND TEST IN ACCORDANCE WITH ATP 1011559.



PARTIAL SECTION A-A
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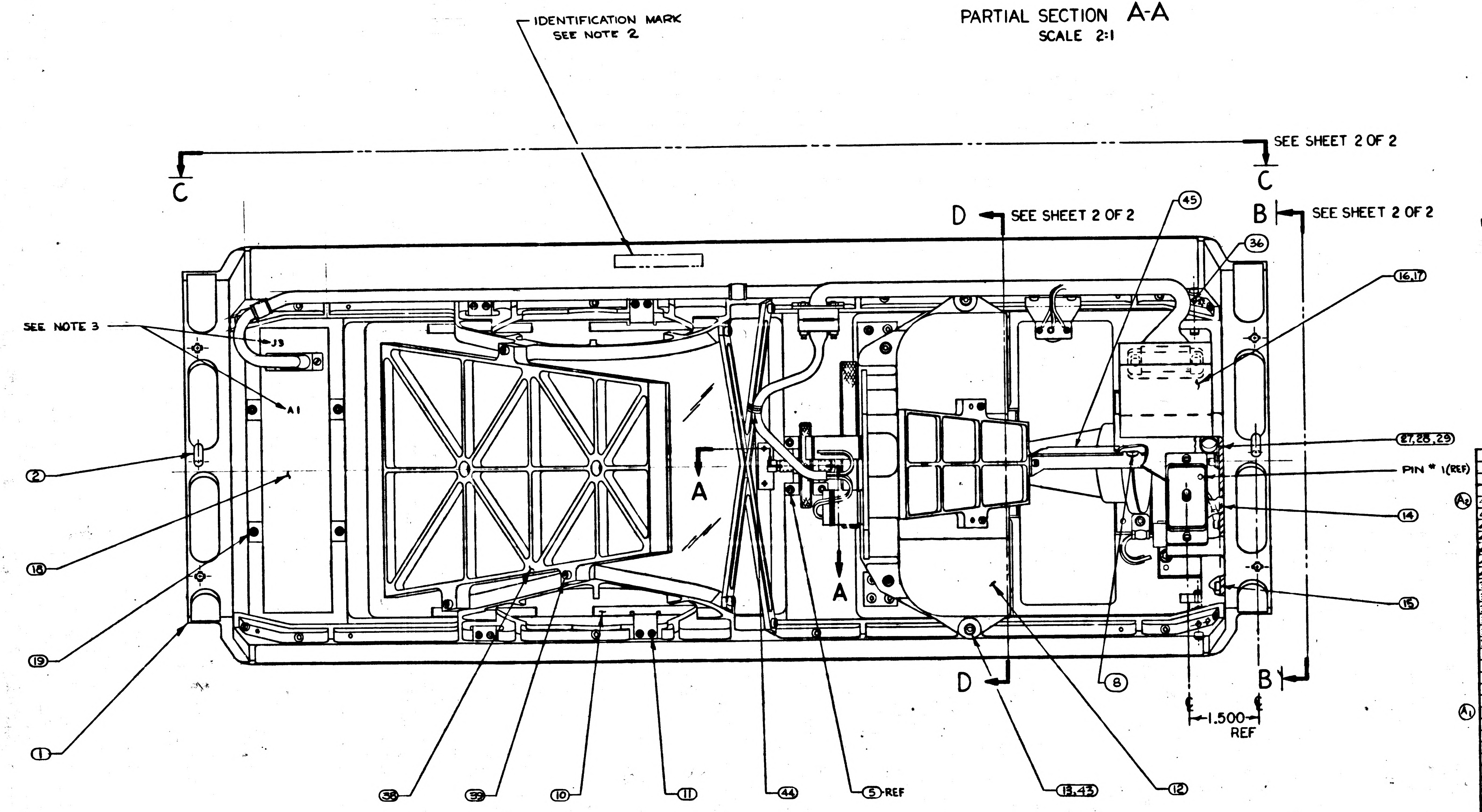

REFERENCE:
1. DIAGRAM, WIRING 1011526 (80387000060)
2. SYSTEM SCHEMATIC DIAGRAM 1011405 (80387000010)

	A	A
A3	SHEET 1	SHEET 2
	REVISION STATUS OF SHEETS	

* PURCHASE ITEM: SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION
A2	46	3		NAS1352C044			SCREW, CAP, SOCKET HEAD		
	45	1		1011540	59387000070		BRACKET, SUPPORT		
	44	A/R	*	1011753	60035142001		TAPE, LACING AND TYING		
	43	A/R		1011525	49387000020		SPACER, SHIM		
	42	1	*	1011413	68257006201		LAMP, PROJECTION		
	41	4		1014503			SCREW, CAPTIVE		
	40	1		1011420	87387000020		CARTRIDGE, ASSY OF		
	39	3		NAS1352C04LL8	74455157015		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING		
	38	1		1011360	58387000030		MIRROR, LARGE		
	37	2	*	1011466	74441122001		COLLAR, SHAFT		
	36	2		MS51029-9			SETSCREW, HEXAGON, SOC HD, FLAT POINT		
	35	2		MS16555-645			PIN, DOWEL		
	34	1		1011473	87387000070		ACCESS DOOR ASSY OF		
	33								
	32	2		1011539	51387000190		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING (MOD.)		
	31								
	30								
	29	3		NAS1352C04LL6	74455157014		SCREW, CAP, HEXAGON, SOC HD SELF-LOCKING		
A1	28	3	*	1011918-1			WASHER, CABLE CLAMP		
	27	1	*	1000220-6			CLAMP, CABLE		
	26	2	*	1000220-5			CLAMP, CABLE		
	25								
	24	1		1011487	80387000050		WIRING HARNESS - BRANCHED		
	23	1		1011489	59387000060		BRACKET, CONNECTOR		
	22	4	*	1011750	74443128008		NUT, SELF-LOCKING, HEXAGON		
	21	4		NAS1352C04-6			SCREW, CAP, HEXAGON, SOC HD		
	20	1		1011469	59387000040		BRACKET, SWITCH		
	19	4		1011625-26	74455151026		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING		
	18	1	*	1011375	75005005601		INDICATOR, INTEGRATED READOUT		
	17	3		NAS1352C06-4			SCREW, CAP, HEXAGON, SOC HD		
	16	1		1011483	87387000080		AMPLIFIER AND SWITCH ASSY OF		
	15	2		NAS1352C04LL4	74455157013		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING		
	14	1		1011538	85387000200		BRACKET, CONNECTOR, ASSY OF		
	13	4		NAS1352C06LL6	74455157019		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING		
	12	1		1011468	87387000060		GEAR BOX AND MIRROR ASSY OF		
	11	8		1011625-8	74455151008		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING		
	10	4		1011380	58387000010		SPRING, RETAINER		
	9	A/R		1011519	49387000010		SHIM, VIEWSCREEN		
	8	2		NAS1352C06-6			SCREW, CAP, HEXAGON, SOC HD		
	7	1		1011459	85387000080		KNOB AND INSERT-ASSY OF		
	6	2		1011383	52387000010		BLOCK, BEARING		
	5	6		NAS1189C02T-4L			SCREW, SELF LOCKING, 100° FLAT HD		
	4	1		1011388	52387000020		SCREW, SCREEN ADJUST		
	3	1		1011377	46387000010		SCREEN, VIEW		
	2	2		1011446	39387000010		PIN, ALIGNMENT		
	1	1		1011537	87387000080		HOUSING, MACHINING ASSEMBLY		

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
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DO NOT SCALE THIS DRAWING
MATERIAL ~
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 88387000000

DRAWN DATE 7/23/63
CHECKED
APPROVAL 9-30-63
APPROVAL 10-2-63
NASA APPROVAL 10-3-63
MIT APPROVAL 3 Oct 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
MAP & DATA VIEWER
ASSEMBLY OF

CODE IDENT NO.
SIZE E
NASA NUMBER 1011559
SCALE 1:1
WEIGHT CALC ACTUAL
SHEET OF 2

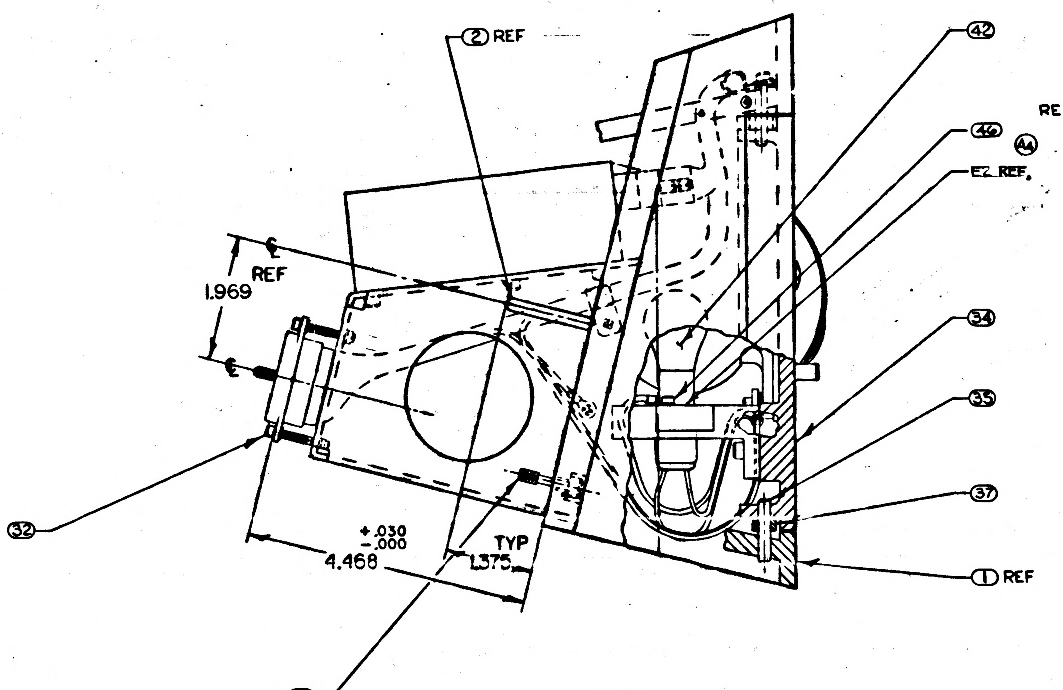
MASTER

1011559 A

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO. 05016	12/1/63	

REVISIONS 03576

NOTES
SEE SHEET 1 OF 2



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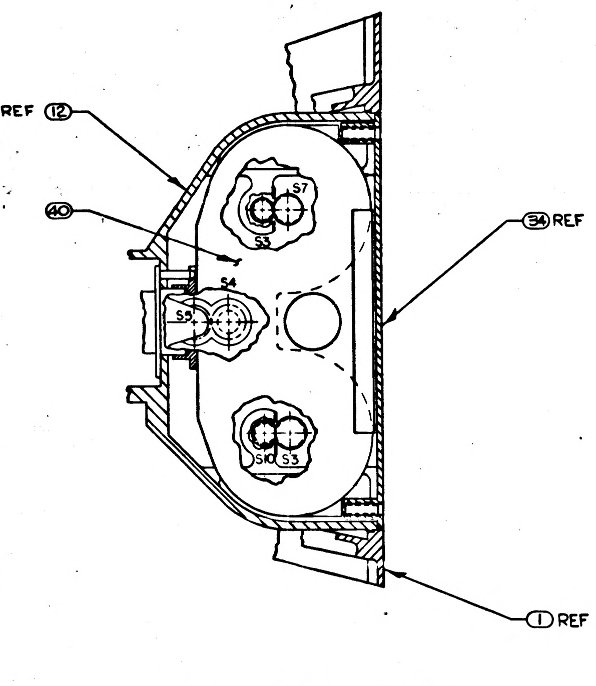
PARTIAL VIEW B-B
SEE SHEET 1 OF 2



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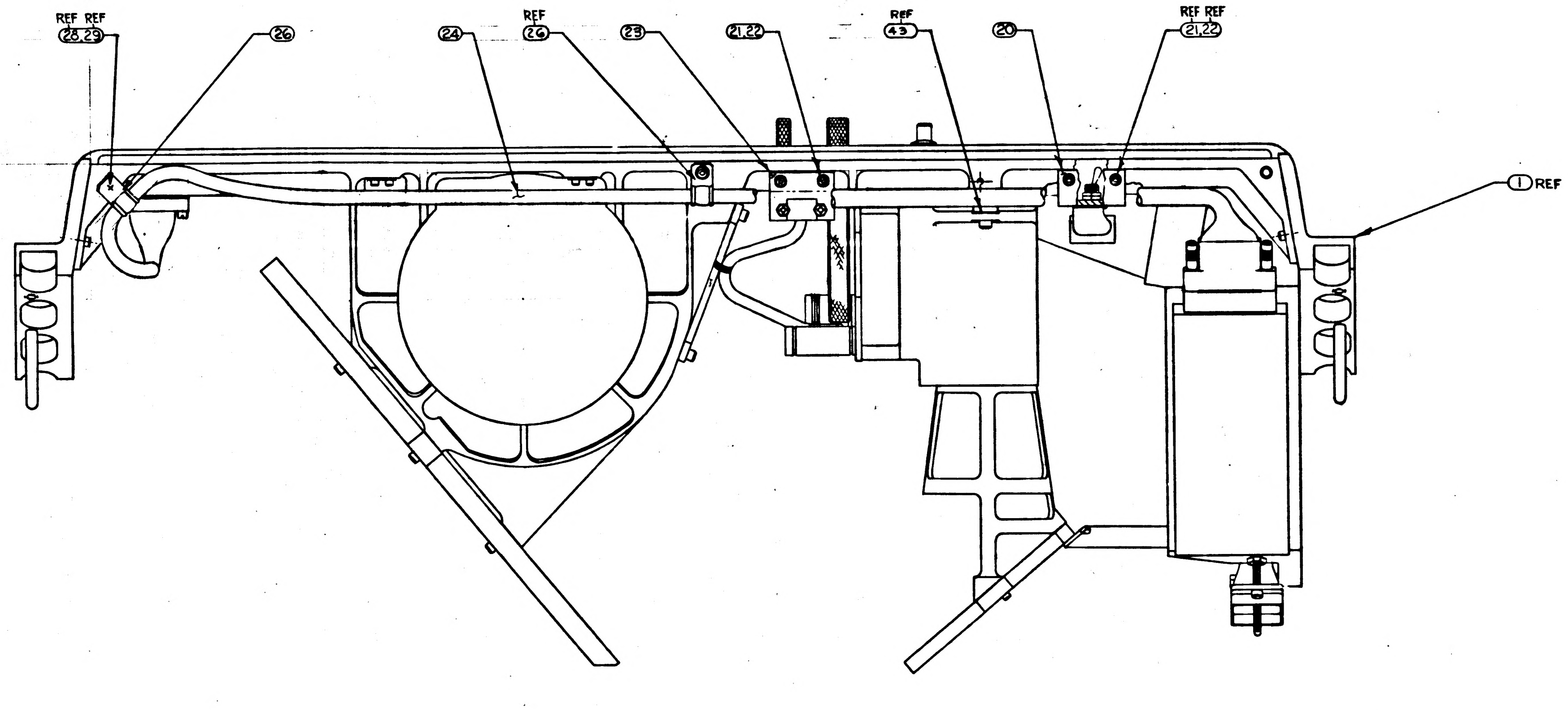
PARTIAL SECTION D-D
SEE SHEET 1 OF 2



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VIEW C-C
SEE SHEET 1 OF 2

FOR LIST OF FIND NO SEE SHEET 1 OF 2

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION

LIST OF PARTS AND MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ~ DECIMALS ± .005 ANGLES ± ~
DO NOT SCALE THIS DRAWING
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NEXT ASSY | USED ON
APPLICATION

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 88387000000
DRAWN Wyrocki DATE 7/23/63
CHECKED Vincent Amato 9/26/63
APPROVAL 9/20/63
APPROVAL E. Thomp 10-2-63
NASA APPROVAL 10-3-63
MIT APPROVAL 3 Oct 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
MAP & DATA VIEWER
ASSEMBLY OF

CODE IDENT NO. | SIZE E | NASA NUMBER 1011559
SCALE 1:1 | WEIGHT | CALC ACTUAL | SHEET 2 OF 2

MASTER

1011559 B

REVISIONS C3576

SYM	ZONE	DESCRIPTION	DATE	APPROVED
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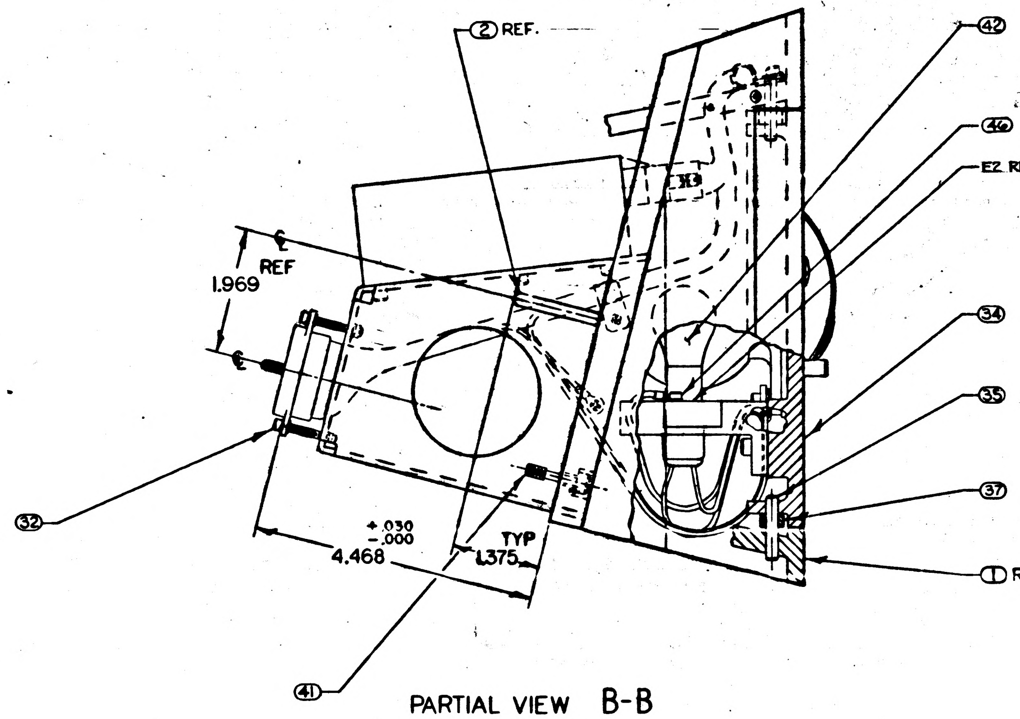
B1		REVISED PER TDRR NO. 07565	2-4-64	WK

NOTES
SEE SHEET 1 OF 2



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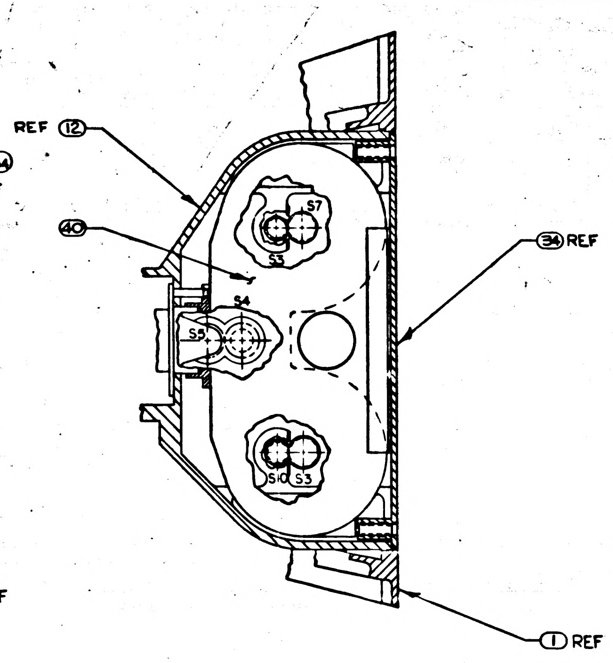
PARTIAL VIEW B-B
SEE SHEET 1 OF 2



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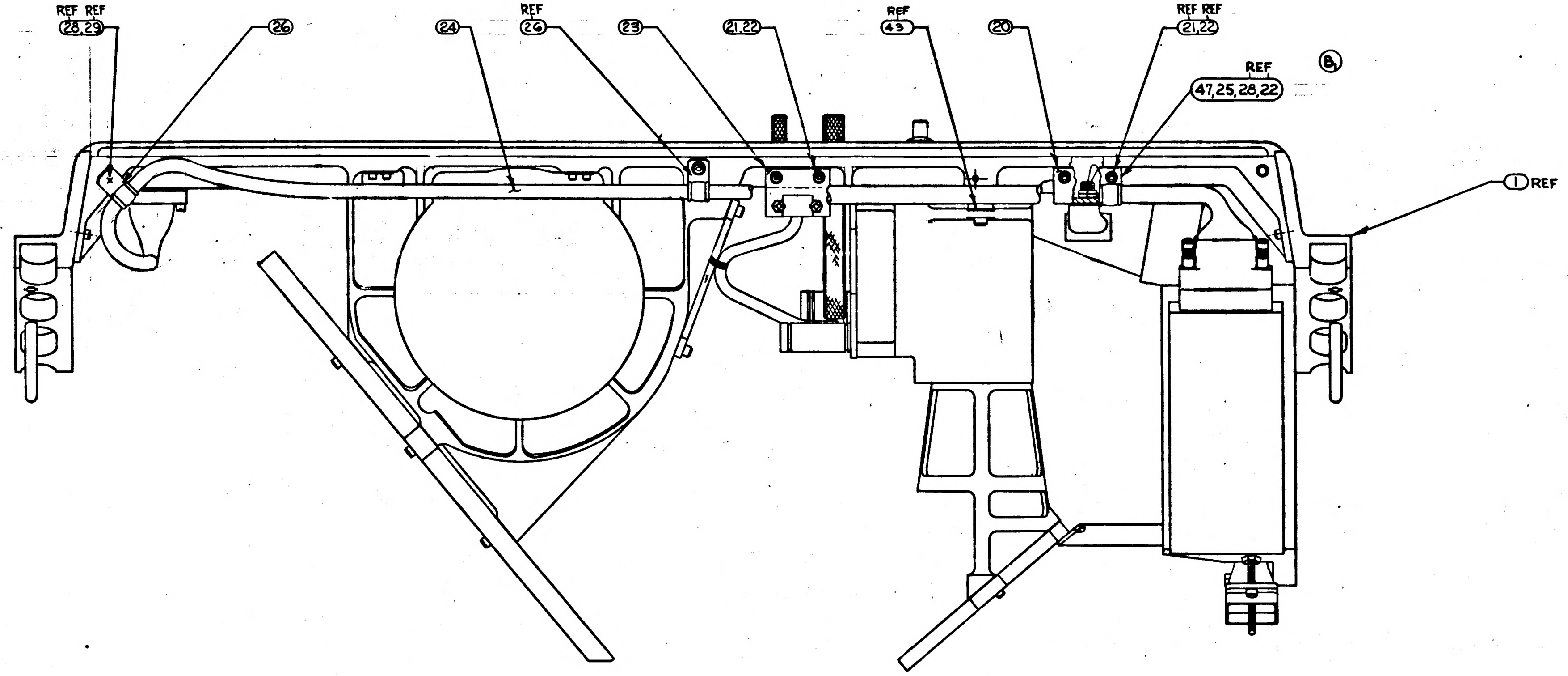
PARTIAL SECTION D-D
SEE SHEET 1 OF 2



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① REF

VIEW C-C
SEE SHEET 1 OF 2

FOR LIST OF FIND NO SEE SHEET 1 OF 2

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOL ON: FRACTIONS ± ~ DECIMALS ±.005 ANGLES ± ~ DO NOT SCALE THIS DRAWING	KOLLSMAN INSTRUMENT CORPORATION ELMHURST NEW YORK KIC PN 88387000000	MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
MATERIAL —	DRAWN Wysocki DATE 7/23/63 CHECKED Vincent Amato 9/24/63 APPROVAL 9/26/63 APPROVAL 10-2-63	TITLE MAP & DATA VIEWER ASSEMBLY OF	
CONTRACT	NASA APPROVAL 10-3-63 MIT APPROVAL 3 Oct 63	CODE IDENT NO.	SIZE E NASA NUMBER 1011559
NEXT ASSY / USED ON APPLICATION		SCALE 1:1	WEIGHT CALC ACTUAL SHEET 2 OF 2

MASTER

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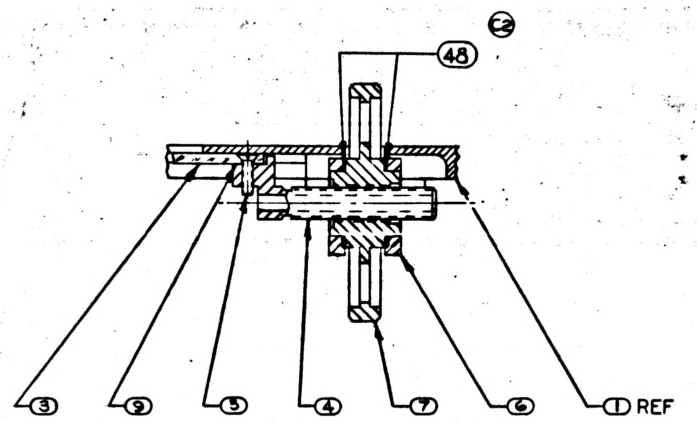
PHOTOGRAPHIC SCALE ONLY

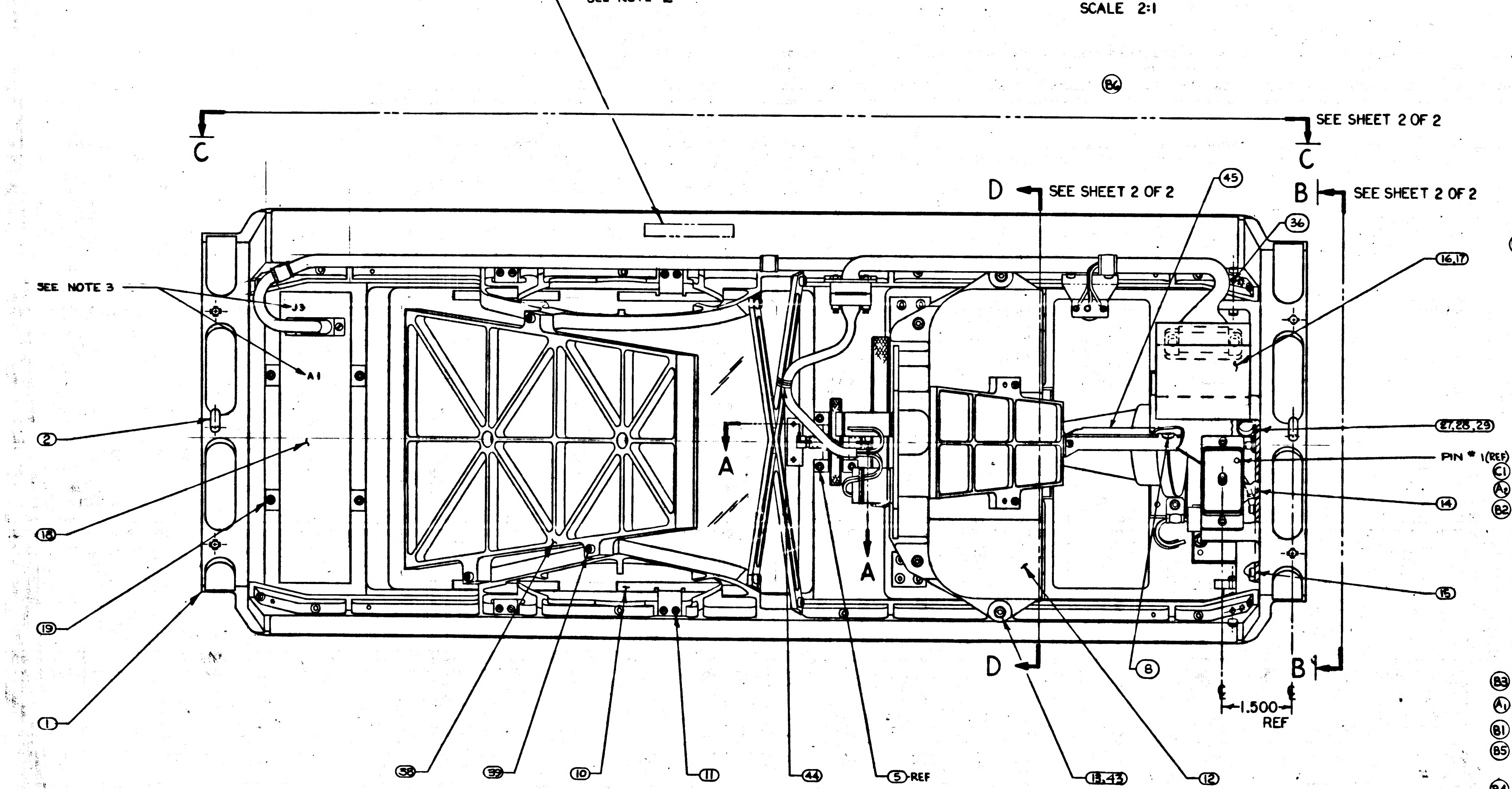
1011559 D

SYM	ZONE	DESCRIPTION	DATE	
A4		REVISED PER TDRR NO. 03016		
B6		REVISED PER TDRR NO. 07565		
C2		REVISED PER TDRR NO. 07566		
D1		REVISED PER TDRR NO. 07567		

NOTES
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA PART NO, REVISION LETTER & MANUFACTURERS SYMBOL PER ND1002019.
3. MARK CHARACTERS IN APPROX LOCATION SHOWN IN ACCORDANCE WITH ND1002019.
4. ALL SCREWS WHICH ARE NOT SECURED BY LOCKING DEVICES SHALL BE SECURED PER MIL-S-40083 (ORD) CLASS 20 PER ND1002211.
5. ASSEMBLE AND TEST IN ACCORDANCE WITH ATP 1011559.
6. INSPECT PER PS 1011559



PARTIAL SECTION A-A
SCALE 2:1



REFERENCE:
1. DIAGRAM, WIRING 1011526 (80387000060)
2. SYSTEM SCHEMATIC DIAGRAM 1011405 (80387000010)
B7 3. OUTLINE DRAWING 1011472 (A8870000000)

A3

D	–
C	–
B	–
A	A
SHEET 1	SHEET 2

REVISION STATUS OF SHEETS

* PURCHASE ITEM: SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION
C1	48	2		1011544-1	79387000001		WASHER, SLIP		
A2	47	1		1000220-7			CLAMP, CABLE		
	46	3		NAS1352C044			SCREW, CAP, SOCKET HEAD		
B2	45	1		1011540	59387000070		BRACKET, SUPPORT		
	44	A/R	*	1011753	60035142001		TAPE, LACING AND TYING		
	43	A/R		1011525	[illegible]		SPACER, SHIM		
	42	1	*	1011413	68257006801		LAMP, PROJECTION		
	41	4		1014503			SCREW, CAPTIVE		
	40	1		1011420	87387000020		CARTRIDGE, ASSY OF		
	39	3		NAS1352C04LL8	74455157015		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING		
	38	1		1011360	58387000030		MIRROR, LARGE		
	37	2	*	1011466	74414122001		COLLAR, SHAFT		
	36	2		MS51029-9			SETSCREW, HEXAGON, SOC HD, FLAT POINT		
	35	2		MS16555-645			PIN, DOWEL		
	34	1		1011473	87387000070		ACCESS DOOR ASSY OF		
	33								
	32	2		1011539	87387000190		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING (MOD.)		
	31								
B3	30								
	29	3		NAS1352C04LL6	74455157014		SCREW, CAP, HEXAGON, SOC HD SELF-LOCKING		
A1	28	4	*	1011918-1			WASHER, CABLE CLAMP		
	27	1	*	1000220-9			CLAMP, CABLE		
B1	26	2	*	1000220-6			CLAMP, CABLE		
	25	1		NAS1352C04-8			SCREW, SOC. HD. CAP		
B5	24	1		1011487	80387000050		WIRING HARNESS - BRANCHED		
	23	1		1011489	59387000060		BRACKET, CONNECTOR		
	22	4	*	1011750	74443128008		NUT, SELF-LOCKING, HEXAGON		
B4	21	3		NAS1352C04-6			SCREW, CAP, HEXAGON, SOC HD		
	20	1		1011469	59387000040		BRACKET, SWITCH		
	19	4		1011625-26	74455151026		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING		
	18	1	*	1011375	75005005601		INDICATOR, INTEGRATED READOUT		
	17	3		NAS1352C06-4			SCREW, CAP, HEXAGON, SOC HD		
	16	1		1011483	87387000080		AMPLIFIER AND SWITCH ASSY OF		
	15	2		NAS1352C04LL4	74455157013		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING		
	14	1		1011538	85387000200		BRACKET, CONNECTOR, ASSY OF		
	13	4		NAS1352C06LL6	74455157019		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING		
	12	1		1011468	87387000060		GEAR BOX AND MIRROR ASSY OF		
	11	8		1011625-8	74455151008		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING		
	10	4		1011380	58387000010		SPRING, RETAINER		
	9	A/R		1011519	[illegible]		SHIM, VIEWSCREEN		
	8	2		NAS1352C06-6			SCREW, CAP, HEXAGON, SOC HD		
	7	1		1011459	85387000080		KNOB AND INSERT-ASSY OF		
	6	2		1011383	52387000010		BLOCK, BEARING		
D1	5	6		NAS1189C02P4L	74455155002		SCREW, SELF LOCKING, 100° FLAT HD		
	4	1		1011388	52387000020		SCREW, SCREEN ADJUST		
	3	1		1011377	46387000010		SCREEN, VIEW		
	2	2		1011446	39387000010		PIN, ALIGNMENT		
	1	1		1011537	87387000080		HOUSING, MACHINING ASSEMBLY		

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ~ DECIMALS ± .005 ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL ~
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 88387000000

DRAWN DATE 7/23/63
CHECKED
APPROVAL 9-23-63
APPROVAL 10-2-63
NASA APPROVAL 10-3-63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
MAP & DATA VIEWER
ASSEMBLY OF

CODE IDENT NO.
SIZE E
NASA NUMBER 1011559
SCALE 1:1
WEIGHT
SHEET 1 OF 2

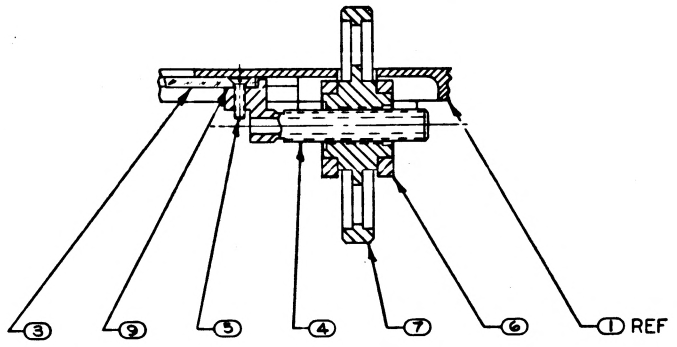
MASTER

INCHES
PHOTOGRAPHIC SCALE ONLY

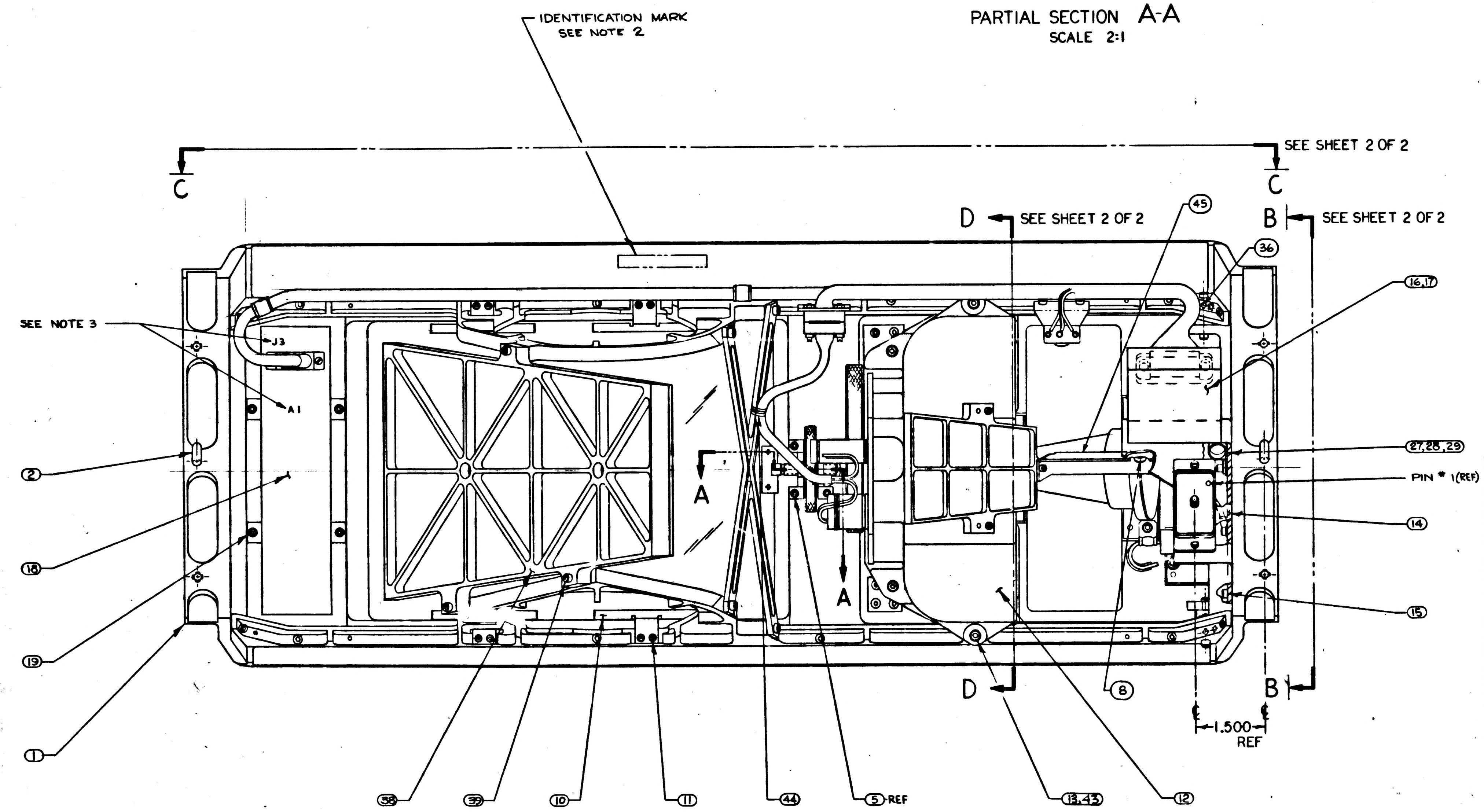
1011559

SYM	ZONE	REVISIONS DESCRIPTION	DATE	APPROVAL

NOTES
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA PART NO, REVISION LETTER & MANUFACTURERS SYMBOL PER ND1002019.
3. MARK CHARACTERS IN APPROX LOCATION SHOWN IN ACCORDANCE WITH ND1002019.
4. ALL SCREWS WHICH ARE NOT SECURED BY LOCKING DEVICES SHALL BE SECURED PER MIL-S-40083 (ORD) CLASS 20 PER ND1002211.
5. ASSEMBLE AND TEST IN ACCORDANCE WITH ATP 1011559.



PARTIAL SECTION A-A
SCALE 2:1



REFERENCE:
1. DIAGRAM, WIRING 1011526 (80387000060)
2. SYSTEM SCHEMATIC DIAGRAM 1011405 (80387000010)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
45	1		1011540	59387000070		BRACKET, SUPPORT			
44	A/R	*	1011753	60035142001		TAPE, LACING AND TYING			
43	A/R		1011525	49387000020		SPACER, SHIM			
42	1	*	1011413	68257006201		LAMP, PROJECTION			
41	4		1014503			SCREW, CAPTIVE			
40	1		1011420	87387000020		CARTRIDGE, ASSY OF			
39	3		NAS1352C04LL8	74455157015		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING			
38	1		1011360	58387000030		MIRROR, LARGE			
37	2	*	1011466	74414122001		COLLAR, SHAFT			
36	2		MS51029-9			SETSCREW, HEXAGON, SOC HD, FLAT POINT			
35	2		MS16555-645			PIN, DOWEL			
34	1		1011473	87387000070		ACCESS DOOR ASSY OF			
33									
32	2		1011539	57387000190		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING (MOD.)			
31									
30									
29	3		NAS1352C04LL6	74455157014		SCREW, CAP, HEXAGON, SOC HD SELF-LOCKING			
28	3	*	1000223			WASHER, CABLE CLAMP			
27	1	*	1000220-6			CLAMP, CABLE			
26	2	*	1000220-5			CLAMP, CABLE			
25									
24	1		1011487	80387000050		WIRING HARNESS - BRANCHED			
23	1		1011489	59387000060		BRACKET, CONNECTOR			
22	4	*	1011750	74443128008		NUT, SELF-LOCKING, HEXAGON			
21	4		NAS1352C04-6			SCREW, CAP, HEXAGON, SOC HD			
20	1		1011469	59387000040		BRACKET, SWITCH			
19	4		1011625-26	74455151026		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING			
18	1	*	1011375	75005005601		INDICATOR, INTEGRATED READOUT			
17	3		NAS1352C06-4			SCREW, CAP, HEXAGON, SOC HD			
16	1		1011483	87387000080		AMPLIFIER AND SWITCH ASSY OF			
15	2		NAS1352C04LL4	74455157013		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING			
14	1		1011538	85387000200		BRACKET, CONNECTOR, ASSY OF			
13	4		NAS1352C06LL6	74455157019		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING			
12	1		1011468	87387000060		GEAR BOX AND MIRROR ASSY OF			
11	8		1011625-8	74455151008		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING			
10	4		1011380	58387000010		SPRING, RETAINER			
9	A/R		1011519	49387000010		SHIM, VIEWSCREEN			
8	2		NAS1352C06-6			SCREW, CAP, HEXAGON, SOC HD			
7	1		1011459	85387000080		KNOB AND INSERT-ASSY OF			
6	2		1011383	52387000010		BLOCK, BEARING			
5	6		NAS1189C02T-4L			SCREW, SELF LOCKING, 100° FLAT HD			
4	1		1011388	52387000020		SCREW, SCREEN ADJUST			
3	1		1011377	46387000010		SCREEN, VIEW			
2	2		1011446	39387000010		PIN, ALIGNMENT			
1	1		1011537	87387000080		HOUSING, MACHINING ASSEMBLY			

LIST OF PARTS AND MATERIALS

*PURCHASE ITEM: SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ~ DECIMALS ±.005 ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL ~
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 88387000000
DRAWN Wysocki DATE 7/23/63
CHECKED 9/24/63
APPROVAL M Herner 9-3-63
APPROVAL E. Thomp 10-2-63
NASA APPROVAL W J Rhine 10-3-63
MIT APPROVAL W Kupfer 3 Oct

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

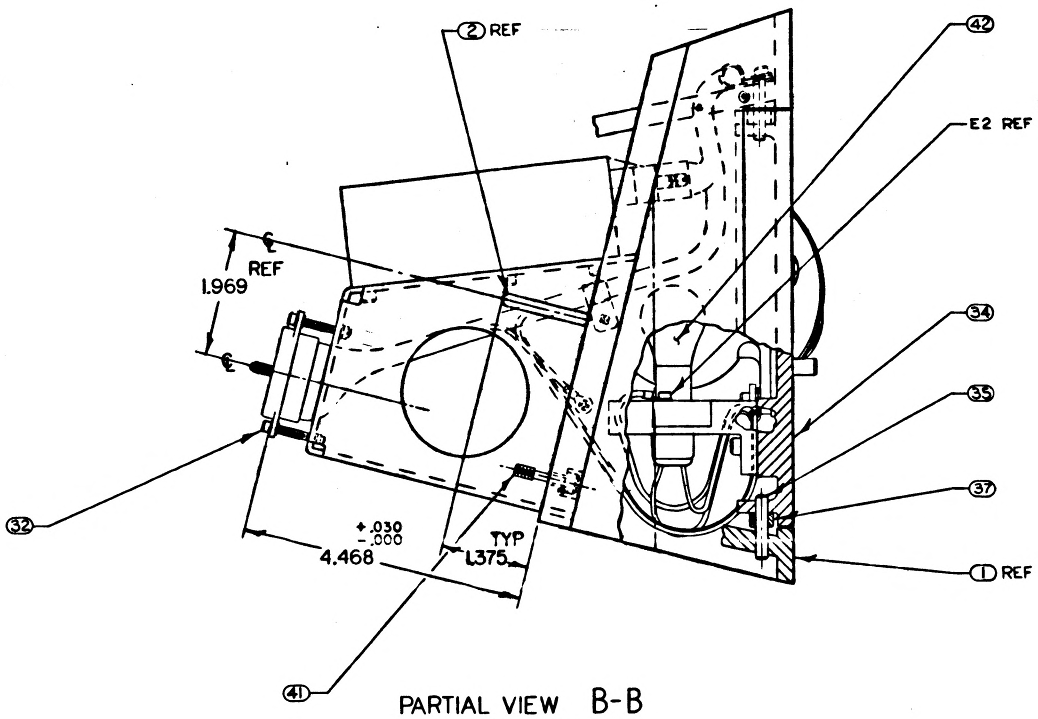
TITLE
MAP & DATA VIEWER
ASSEMBLY OF

CODE IDENT NO.
SIZE E
NASA NUMBER 1011559
SCALE 1:1
WEIGHT CALC ACTUAL
SHEET 1 OF 2

1011559

SYM	ZONE	REVISIONS 03576 DESCRIPTION	DATE	APPROVAL

NOTES
SEE SHEET 1 OF 2



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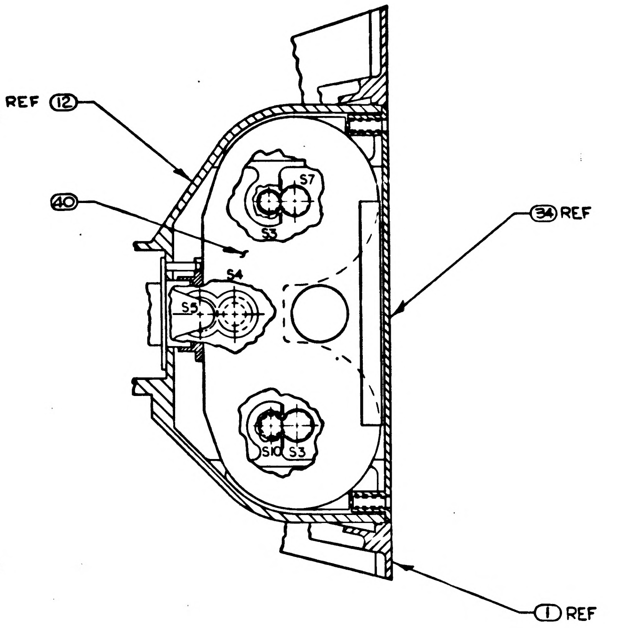
PARTIAL VIEW B-B
SEE SHEET 1 OF 2



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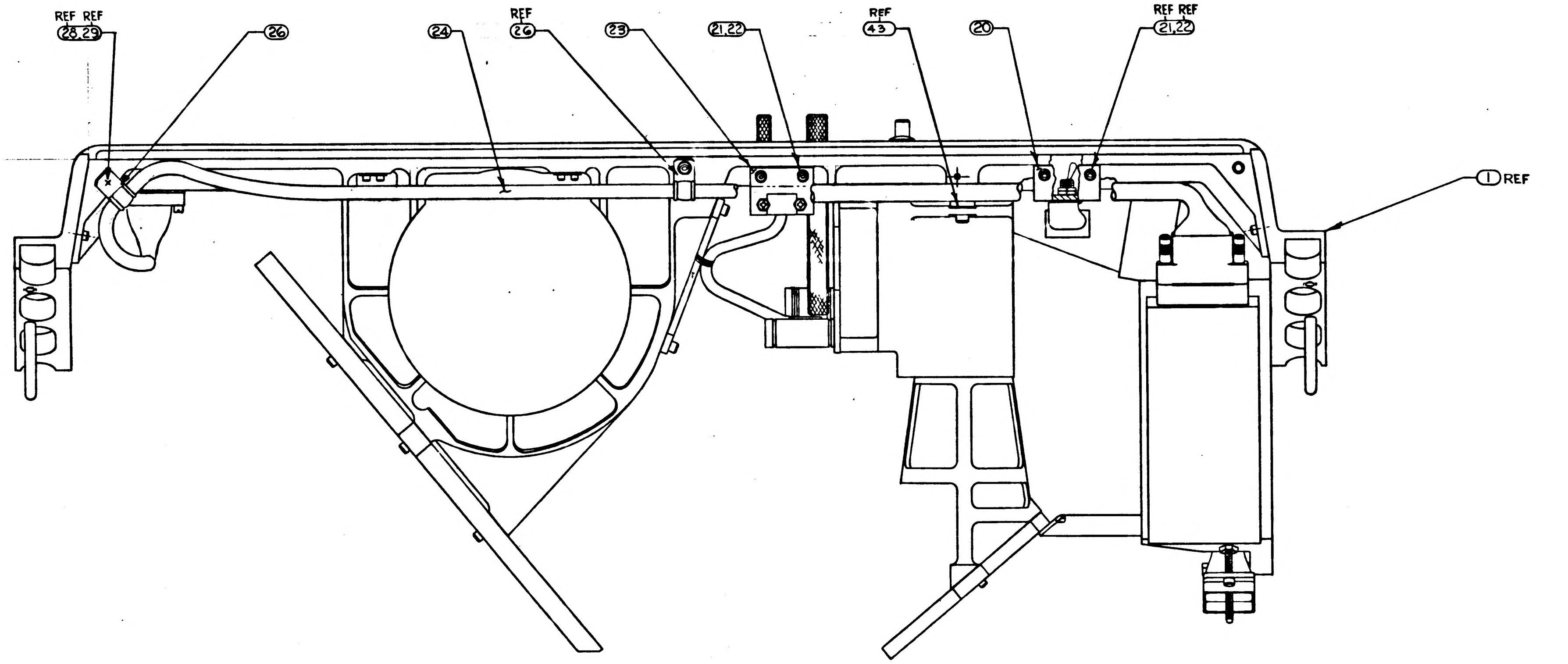
PARTIAL SECTION D-D
SEE SHEET 1 OF 2



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VIEW C-C
SEE SHEET 1 OF 2

FOR LIST OF FIND NO SEE SHEET 1 OF 2

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT W

LIST OF PARTS AND MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ~ | DECIMALS ± .005 | ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL ~
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 88387000000
DRAWN Wysocki DATE 7/23/63
CHECKED 9/26/63
APPROVAL M Werner 9/30/63
APPROVAL E. Thomp 10-2-63
NASA APPROVAL 10-3-63
MIT APPROVAL 3 Oct 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
MAP & DATA VIEWER
ASSEMBLY OF

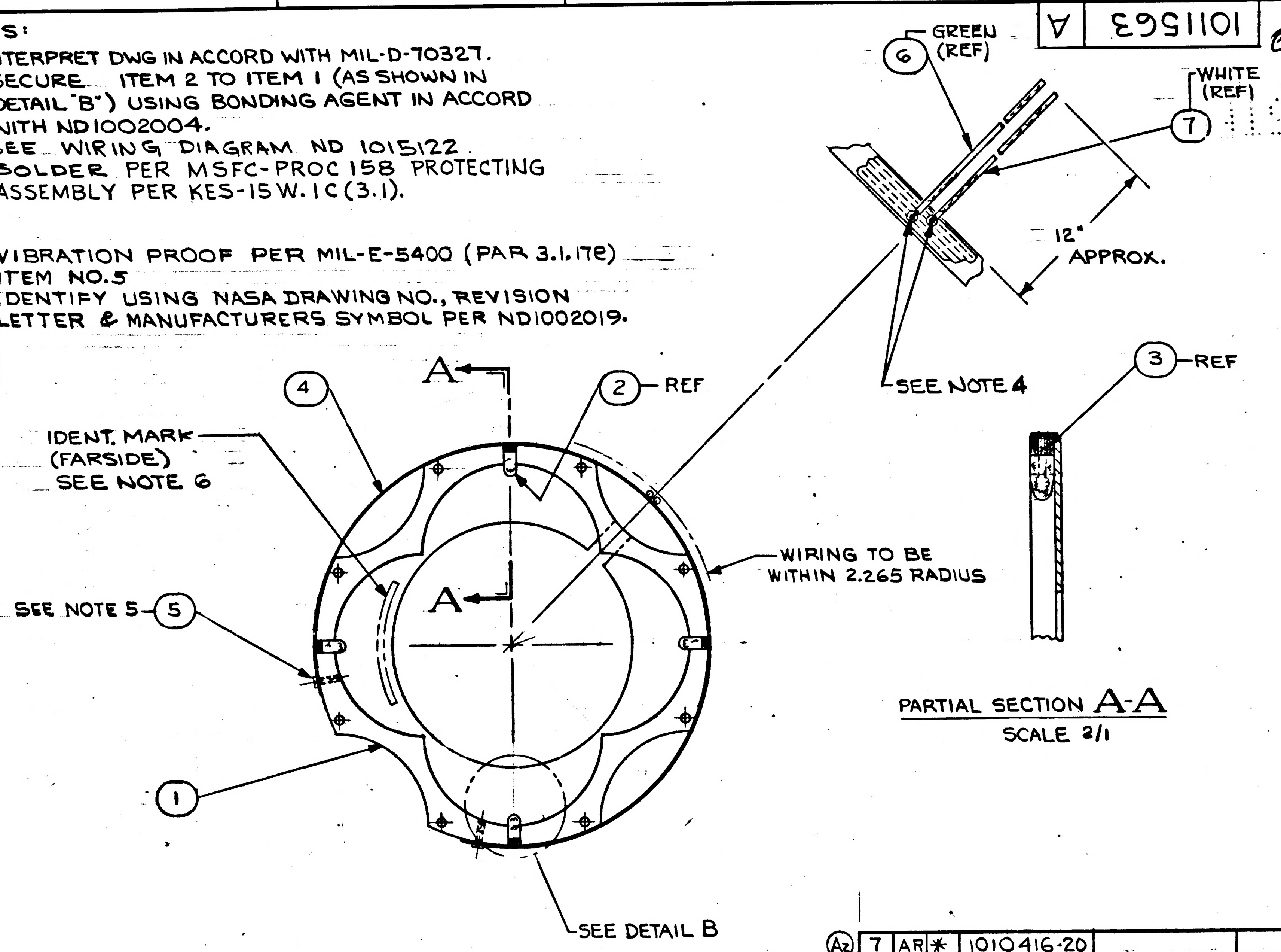
CODE IDENT NO. | SIZE E | NASA NUMBER 1011559
SCALE 1:1 | WEIGHT CALC ACTUAL | SHEET 2 OF 2

1011563 A

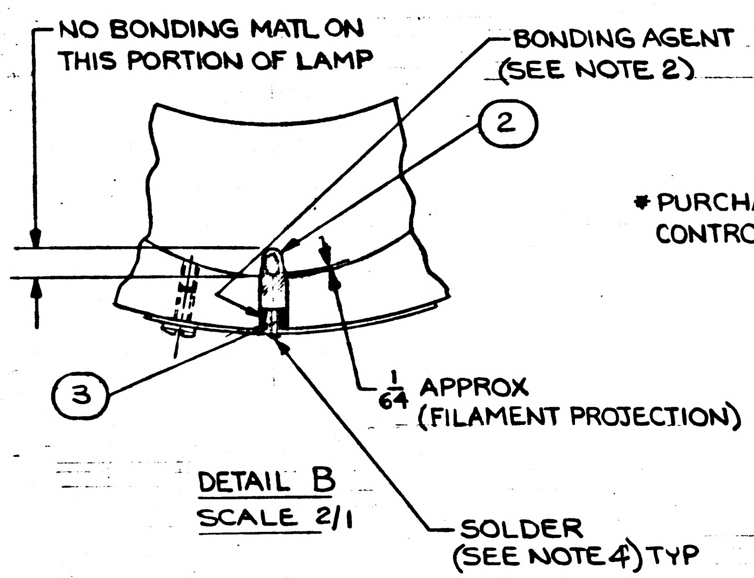
REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A_2		REVISED PER TDRR NO. 02952	9/5/63	

NOTES:

1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. SECURE ITEM 2 TO ITEM 1 (AS SHOWN IN DETAIL "B") USING BONDING AGENT IN ACCORD WITH ND1002004.
3. SEE WIRING DIAGRAM ND 1015122.
4. SOLDER PER MSFC-PROC 158 PROTECTING ASSEMBLY PER KES-15W.1C(3.1).
5. VIBRATION PROOF PER MIL-E-5400 (PAR 3.1.17e) ITEM NO.5
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND1002019.


6
GREEN (REF)
WHITE (REF)
7
12" APPROX.
SEE NOTE 4
3 REF
A
A
4
2 REF
IDENT. MARK (FARSIDE) SEE NOTE 6
WIRING TO BE WITHIN 2.265 RADIUS
SEE NOTE 5
5
1
SEE DETAIL B

PARTIAL SECTION A-A
SCALE 2/1


NO BONDING MATL ON THIS PORTION OF LAMP
BONDING AGENT (SEE NOTE 2)
2
3
1/64 APPROX (FILAMENT PROJECTION)
SOLDER (SEE NOTE 4) TYP

DETAIL B
SCALE 2/1

MASTER

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
A_2	7	AR	*	1010416-20			WIRE, ELECTRICAL, STRANDED, INSULATED			
A_1	6	AR	*	1010416-16			WIRE, ELECTRICAL, STRANDED, INSULATED			
	5	2		1011904	45386900190		SCREW, MINIATURE			
	4	1	*	1011903			FLEXPRINT			
	3	AR	*	1006776-25			INSULATION SLEEVING ELECTRICAL			
	2	4	MS	24367			LAMP, INCANDESCENT			
	1	1		1011334	57386900800		PLATE, LAMP MOUNTING			

LIST OF PARTS AND MATERIALS

1011906	1011000
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± –	± –	± –

DO NOT SCALE THIS DRAWING
MATERIAL –
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900320
DRAWN J. Pelillo DATE 6-27-63
CHECKED Paul Pappachristou
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL W J Rhine 8/19/63
MIT APPROVAL W Kupferberg 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LAMP AND PLATE,
ASSY OF

CODE IDENT NO. | SIZE C | NASA NUMBER 1011563
SCALE 1/1 | WEIGHT | CALC ACTUAL | SHEET 1 OF 1

1011563 A

E-184

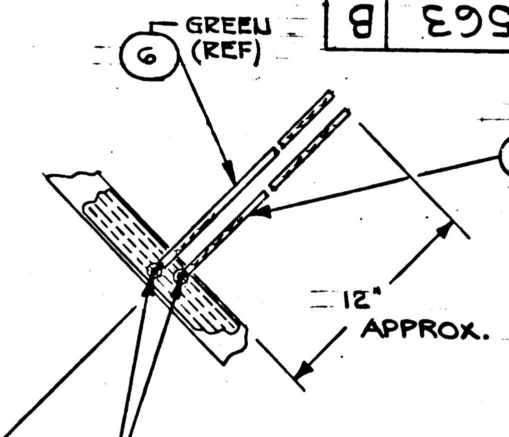
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011563 B

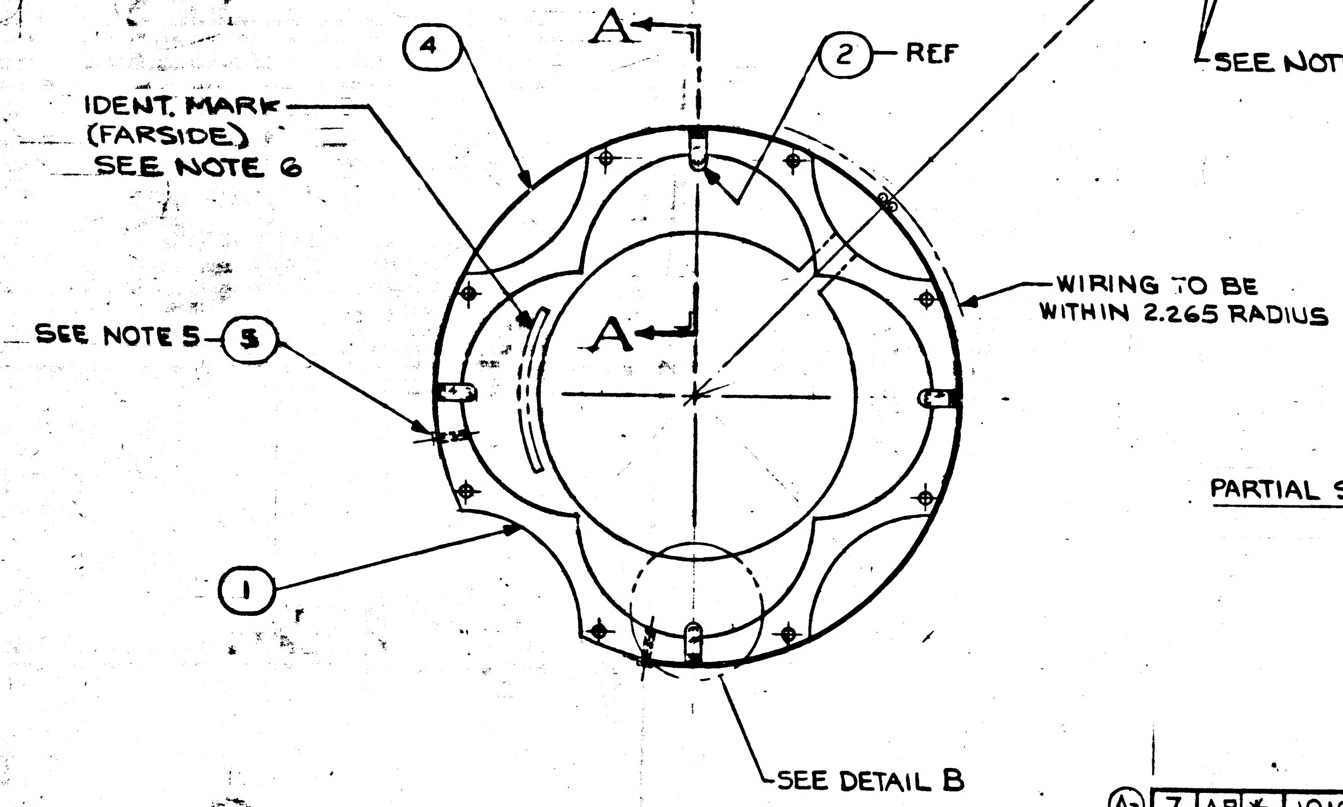
NOTES:
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. SECURE ITEM 2 TO ITEM 1 (AS SHOWN IN DETAIL "B") USING BONDING AGENT IN ACCORD WITH ND1002004.
3. SEE WIRING DIAGRAM ND 1015122.
4. SOLDER PER MSFC-PROC 158 PROTECTING ASSEMBLY PER KES-15W.1C(3.1).
5. VIBRATION PROOF PER MIL-E-5400 (PAR 3.1.17e) ITEM NO.5
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND1002019.

REVISIONS 02623

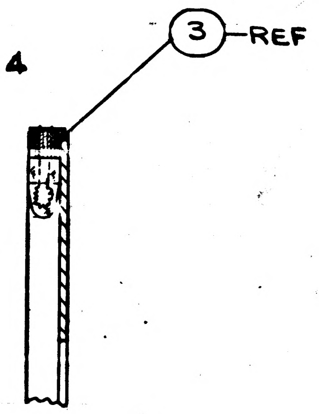
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A2		REVISED PER TDRR NO. 02952	9/5/63	
B1		REVISED PER TDRR NO. 03352	9/23/63	9/26



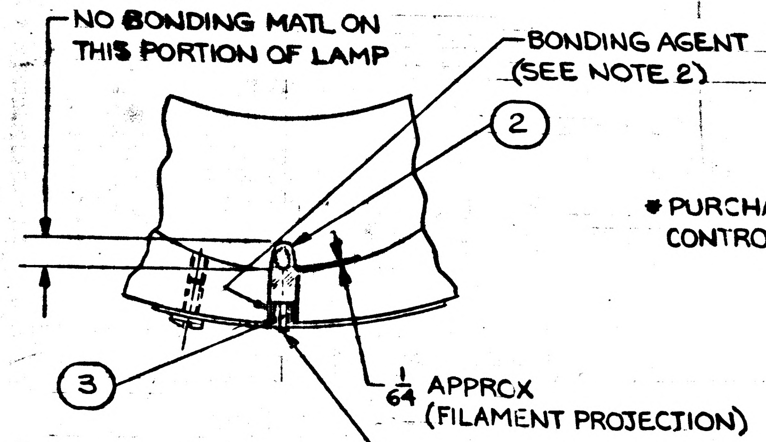
6
GREEN (REF)
WHITE (REF)
7
12" APPROX.
SEE NOTE 4



A
4
2 REF
IDENT. MARK (FARSIDE) SEE NOTE 6
WIRING TO BE WITHIN 2.265 RADIUS
SEE NOTE 5
5
A
1
SEE DETAIL B



PARTIAL SECTION A-A
SCALE 2/1



NO BONDING MATL ON THIS PORTION OF LAMP
BONDING AGENT (SEE NOTE 2)
2
3
1/64 APPROX (FILAMENT PROJECTION)
SOLDER (SEE NOTE 4) TYP

DETAIL B
SCALE 2/1

MASTER

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
A2	7	AR	*	1010416-20			WIRE, ELECTRICAL, STRANDED, INSULATED			
A1	6	AR	*	1010416-16			WIRE, ELECTRICAL, STRANDED, INSULATED			
	5	2		1011904	45386900190		SCREW, MINIATURE			
	4	1	*	1011903			FLEXPRINT			
	3	AR	*	1006776-25			INSULATION SLEEVING ELECTRICAL			
	2	4		MS24367-715			LAMP, INCANDESCENT			
	1	1		1011334	57386900800		PLATE, LAMP MOUNTING			

LIST OF PARTS AND MATERIALS

1011906	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900320
DRAWN J. Schiller DATE 6-27-63
CHECKED Paul Pappachristou
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL W J Rhine 9/1963
MIT APPROVAL 9/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LAMP AND PLATE,
ASSY OF

CODE IDENT NO. | SIZE C | NASA NUMBER 1011563
SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

E-154

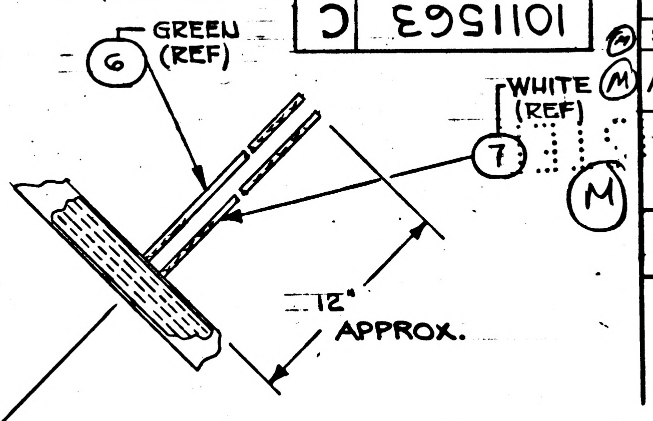
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011563 B

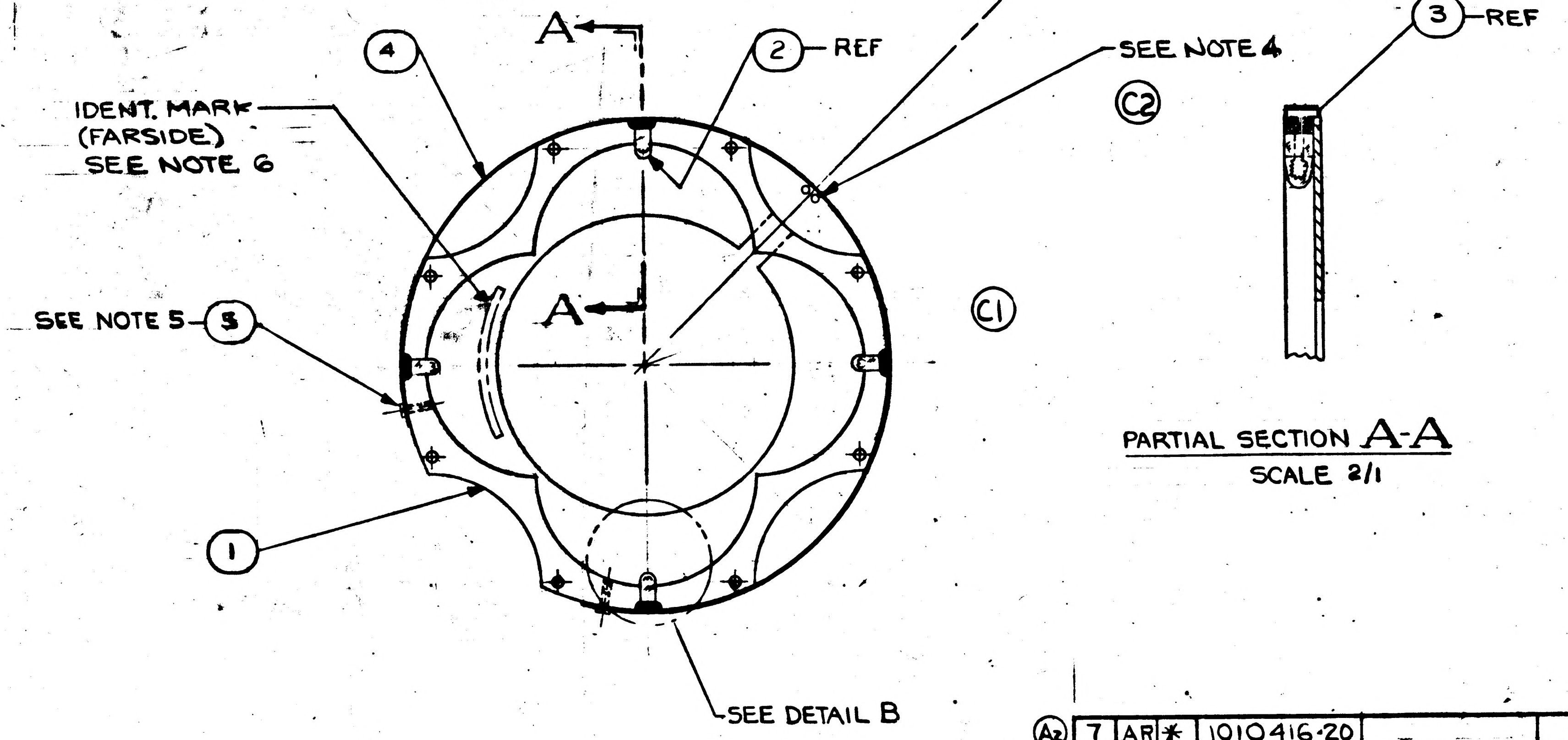
1011563 C

NOTES:
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. SECURE ITEM 2 TO ITEM 1 (AS SHOWN IN DETAIL "B") USING BONDING AGENT IN ACCORD WITH ND1002004.
3. SEE WIRING DIAGRAM ND 1015122.
4. SOLDER PER MSFC-PROC 158 PROTECTING ASSEMBLY PER KES-15 W.1C (3.1).
5. VIBRATION PROOF PER MIL-E-5400 (PAR 3.1.17e) ITEM NO. 5
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND1002019.

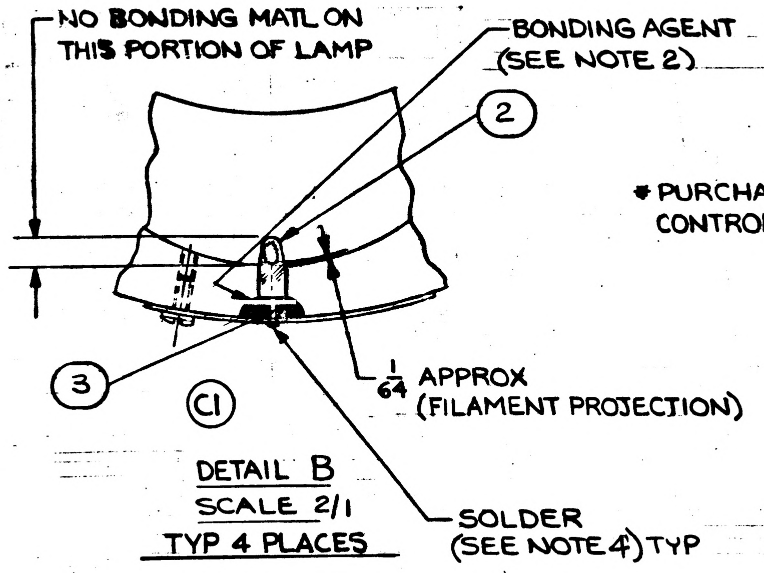
REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A2		REVISED PER TDRR NO. 02952	9/5/63	
B1		REVISED PER TDRR NO. 03352	9/23/63	9/26
C2		REVISED PER TDRR NO 06919	17 MAR 64	WK



6
GREEN (REF)
WHITE (REF)
7
M
12" APPROX.



A
4
2 REF
IDENT. MARK (FARSIDE) SEE NOTE 6
SEE NOTE 4
C2
3 REF
SEE NOTE 5 5
A
C1
1
SEE DETAIL B
PARTIAL SECTION A-A
SCALE 2/1



NO BONDING MATL ON THIS PORTION OF LAMP
BONDING AGENT (SEE NOTE 2)
2
3
C1
1/64 APPROX (FILAMENT PROJECTION)
SOLDER (SEE NOTE 4) TYP

DETAIL B
SCALE 2/1
TYP 4 PLACES

MASTER

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
A2	7	AR	*	1010416-20	-	-	WIRE, ELECTRICAL, STRANDED, INSULATED			
A1	6	AR	*	1010416-16			WIRE, ELECTRICAL, STRANDED, INSULATED			
	5	2		1011904	45386900190		SCREW, MINIATURE			
	4	1	*	1011903			FLEXPRINT			
	3	AR	*	1006776-25			INSULATION SLEEVING ELECTRICAL			
	2	4		MS24367-715			LAMP, INCANDESCENT			
	1	1		1011334	57386900800		PLATE, LAMP MOUNTING			

LIST OF PARTS AND MATERIALS

1011906	1011000
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± -	± -	± -

DO NOT SCALE THIS DRAWING

MATERIAL -

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900320

DRAWN J. Schiller DATE 6-27-63
CHECKED Paul Pappachristou
APPROVAL J. Kuschmann 8-15-63
APPROVAL F.J. Siracco 8-15-63
NASA APPROVAL W J Rhine 5-1963
MIT APPROVAL W Kupfer Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LAMP AND PLATE,
ASSY OF

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011563
SCALE 1/1	WEIGHT CALC ACTUAL	SHEET 1 OF 1

E-154

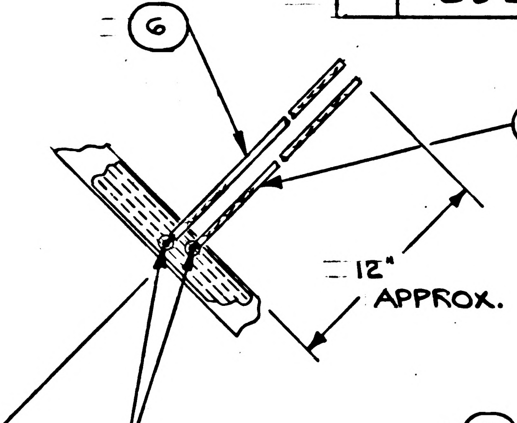
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

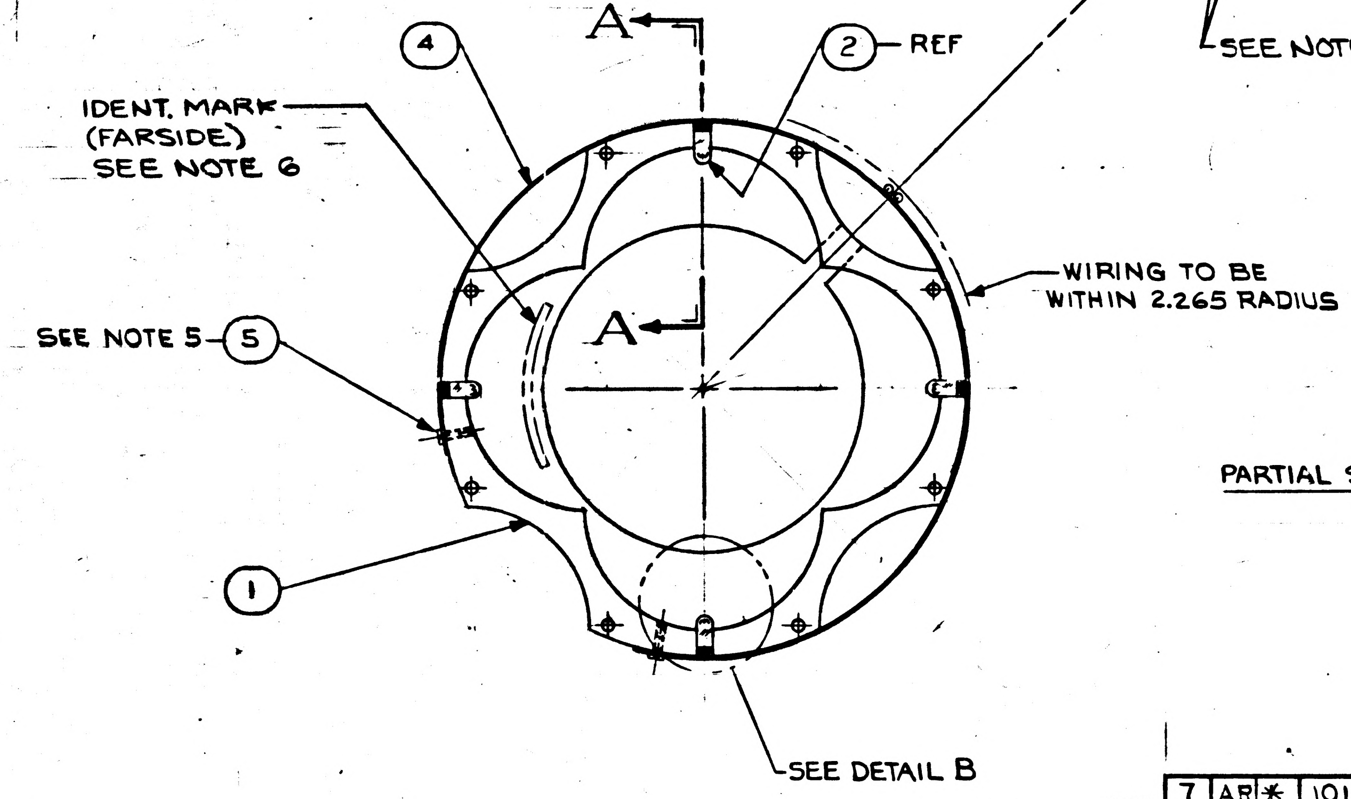
1011563

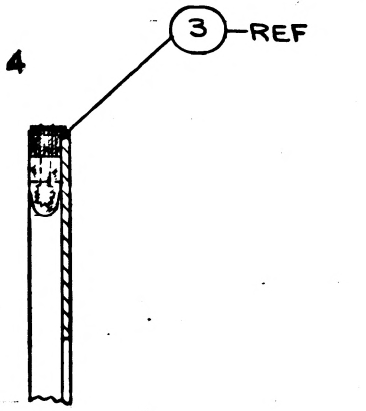
SYM	ZONE	REVISIONS 02623 DESCRIPTION	DATE	APPROVAL

NOTES:

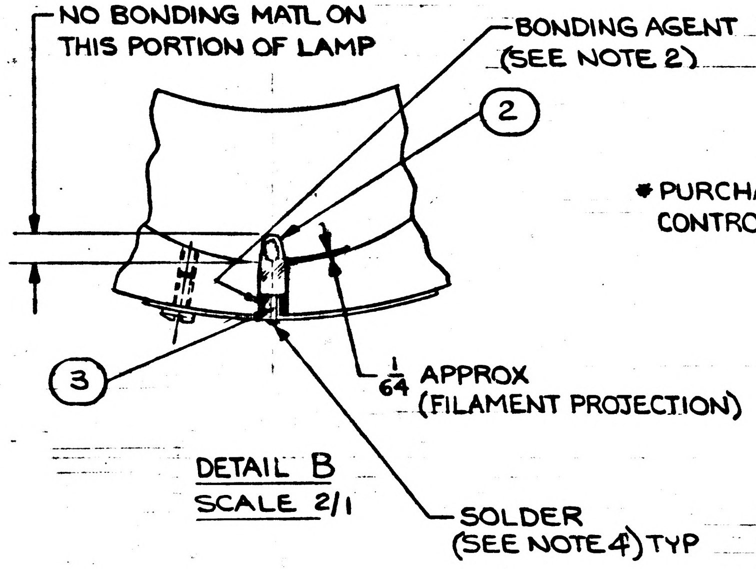
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. SECURE ITEM 2 TO ITEM 1 (AS SHOWN IN DETAIL "B") USING BONDING AGENT IN ACCORD WITH ND1002004.
3. SEE WIRING DIAGRAM ND 1015122.
4. SOLDER PER MSFC-PROC 158 PROTECTING ASSEMBLY PER KES-15W.1C(3.1).
5. VIBRATION PROOF PER MIL-E-5400 (PAR 3.1.17e) ITEM NO.5
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND1002019.


6
7
12" APPROX.
SEE NOTE 4


A
A
4
2 REF
IDENT. MARK (FARSIDE) SEE NOTE 6
WIRING TO BE WITHIN 2.265 RADIUS
SEE NOTE 5
5
1
SEE DETAIL B



PARTIAL SECTION A-A
SCALE 2/1


NO BONDING MATL ON THIS PORTION OF LAMP
BONDING AGENT (SEE NOTE 2)
2
3
1/64 APPROX (FILAMENT PROJECTION)
SOLDER (SEE NOTE 4) TYP

DETAIL B
SCALE 2/1

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
7	AR	*	1010416-13			WIRE, ELECTRICAL, STRANDED, INSULATED			
6	AR	*	1010416-11			WIRE, ELECTRICAL, STRANDED, INSULATED			
5	2		1011904	45386900190		SCREW, MINIATURE			
4	1	*	1011903			FLEXPRINT			
3	AR	*	1006776-25			INSULATION SLEEVING ELECTRICAL			
2	4	MS	24367			LAMP, INCANDESCENT			
1	1		1011334	57386900800		PLATE, LAMP MOUNTING			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011906	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOLERANCES ON	FRACTIONS	DECIMALS	ANGLES
±	~	~	~

DO NOT SCALE THIS DRAWING

MATERIAL ~

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900320

DRAWN J. Dolcides DATE 6-27-63
CHECKED Paul Pappachristou
APPROVAL G. Kuhlmann 8-15-63
APPROVAL J. J. Siracu 8-15-63
NASA APPROVAL W J Rhine 8/19/63
MIT APPROVAL W Kupferberg 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LAMP AND PLATE,
ASSY OF

CODE IDENT NO.
SIZE C
NASA NUMBER 1011563
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

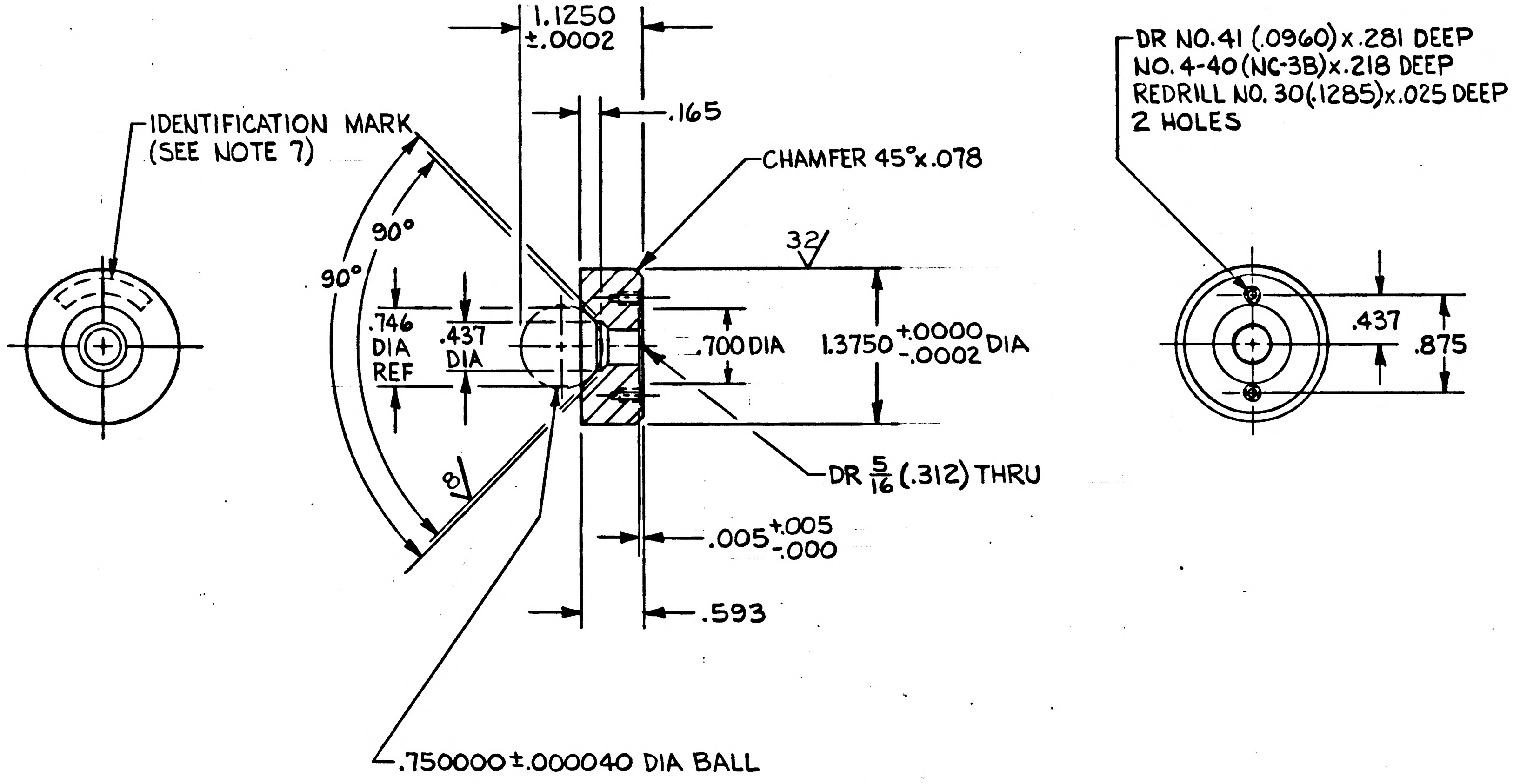
1011563

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

A	1011566

REVISIONS TDRR 01583				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	A-4	NEXT ASSY NO. WAS 1011000 TDRR 02241	7-17-63	WK 7-24-63

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. HEAT TREAT TO ROCKWELL C-58 MIN PER ND 1002087.
6. PASSIVATE PER MIL-STD-171 (KPS-1005I.200).
7. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019.


IDENTIFICATION MARK (SEE NOTE 7)
1.1250 ±.0002
.165
CHAMFER 45° x .078
32√
90°
90°
.746 DIA REF
.437 DIA
.700 DIA
1.3750 +.0000 -.0002 DIA
8°
DR 5/16 (.312) THRU
.005 +.005 -.000
.593
.750000 ±.000040 DIA BALL
DR NO. 41 (.0960) x .281 DEEP
NO. 4-40 (NC-3B) x .218 DEEP
REDRILL NO. 30 (.1285) x .025 DEEP
2 HOLES
.437
.875

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

Ⓐ	1011889	1011000
	NEXT ASSY	USED ON
	APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL STAINLESS STEEL AISI 440C
FED. SPEC: QQ-S-763, CLASS 440C, CONDITION A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386900850

DRAWN V. AMATO DATE 3-5-63
CHECKED W.W. Lang 5-23-63
APPROVAL E.J. [illegible] 5-24-63
APPROVAL R.H. [illegible] 6-3-63
NASA APPROVAL Jack Barnard
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
INSERT, BALL MOUNT, STATIONARY

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011566

SCALE 1/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

MASTER

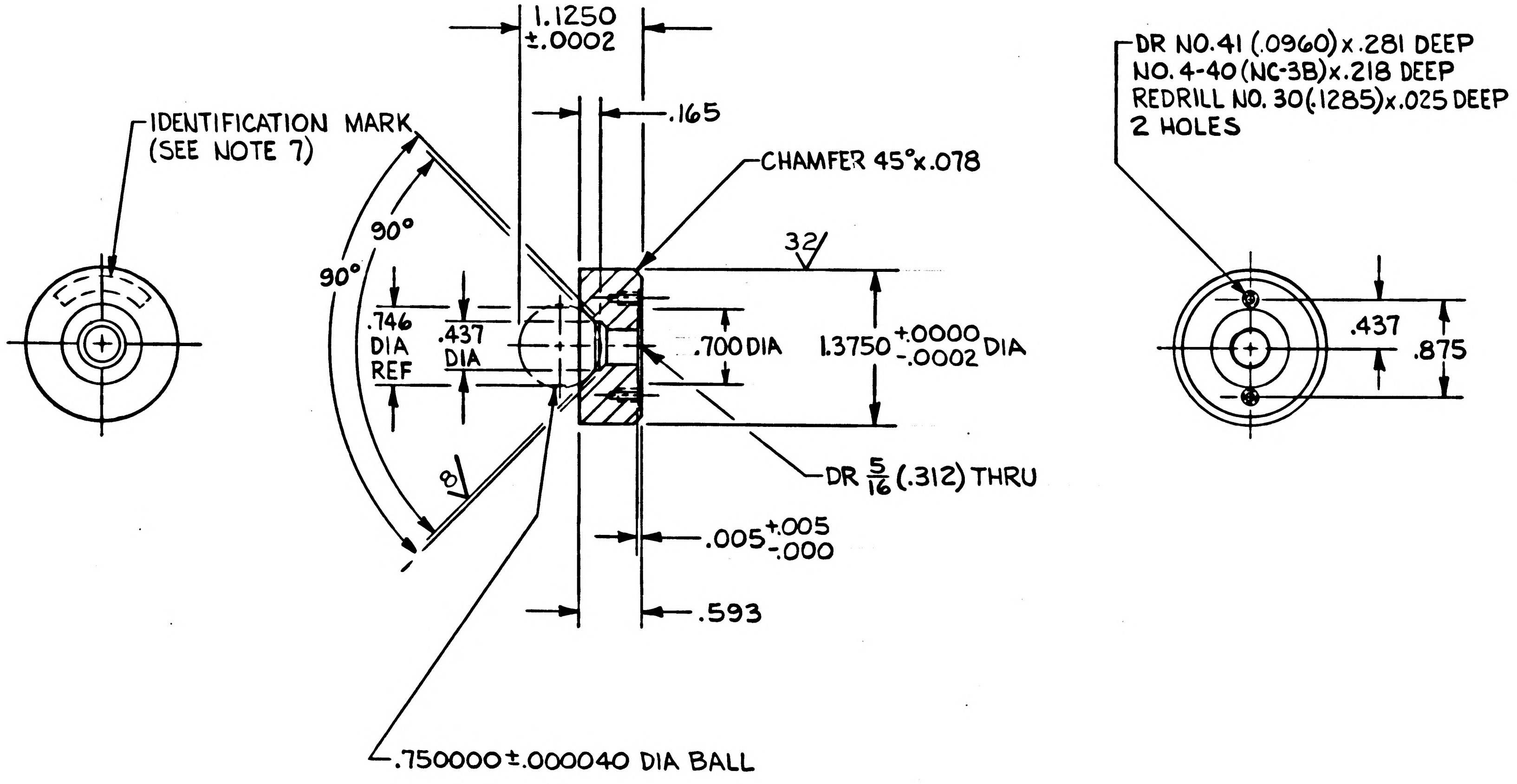
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011566

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REVISIONS TORR 01583

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. $\sqrt{}^{63}$ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. HEAT TREAT TO ROCKWELL C-58 MIN PER ND1002087.
6. PASSIVATE PER MIL-STD-171 (KPS-1005I.200).
7. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019.


IDENTIFICATION MARK (SEE NOTE 7)
1.1250 ±.0002
.165
CHAMFER 45°x.078
32
90°
90°
.746 DIA REF
.437 DIA
.700 DIA
1.3750 +.0000 -.0002 DIA
DR 5/16 (.312) THRU
.005 +.005 -.000
.593
.750000±.000040 DIA BALL
DR NO.41 (.0960) x.281 DEEP
NO. 4-40 (NC-3B) x.218 DEEP
REDRILL NO. 30 (.1285) x.025 DEEP
2 HOLES
.437
.875

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± 1°

DO NOT SCALE THIS DRAWING
MATERIAL STAINLESS STEEL AISI 440C FED. SPEC: QQ-S-763, CLASS 440C, CONDITION A
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386900850
DRAWN V. AMATO DATE 3-5-63
CHECKED W.W. Lang 5-23-63
APPROVAL Ed. Macdonald 5-24-63
APPROVAL R.H. Bea 6-3-63
NASA APPROVAL Jack Barnard
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
INSERT, BALL MOUNT,
STATIONARY

CODE IDENT NO.
SIZE C
NASA NUMBER 1011566
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

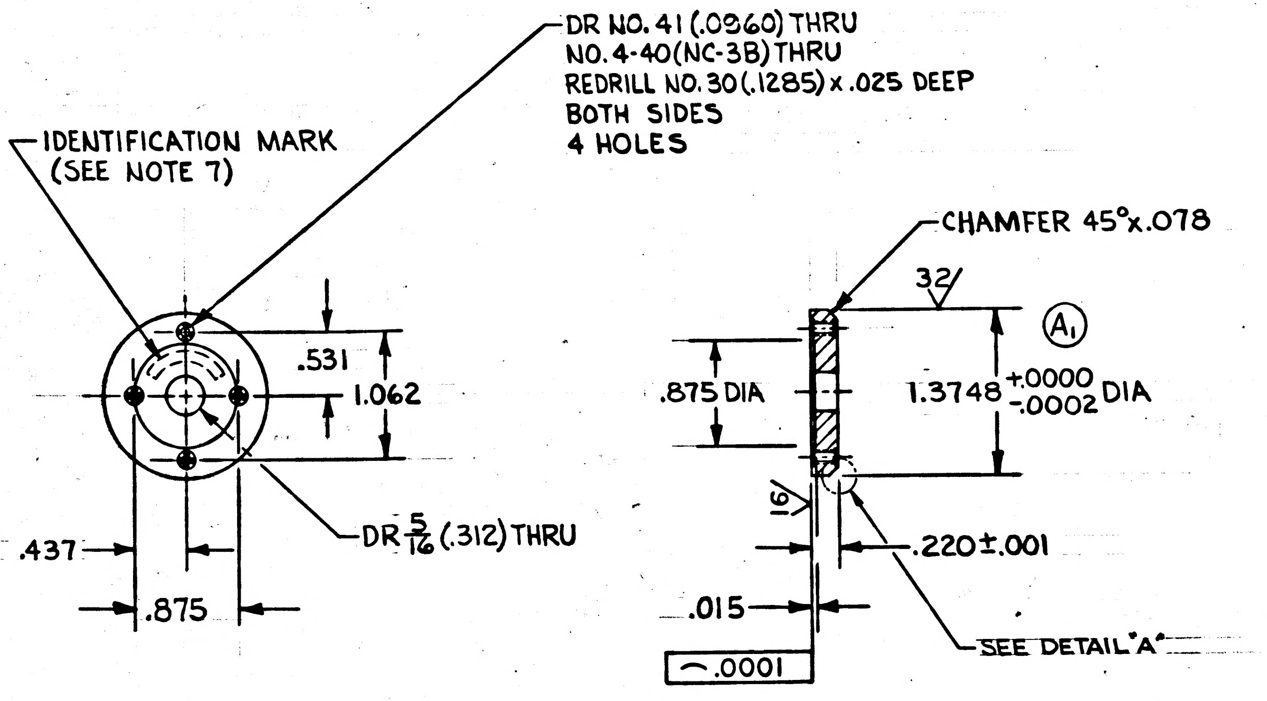
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011566

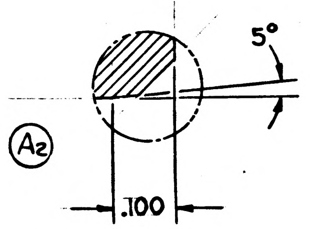
1011567 A

REVISIONS TPRR 01583				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO. 05496	12-27 63	WK

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. HEAT TREAT TO ROCKWELL C-58 MIN PER ND 1002087.
6. PASSIVATE PER MIL-STD-171 (KPS-10051.200)
7. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019.



DR NO. 41 (.0960) THRU
NO. 4-40 (NC-3B) THRU
REDRILL NO. 30 (.1285) x .025 DEEP
BOTH SIDES
4 HOLES
IDENTIFICATION MARK
(SEE NOTE 7)
.531
1.062
.437
.875
DR 5/16 (.312) THRU
CHAMFER 45° x .078
32√
A1
.875 DIA
1.3748 +.0000 -.0002 DIA
16√
.220 ± .001
.015
⌒ .0001
SEE DETAIL "A"



DETAIL "A"
SCALE 4/1

MASTER

A3

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011738	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL CORROSION RESISTANT STEEL FED. SPEC: QQ-S-763, CLASS 440C, CONDITION A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386900860

DRAWN V. AMATO DATE 3-5-63
CHECKED W. W. Lang 5-23-63
APPROVAL E. A. MacDonald 5-24-63
APPROVAL R. W. Bass 6-3-63
NASA APPROVAL Jack Barnes
MIT APPROVAL R. E. Larson Jr. 6/14/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
INSERT, BALL MOUNT, PLANE BASE

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011567

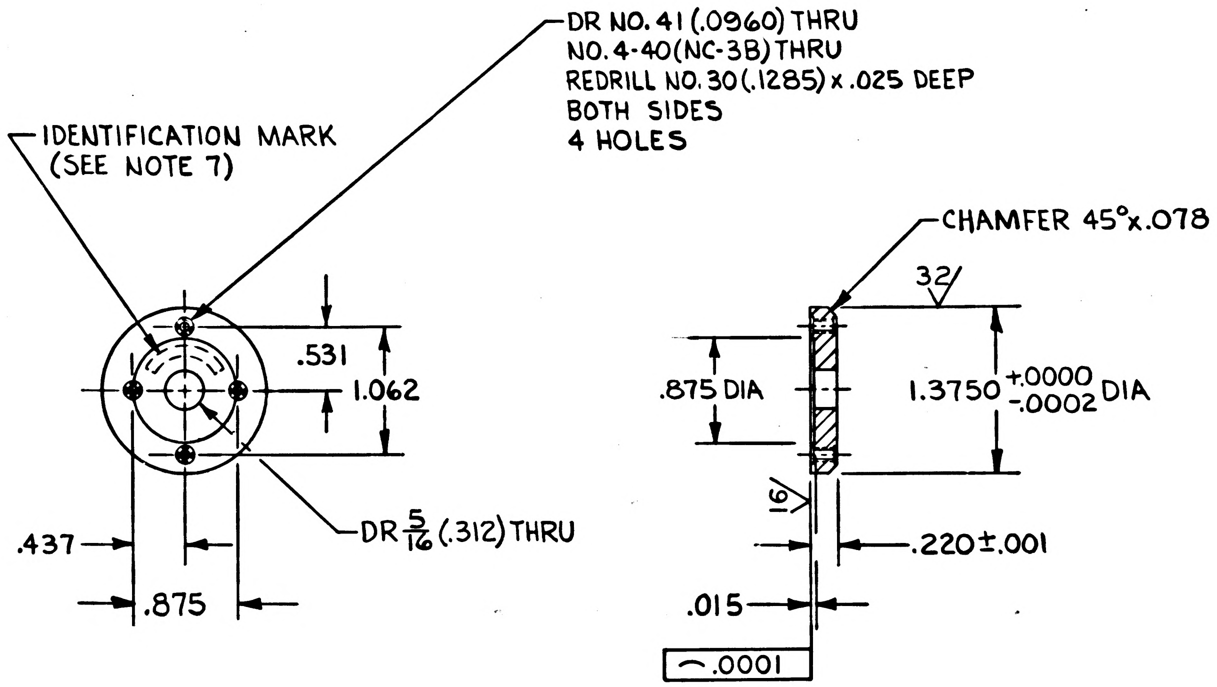
SCALE 1/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011567

SYM	ZONE	REVISIONS TDRR 01583 DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. HEAT TREAT TO ROCKWELL C-58 MIN PER ND 1002087.
6. PASSIVATE PER MIL-STD-171 (KPS-10051.200)
7. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019.


DR NO. 41 (.0960) THRU
NO. 4-40(NC-3B) THRU
REDRILL NO. 30 (.1285) x .025 DEEP
BOTH SIDES
4 HOLES
IDENTIFICATION MARK
(SEE NOTE 7)
.531
1.062
DR 5/16 (.312) THRU
.437
.875
CHAMFER 45° x .078
32
.875 DIA
1.3750 +.0000 -.0002 DIA
16
.220±.001
.015
⌒.0001

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011738	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± 1°

DO NOT SCALE THIS DRAWING
MATERIAL STAINLESS STEEL AISI 440C FED. SPEC: QQ-S-763, CLASS 440C, CONDITION A
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386900860
DRAWN V. AMATO DATE 3-5-63
CHECKED W.W. Lang 5-23-63
APPROVAL E.A. Macdonald 5-24-63
APPROVAL R.W. Boos 6-3-63
NASA APPROVAL Jack Barnes
MIT APPROVAL 6/14/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
INSERT, BALL MOUNT,
PLANE BASE

CODE IDENT NO.
SIZE C
NASA NUMBER 1011567
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

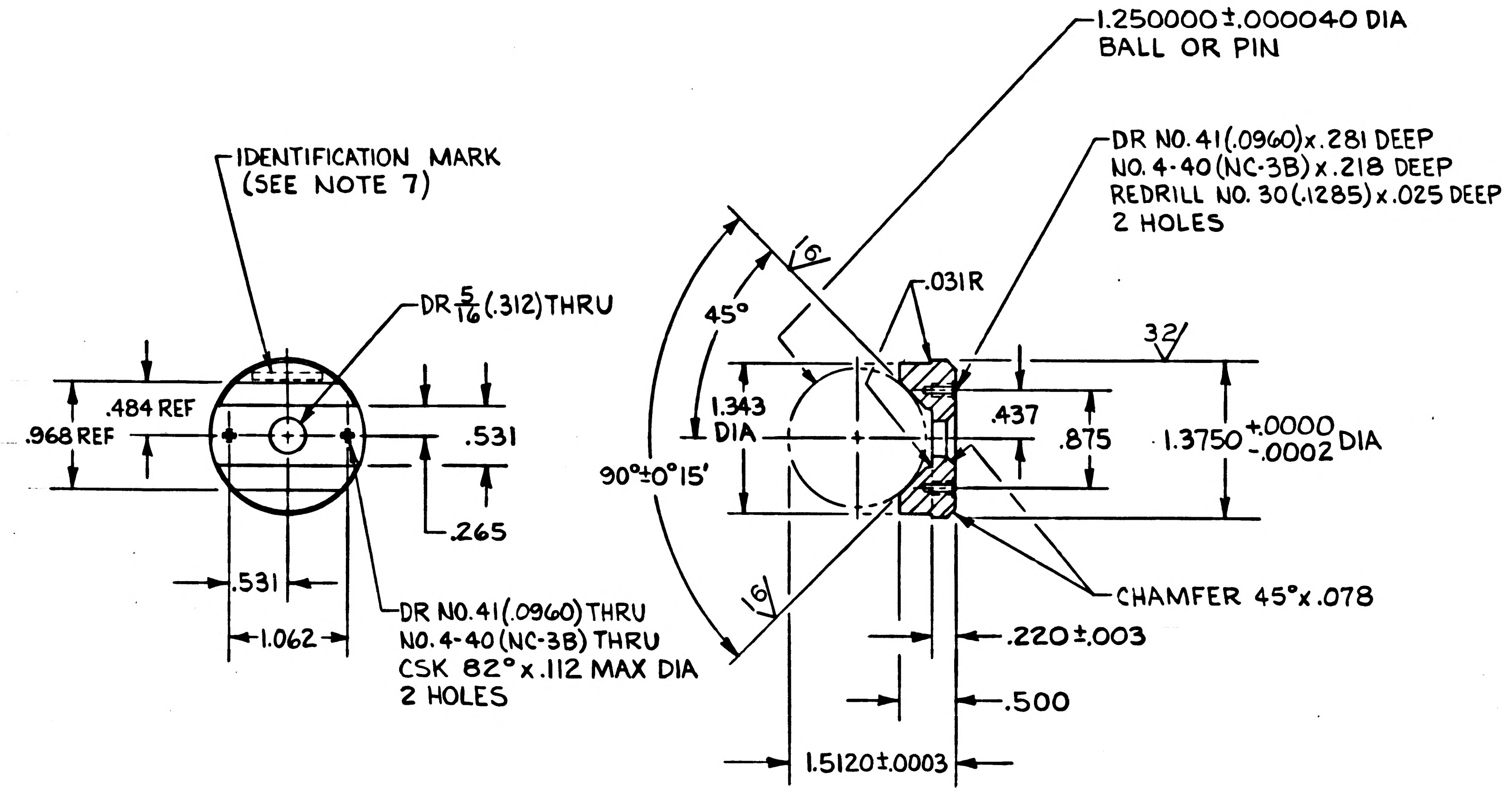
E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

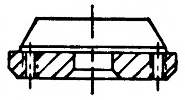
1011569

REVISIONS			TDRR 01583	
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. HEAT TREAT TO ROCKWELL C-58 MIN PER ND1002087.
6. PASSIVATE PER MIL-STD-171 (KPS-10051.200).
7. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND1002019.



1.250000±.000040 DIA
BALL OR PIN
DR NO. 41 (.0960) x .281 DEEP
NO. 4-40 (NC-3B) x .218 DEEP
REDRILL NO. 30 (.1285) x .025 DEEP
2 HOLES
IDENTIFICATION MARK
(SEE NOTE 7)
DR 5/16 (.312) THRU
.031R
32√
45°
16
1.343
DIA
.437
.875
1.3750 +.0000 -.0002 DIA
.484 REF
.968 REF
.531
.265
90°±0°15'
.531
1.062
DR NO. 41 (.0960) THRU
NO. 4-40 (NC-3B) THRU
CSK 82° x .112 MAX DIA
2 HOLES
16
CHAMFER 45° x .078
.220±.003
.500
1.5120±.0003



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011739	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± –	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL STAINLESS STEEL AISI 440 C
FED. SPEC: QQ-S-763, CLASS 440 C, CONDITION A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386900880

DRAWN V. AMATO DATE 3-6-63
CHECKED W. W. Lang 5-24-63
APPROVAL 5-24-63
APPROVAL 6-3-63

NASA APPROVAL Jack Barnes

MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
INSERT, BALL MOUNT,
LINE BASE

CODE IDENT NO.
SIZE C
NASA NUMBER 1011569

SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

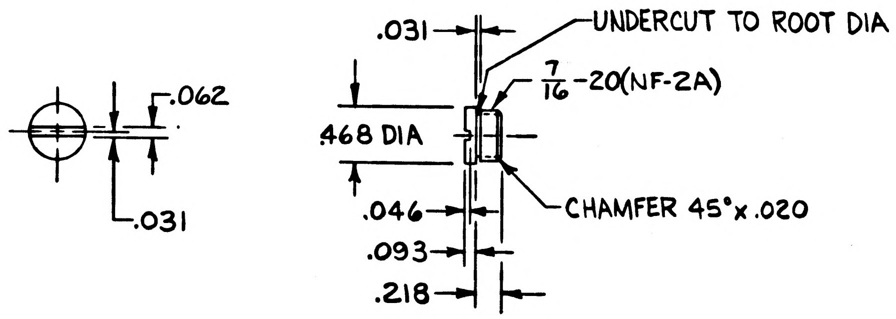
E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

	1011573

REVISIONS TDRR 01583			
SYM	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. PASSIVATE PER MIL-STD-171 (KPS-10051.200)



MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± –	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL STAINLESS STEEL AISI 440C FED. SPEC: QQ-S-763, CLASS 440 C, CONDITION A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386900920

DRAWN V. AMATO DATE 3-8-63
CHECKED W.W. Lang 5-20-63
APPROVAL 6-3-63
APPROVAL R.H. Gras 6-3-63

NASA APPROVAL Jack Barnes
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE PLUG

CODE IDENT NO.	SIZE	NASA NUMBER
	B	1011573

SCALE 1/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

E-153

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

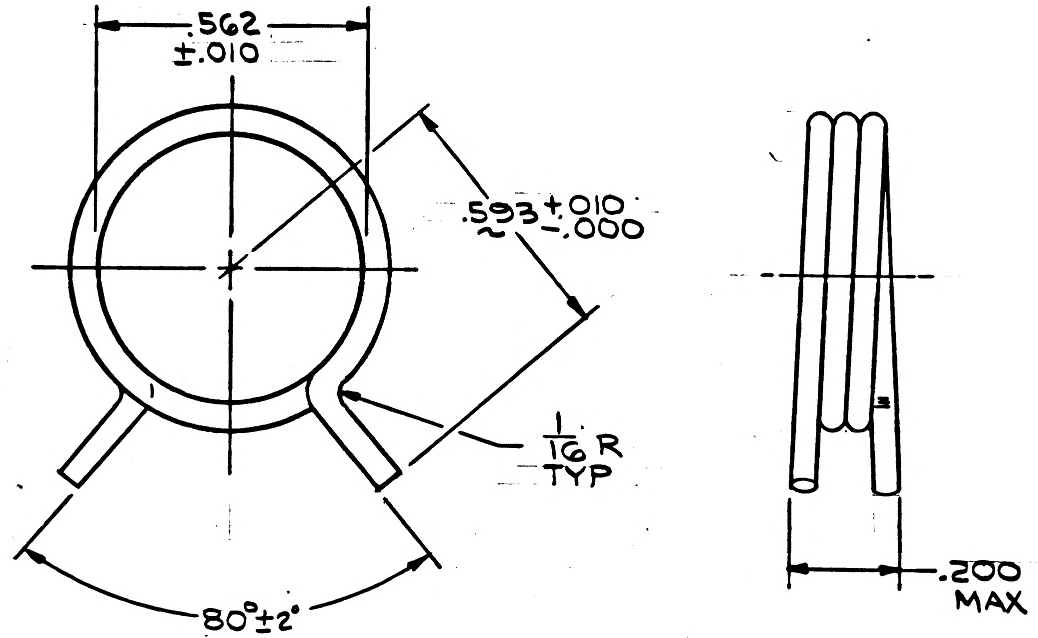
1011577 A

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	A-4	"USED ON" NO. WAS 1011701 TDRR NO. 02242	7-17-63	WC 7-24-63

REVISIONS TDRR 01141

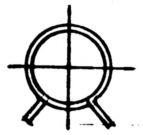
NOTES:-

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. MATERIAL:
   U.S. STEEL WIRE GA #17 (.054)
   STAINLESS STEEL TY17-7PH
   SPRING TEMPER
   AISI 301 PH



SPRING DATA

WIRE DIA ________ .054 REF
NO. OF TURNS ________ 2.7
I.D. ________ .562 REF
FREE ANGLE ________ 80° REF
SPRING RATE ________ 5 LB IN/60° ± 10%



ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
Ⓐ 1011706	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 3

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 56386900290

DRAWN R. BRUNELLE DATE 3-8-63
CHECKED 4-19-63
APPROVAL G. Rankin 4-30-63
APPROVAL E. Pharm 4-30-63
NASA APPROVAL
MIT APPROVAL 8 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SPRING, TORSION

CODE IDENT NO.
SIZE C
NASA NUMBER 1011577
SCALE 4/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011577 A

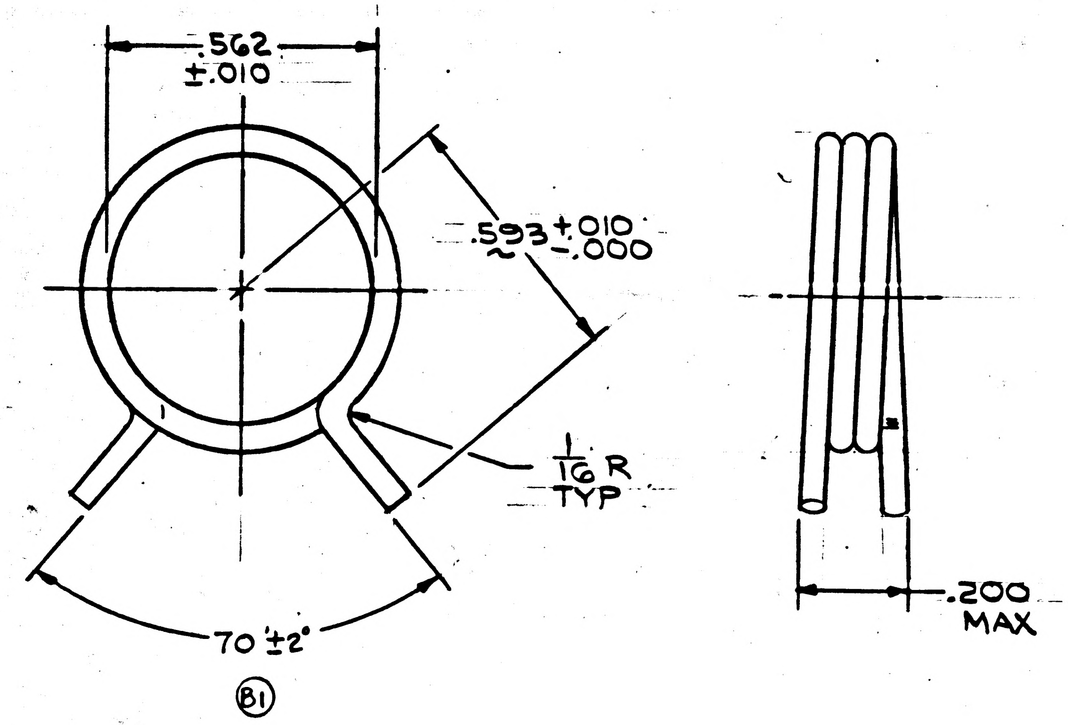
B 1011577 (M)

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	A-4	"USED ON" NO. WAS 1011701 TDRR NO. 02242	7-17-63	WE 7-24-63
B4	B5 A5 D6	GENERAL CHANGES. SEE TDRR NO.	8-1-63	WK 8/6/63

REVISIONS TDRR 01141

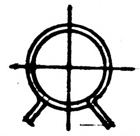
NOTES:-

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ~~ND 1002078~~
3. MATERIAL:
   U.S. STEEL WIRE GA #17 (.054)
   STAINLESS STEEL TY 17-7PH
   SPRING TEMPER
   AISI 301 PH
4. IDENTIFY USING NASA DWG. NO., REVISION LETTER AND (B4) MANUFACTURERS SYMBOL IN ACCORD WITH ND 1002019.



SPRING DATA (B2)

WIRE DIA	.057 REF
NO. OF TURNS	2.8
I.D.	.562 REF
FREE ANGLE	70° REF (B3)
SPRING RATE	2.8 LB IN/55° ± 10%



ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
(A) 1011706	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 3

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 56386900290

DRAWN R. BRUNELLE DATE 3-8-63
CHECKED [illegible] 4-19-63
APPROVAL [illegible] 4-30-63
APPROVAL E. [illegible] 4-30-63

NASA APPROVAL [illegible]
MIT APPROVAL [illegible] 8/4/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SPRING, TORSION

CODE IDENT NO.
SIZE C
NASA NUMBER 1011577

SCALE 4/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

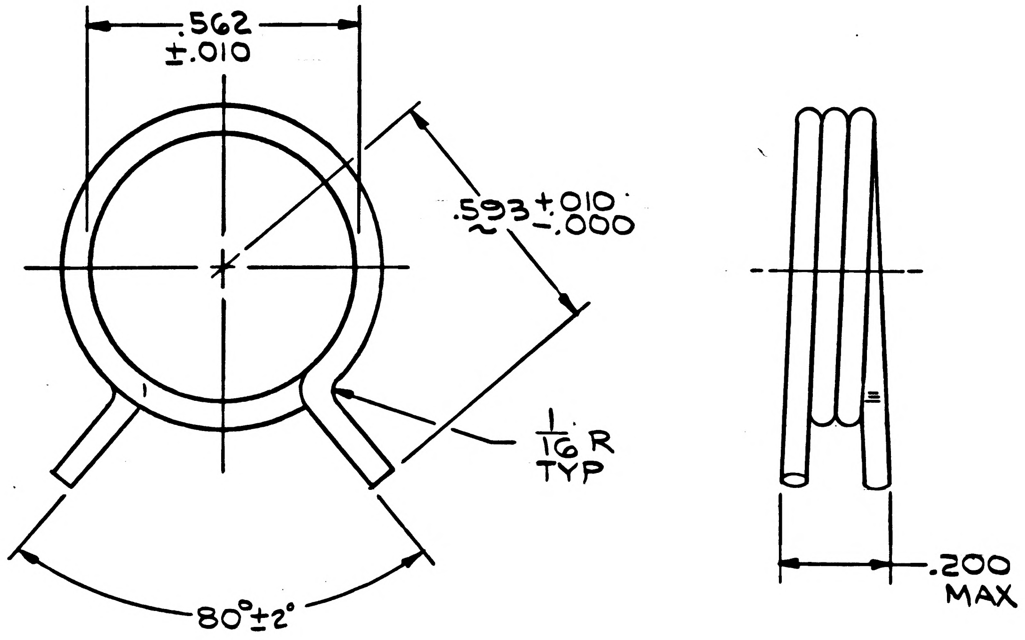
	LLS1101

REVISIONS TDRR 21141

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

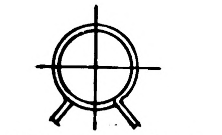
NOTES:-

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. MATERIAL:
   U.S. STEEL WIRE GA #17 (.054)
   STAINLESS STEEL TY 17-7PH
   SPRING TEMPER
   AISI 301 PH



SPRING DATA

WIRE DIA	.054 REF
NO. OF TURNS	2.7
I.D.	.562 REF
FREE ANGLE	80° REF
SPRING RATE	5 LB IN/60° ± 10%


ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011706	1011701

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 3

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 56386900290

DRAWN R. BRUNELLE DATE 3-8-63
CHECKED 4-19-63
APPROVAL 4-30-63
APPROVAL E. [illegible] 4-30-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SPRING, TORSION

CODE IDENT NO.
SIZE C
NASA NUMBER 1011577
SCALE 4/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

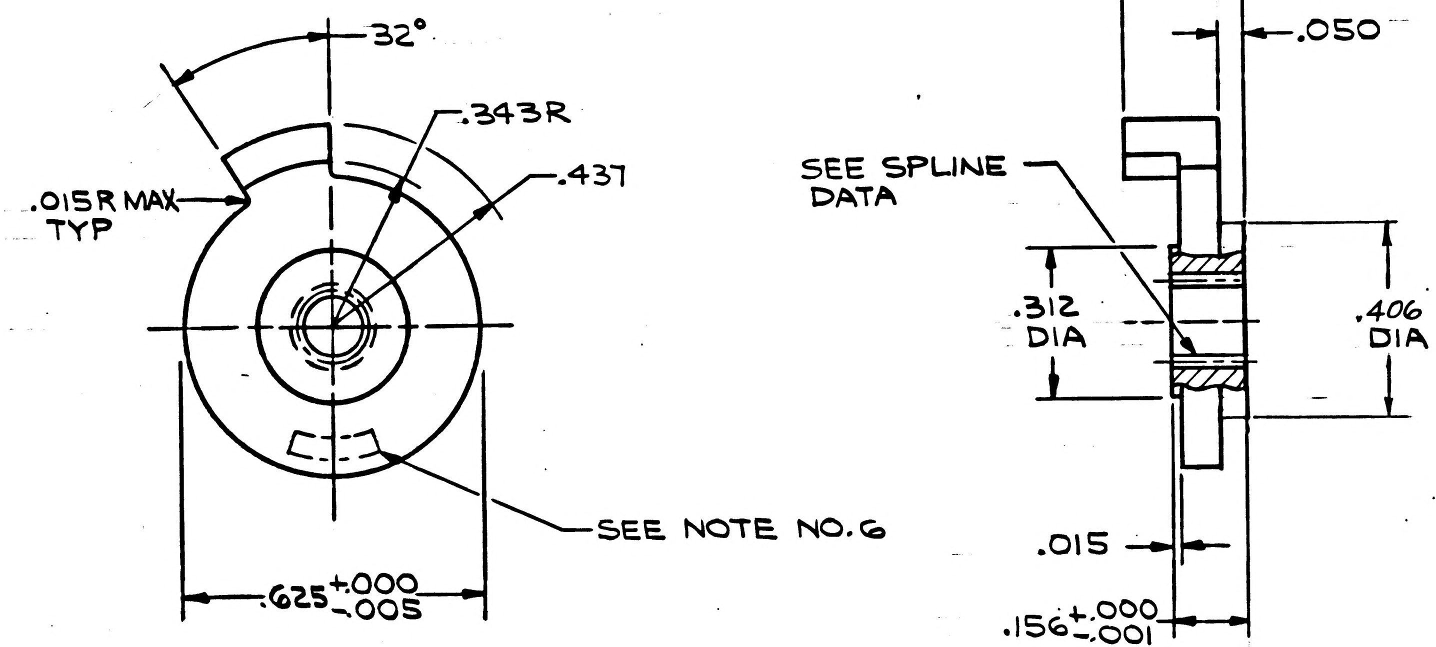
1011577

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011578

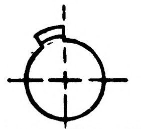
REVISIONS TDRR 21141				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

INTERNAL SPLINE DATA (INVOLUTE)	
AM. STD FLAT ROOT SIDE FIT - CLASS 2	
NO OF TEETH	8
PITCH	48/96
PRESSURE ANGLE	30°
PITCH DIAMETER (REF)	.1667
MAJOR DIAMETER	.1875 +.002 −.000
MINOR DIAMETER	.1458 +.0020 −.0000
CIRCULAR SPACE WIDTH	.0330 +.0002 −.0000
TOOTH FINISH	32√



6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019
5. ANODIZE PER MIL-A-8625 TYPE II (KPS-1005A.200)
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
3. UNLESS OTHERWISE SPECIFIED:-
   a) 63√ FINISH ALL OVER
   b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

NOTES:-



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011706	1011701

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± −	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 2024-T4 FED. SPEC QQ-A-268 TEMPER T4

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK

KIC PN 57386900930

DRAWN R.BRUNELLE DATE 3-7-63
CHECKED 4-23-63
APPROVAL 4-30-63
APPROVAL E. Thomp 4-30-63

NASA APPROVAL Jack Barnard
MIT APPROVAL 8 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
DOG, LIMIT STOP, OUTER

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011578

SCALE 4/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

1011578

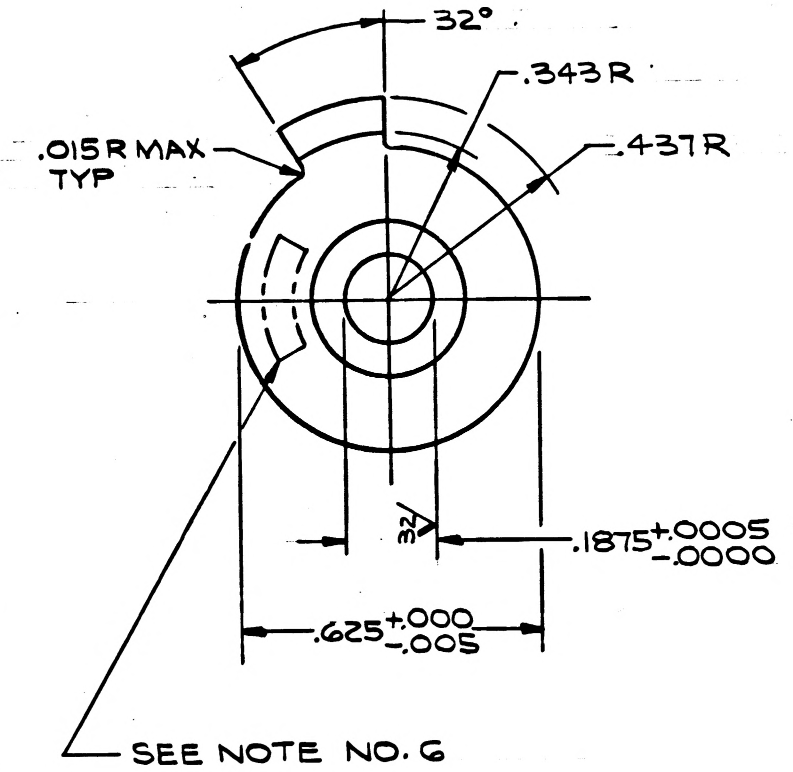
E-154

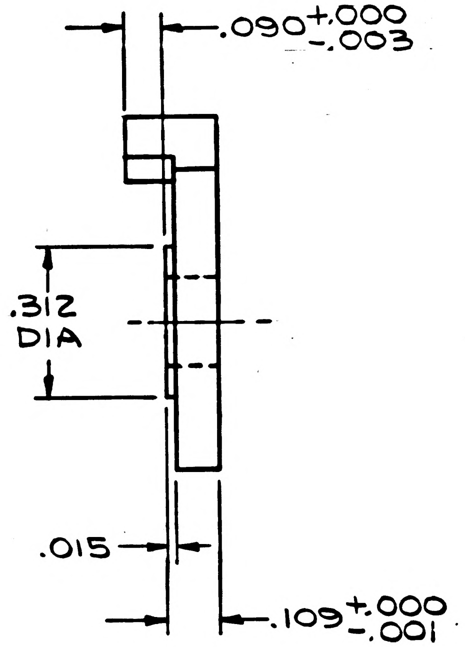
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

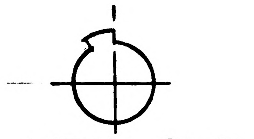
1011579

REVISIONS TDRR 01141				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:-
   - a) 63√ FINISH ALL OVER
   - b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. ANODIZE PER MIL-A-8625 TYPE II (KPS-1005A.200)
6. IDENTIFY USING NASA DRAWING NO. REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019






ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011706	1011701
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING
MATERIAL ALUMINUM ALLOY 2024-T4 FED SPEC QQ-A-268 TEMPER T4
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386900940
DRAWN R. BRUNELLE DATE 3-7-63
CHECKED 4-22-63
APPROVAL 4-30-63
APPROVAL E. Thorup 4-30-63
NASA APPROVAL Jack Bernard
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
DOG, LIMIT STOP, MIDDLE

CODE IDENT NO.
SIZE C
NASA NUMBER 1011579
SCALE 4/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

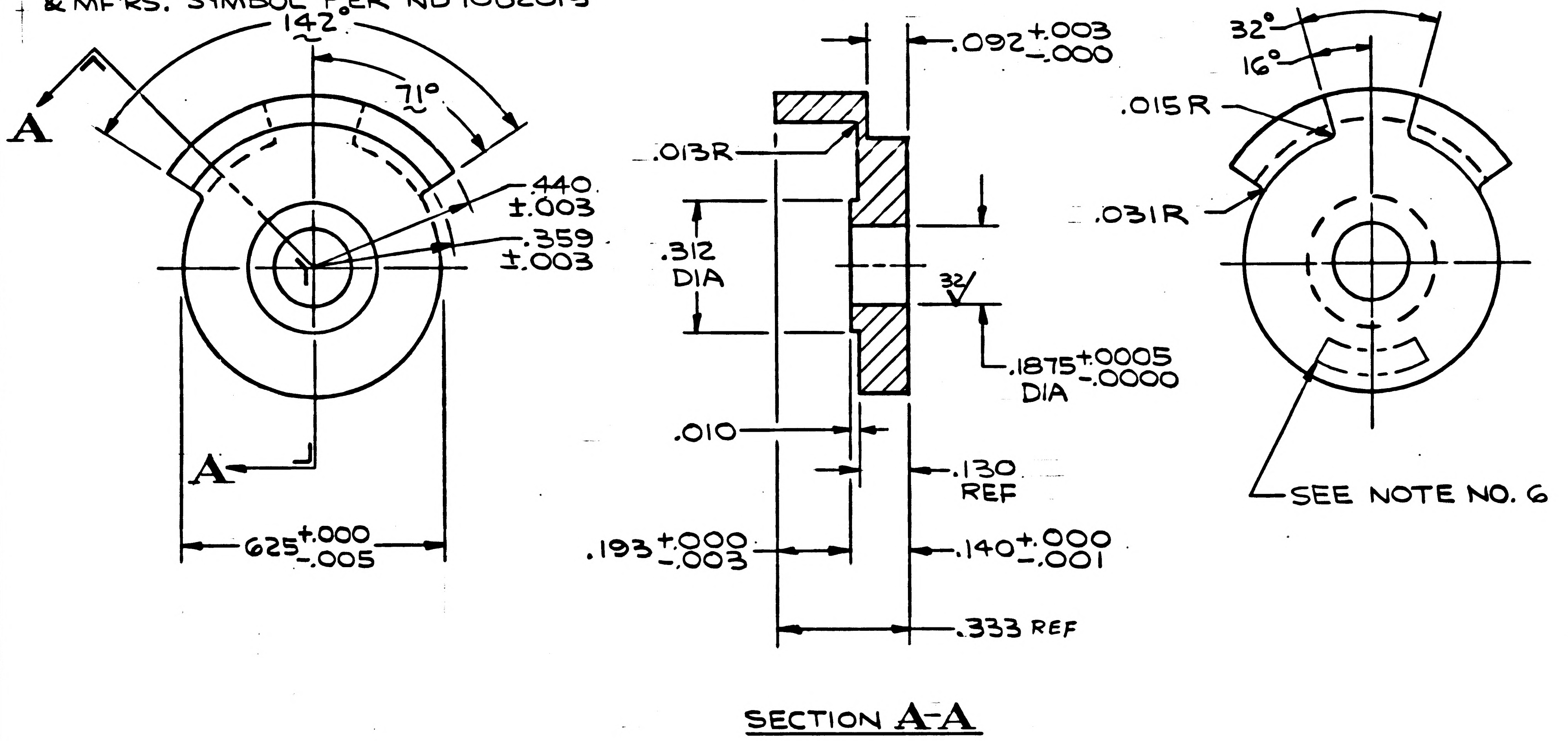
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011579

1011580

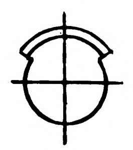
REVISIONS TDRR 31141				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:-
   - a) $\overset{63}{\surd}$ FINISH ALL OVER
   - b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. ANODIZE PER MIL-A-8625 TYPE II (KPS-1005A.200)
6. IDENTIFY (OPP SIDE) USING NASA DWG. NO., REVISION LETTER & MF'RS. SYMBOL PER ND 1002019



142°
71°
A
A
.440 ±.003
.359 ±.003
.625 +.000 -.005
.092 +.003 -.000
.013R
.312 DIA
32
.1875 +.0005 -.0000 DIA
.010
.130 REF
.193 +.000 -.003
.140 +.000 -.001
.333 REF
32°
16°
.015R
.031R
SEE NOTE NO. 6

SECTION A-A



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011706	1011701

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 2024-T4 FED SPEC QQ-A-268 TEMPER T4

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386900950

DRAWN R. BRUNELLE DATE 3-7-63
CHECKED 4-22-63
APPROVAL 4-30-63
APPROVAL E. Dhong 4-30-63
NASA APPROVAL
MIT APPROVAL 8 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE DOG, LIMIT STOP, INNER

CODE IDENT NO.
SIZE C
NASA NUMBER 1011580
SCALE 4/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

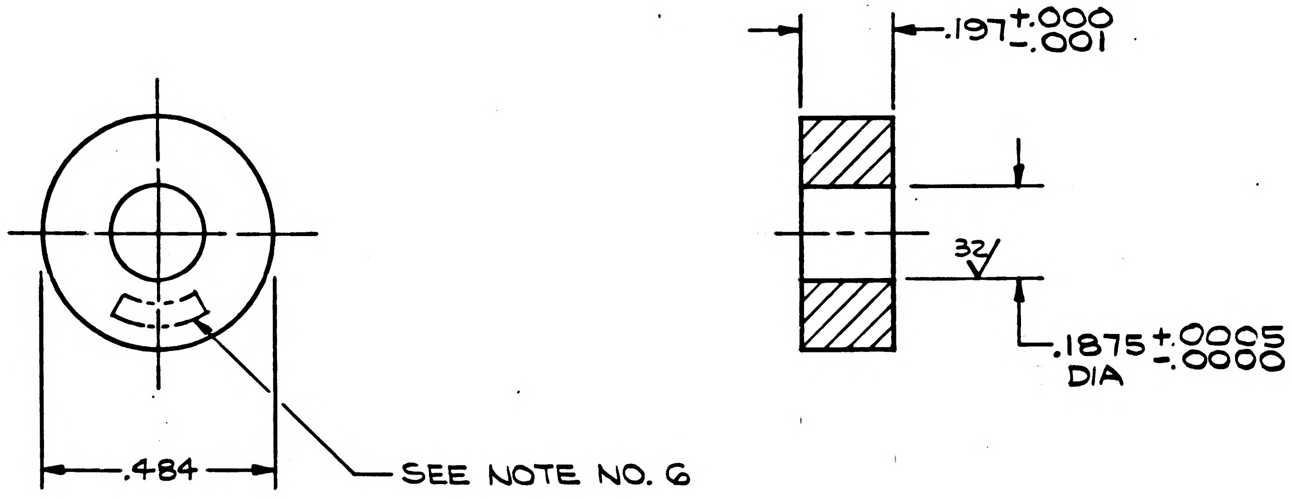
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

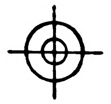
	18S1101

REVISIONS TDRR 01141

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:-
   - a) 63/√ FINISH ALL OVER
   - b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. ANODIZE PER MIL-A-8625 TYPE II (KPS-1005A.200)
6. IDENTIFY USING NASA DRAWING NO. REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019




ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011706	1011701

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± —

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 2024-T4 FED. SPEC QQ-A-268 TEMPER T4

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386900960

DRAWN R. BRUNELLE DATE 3-8-63
CHECKED 4-19-63
APPROVAL 4-30-63
APPROVAL E. Thorup 4-30-63
NASA APPROVAL
MIT APPROVAL 1 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE GUIDE, SPRING, LIMIT STOP

CODE IDENT NO.
SIZE C
NASA NUMBER 1011581
SCALE 4/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

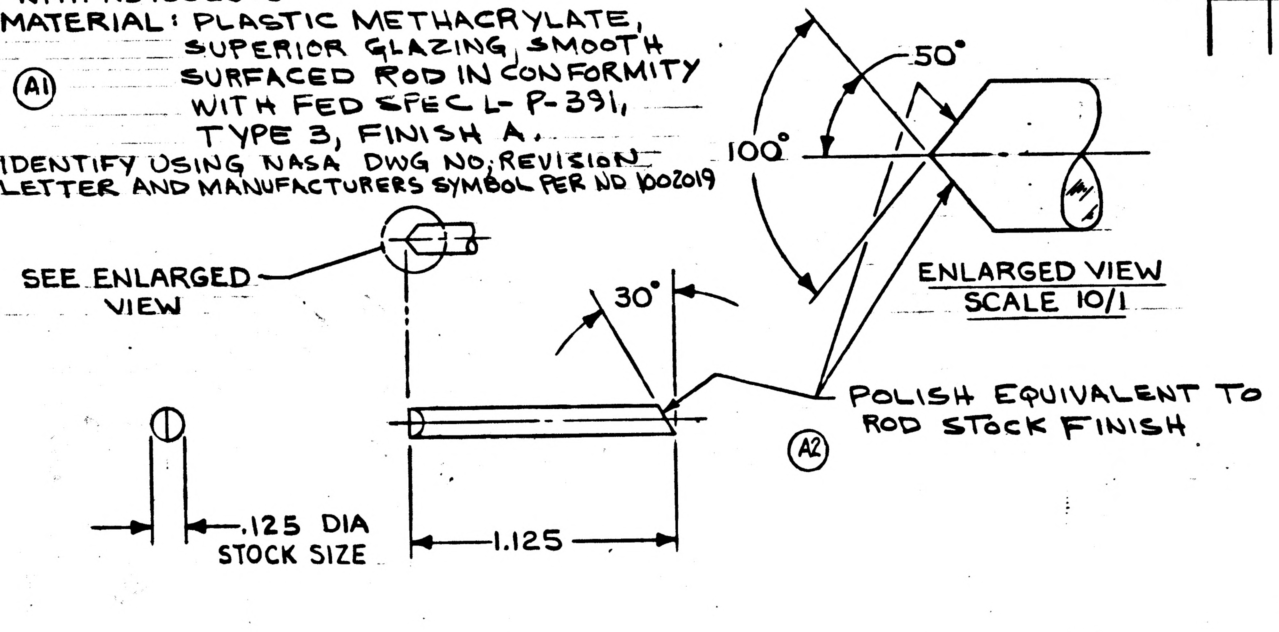
1011581

1011584 A

REVISIONS 01369			
SYM	DESCRIPTION	DATE	APPROVAL
A3	GENERAL CHANGES TDRR 02261	7/27/63	WH 8/6/63

NOTES:

1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORD WITH ND1002078
3. MATERIAL: PLASTIC METHACRYLATE, SUPERIOR GLAZING, SMOOTH SURFACED ROD IN CONFORMITY WITH FED SPEC L-P-391, TYPE 3, FINISH A. Ⓐ1
4. IDENTIFY USING NASA DWG NO, REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

ACTUAL SIZE

MASTER

Ⓐ3 1011797	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL: SEE NOTE 3

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 25386900060

DRAWN J. Schiller DATE 3-11-63
CHECKED V.W. Lang 5-22-63
APPROVAL E. Ruchmann 5-22-63
APPROVAL E. Thorup 5-22-63
NASA APPROVAL Jack Barnard
MIT APPROVAL W Kaffer 8/4/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
ROD,
ILLUMINATING

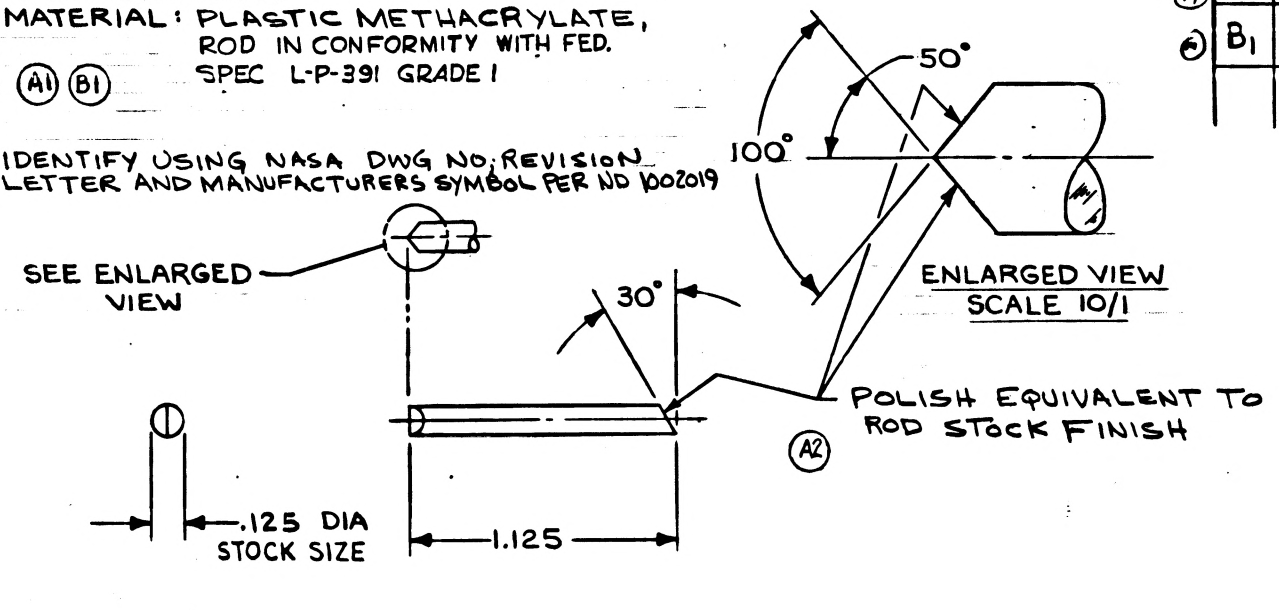
CODE IDENT NO.	SIZE	NASA NUMBER
	B	1011584
SCALE 2/1	WEIGHT CALC ACTUAL	SHEET 1 OF 1

E-153

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011584 B

NOTES:
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORD WITH ND1002078
3. MATERIAL: PLASTIC METHACRYLATE, ROD IN CONFORMITY WITH FED. SPEC L-P-391 GRADE I (A1) (B1)
4. IDENTIFY USING NASA DWG NO, REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019



REVISIONS 01369				
	SYM	DESCRIPTION	DATE	APPROVAL
(M) (M)	A3	GENERAL CHANGES TDRR 02261	7/27/63	WK 8/6/63
	B1	REVISED PER TDRR NO. 03797		WK

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

(A3) 1011797	1011000
NEXT ASSY	USED ON
APPLICATION	

ACTUAL SIZE

MASTER

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 3

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 25386900060

DRAWN J. Scillo DATE 3-11-63
CHECKED W.W. Lang 5-22-63
APPROVAL 5-22-63
APPROVAL E. Morup 5-22-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
ROD,
ILLUMINATING

CODE IDENT NO.
SIZE B
NASA NUMBER 1011584
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

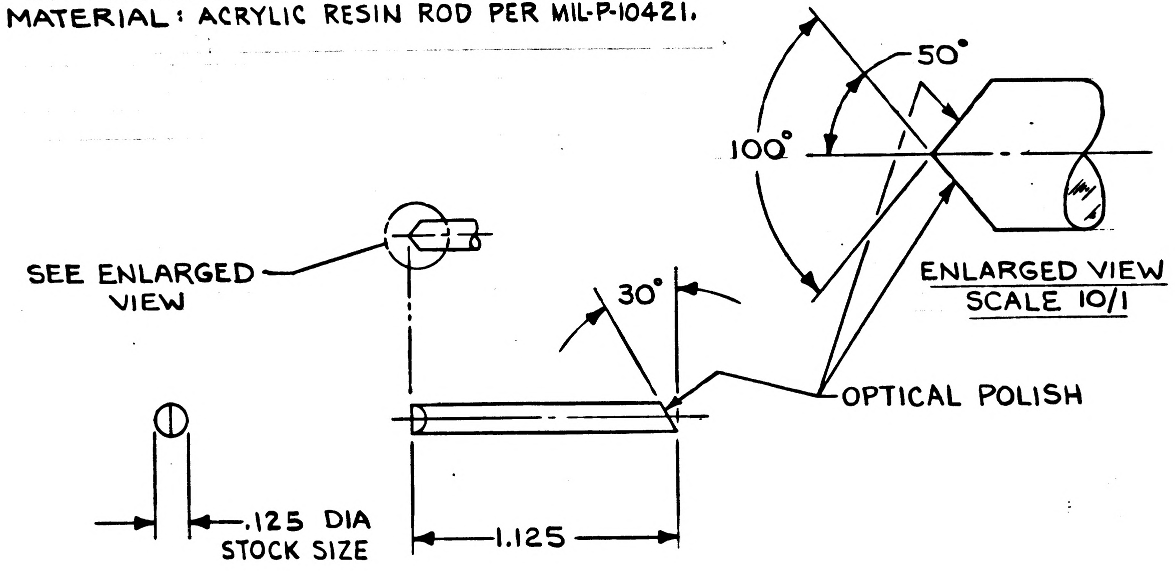
E-153

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011584

REVISIONS 01369			
SYM	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORD WITH ND1002078
3. MATERIAL: ACRYLIC RESIN ROD PER MIL-P-10421.



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	±.005	± 1°

DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE 3
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 25386900060
DRAWN J. Schiller DATE 3-11-63
CHECKED W.W. Lang 5-22-63
APPROVAL 5-22-63
APPROVAL E. Thorup 5-22-63
NASA APPROVAL Jack Barnard
MIT APPROVAL 24 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
ROD,
ILLUMINATING

CODE IDENT NO.
SIZE B
NASA NUMBER 1011584
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

ACTUAL SIZE

E-153

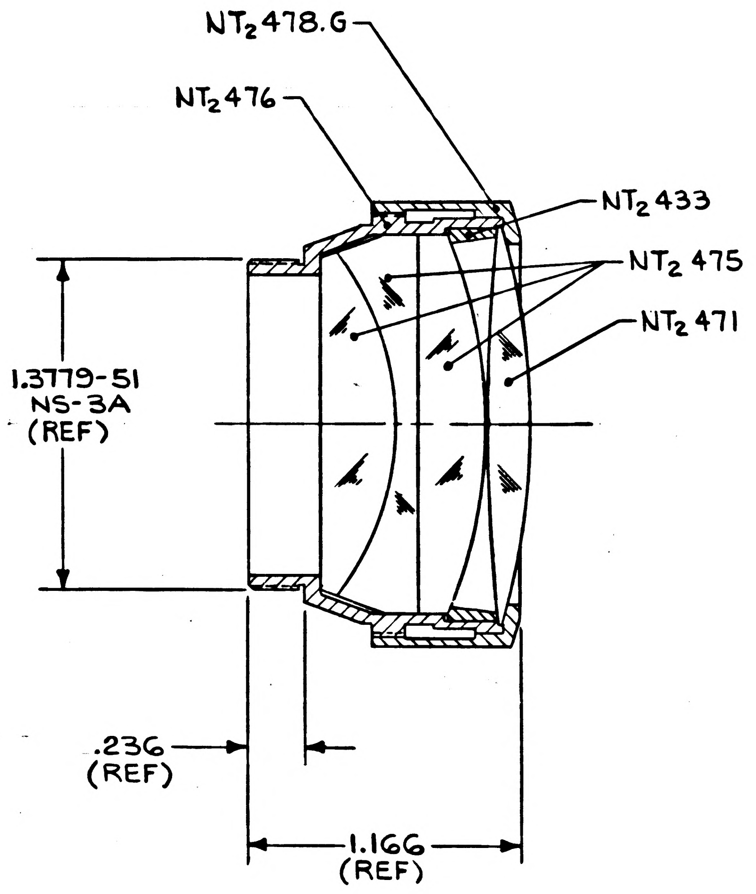
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

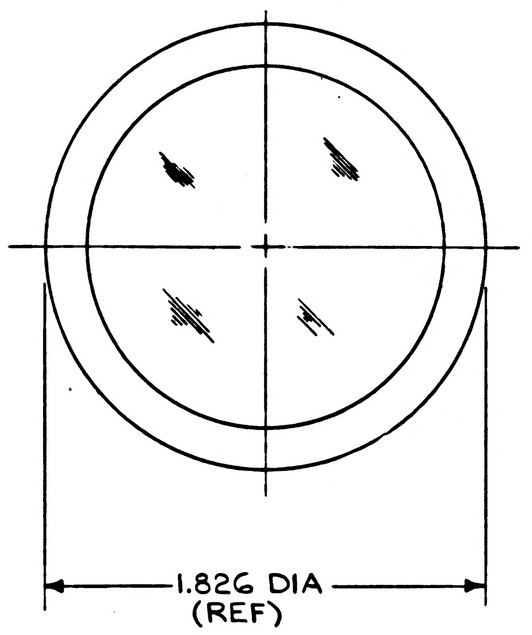
1011585

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REVISIONS TDRR 01640

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING DRAWING NO., REVISION LETTER, AND MANUFACTURERS SYMBOL PER MIL-STD-130.
3. OPTICAL DATA
   EFL = 115.3 ± 1.0MM
   BFL = 92.1 ± 1.0MM
4. PREPARATION FOR DELIVERY PER MIL-P-116 (KES-1003D.1 CLASS I).
5. INSPECT LENS ASSY IN ACCORDANCE WITH MIL-O-13830.





ORIGINAL SOURCE OF SUPPLY:
WILD HEERBRUGG INSTRUMENTS INC.
MAIN & COVERT STREETS
PORT WASHINGTON, L.I., N.Y.

VENDERS PART NO.
SEE CALLOUTS ON DRAWING.

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011736	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	± ~	± ~

DO NOT SCALE THIS DRAWING

MATERIAL ~

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 74471371001

DRAWN F. Schiller DATE 3-11-63
CHECKED W.W. Lang 5-28-63
APPROVAL Thornton Stearns 6-17-63
APPROVAL E. Morris 6-17-63
NASA APPROVAL 6/13/63
MIT APPROVAL 6/19/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OBJECTIVE LENS ASSEMBLY
SOURCE CONTROL DWG

CODE IDENT NO.
SIZE C
NASA NUMBER 1011585
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

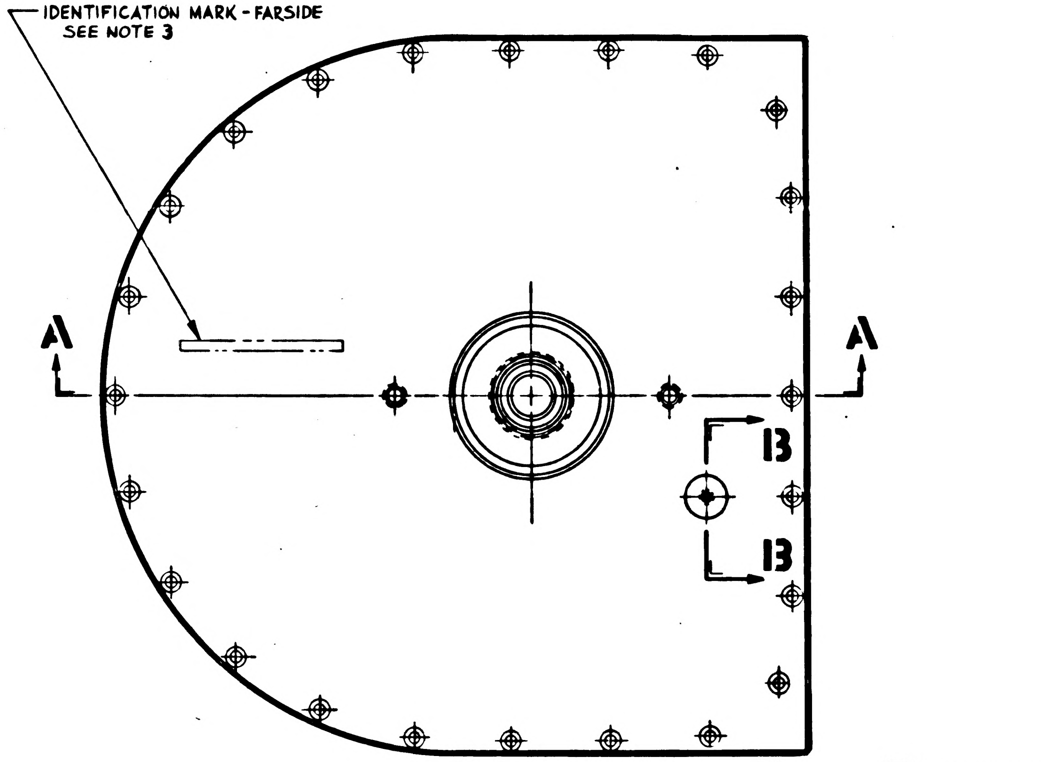
A	1011586

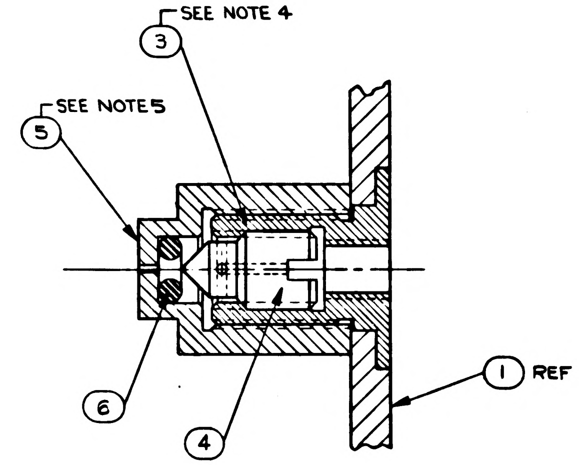
REVISIONS TDRR 014				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO. 10051	6/9/64	

NOTES:

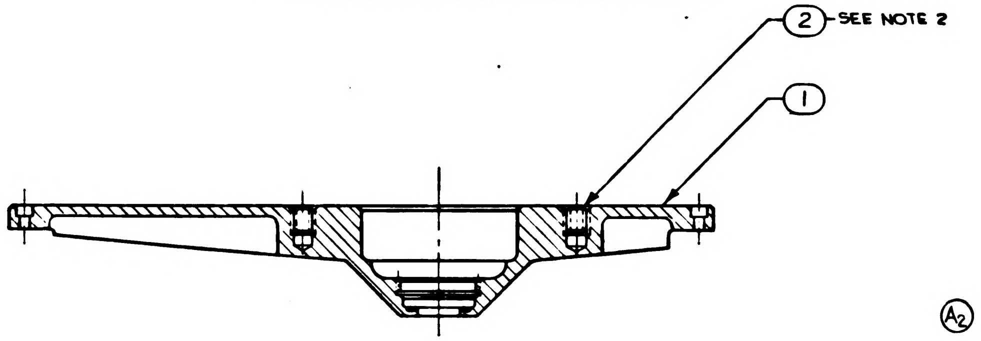
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. INSTALL ITEM ② PER ND1002121
3. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019
4. CEMENT ITEM ③ TO ITEM ① USING ITEM ⑦ AND CURE AT 150° ± 3° F. FOR 2 HOURS PER ND 1002219.
5. VIBRATION PROOF ITEM ⑤ TO ITEM ③ IN ACCORDANCE WITH MIL-S-22473 (GRADE H).

(A1)





(A4) PARTIAL SECTION B-B
SCALE: 4/1



SECTION A-A

(A2)

(A3) * PURCHASE ITEM: SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
7	AR	*	1011541	74471435001		ADHESIVE, EPOXY			
6	1	*	1011768-4	74453043004		PACKING, PREFORMED			
5	1		1012034	57386901670		HOUSING, GAS INJECTION			
4	1		1012033	57386901660		VALVE, THREADED, GAS INJECTION			
3	1		1012032	57386901650		ADAPTER, THREADED, GAS INJECTION			
2	2		NAS1394C-3			INSERT, THREADED			
1	1		1011590	52386900720		PANEL, SEXTANT			

LIST OF PARTS AND MATERIALS

1011711	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900340
DRAWN Brewster DATE 3-5-63
CHECKED J. SULLIVAN 5-2-63
APPROVAL 5-3-63
APPROVAL 5-3-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SEXTANT PANEL & INSERT,
ASS'Y OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011586
SCALE 1/1
WEIGHT
CALC
ACTUAL
SHEET 1 OF 1

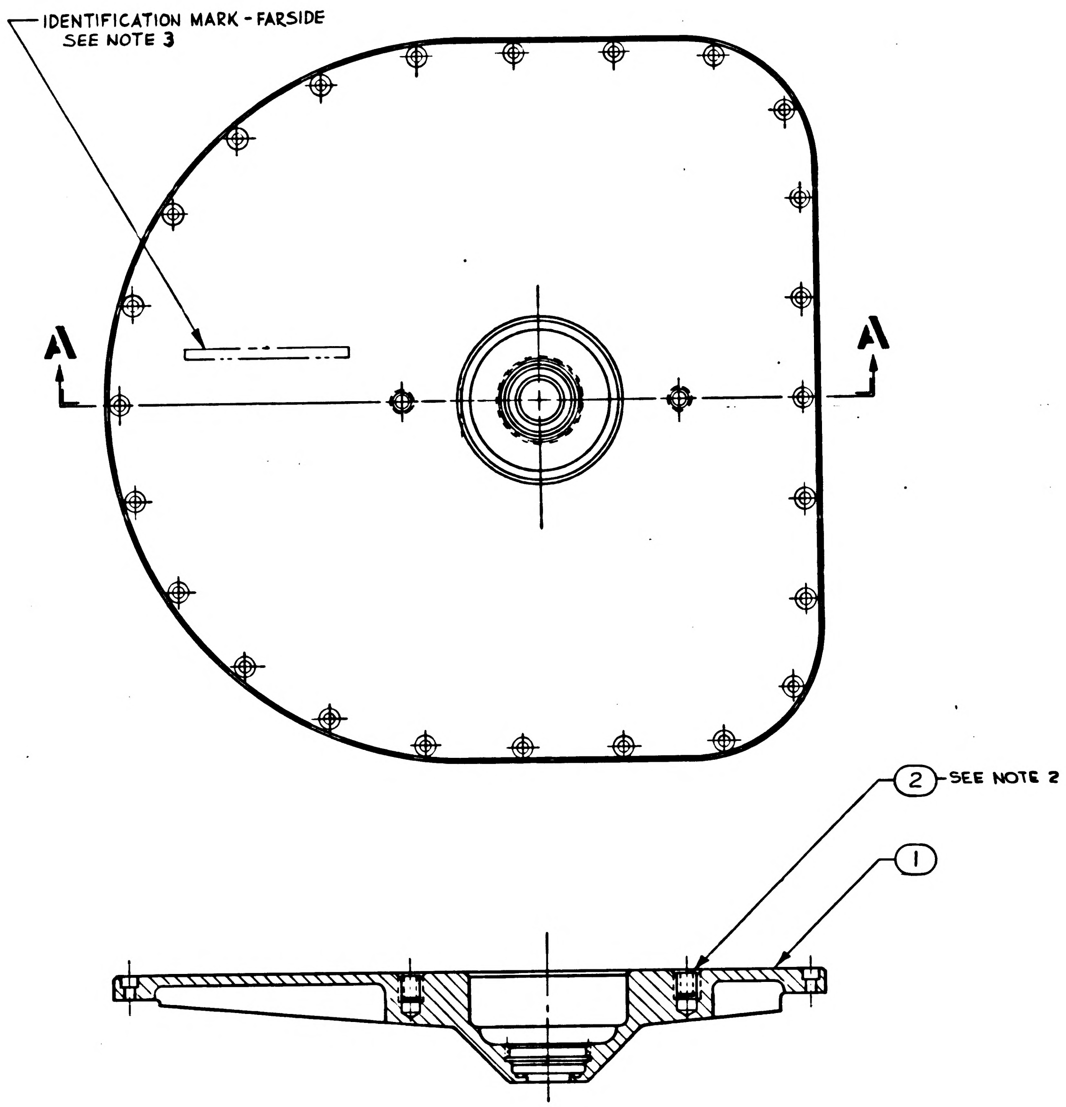
1011586 A

1011586

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. INSTALL ITEM ② PER ND1002121
3. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019



SECTION A-A

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	2		NAS1394C-3			INSERT, THREADED			
1	1		1011590	52386900720		PANEL, SEXTANT			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011711	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900340
DRAWN DATE 3-5-63
CHECKED J. SULLIVAN 5-2-63
APPROVAL 5-3-63
APPROVAL E. Mhang 5-3-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SEXTANT PANEL & INSERT,
ASS'Y OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011586
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011586

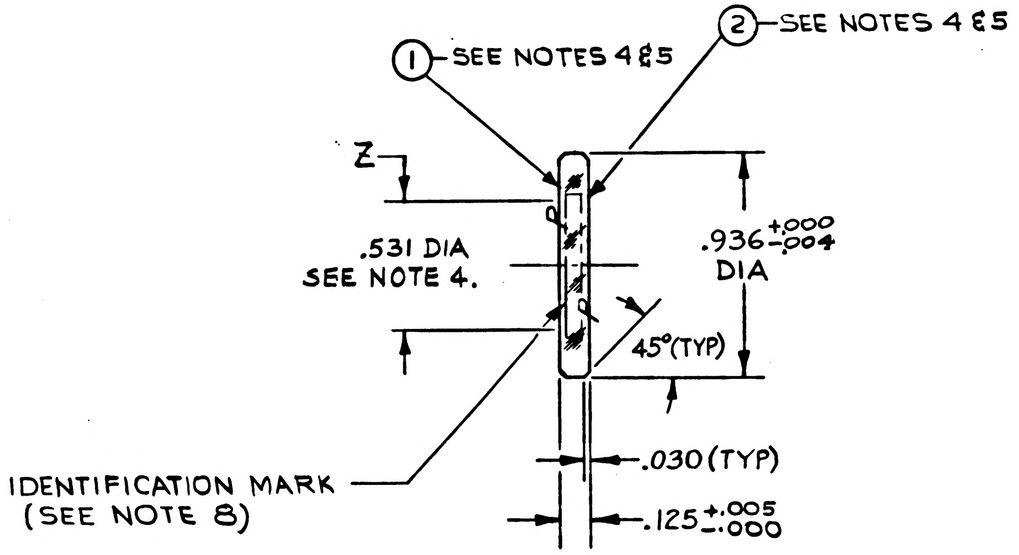
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

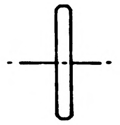
1011589

REVISIONS TDRB 6/1/71				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. ELEMENT IN ACCORDANCE WITH MIL-O-13830 (Ord).
3. MATERIAL: GLASS, OPTICAL IN ACCORDANCE WITH JAN-G-174.
   TYPE = 517-645; N_D = 1.5170±.0010; V = 64.5±.5
   GRADE = C
4. SURFACES ① AND ② POLISHED FLAT WITHIN 1/2 λ AT 5461 Å.
5. SURFACES ① AND ② PARALLEL WITHIN 0°2′
6. SURFACE QUALITY IN ZONE MARKED "Z" = 60-40
7. SURFACES MARKED "P" POLISHED, ALL OTHERS GROUND.
8. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019





ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011711	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 3

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 28386900390

DRAWN DATE 3-7-63
CHECKED T. SULLIVAN 5-2-63
APPROVAL 5-3-63
APPROVAL 5-3-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
WINDOW, GLASS

CODE IDENT NO. | SIZE C | NASA NUMBER 1011589
SCALE 2/1 | WEIGHT | CALC ACTUAL | SHEET 1 OF 1

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011589

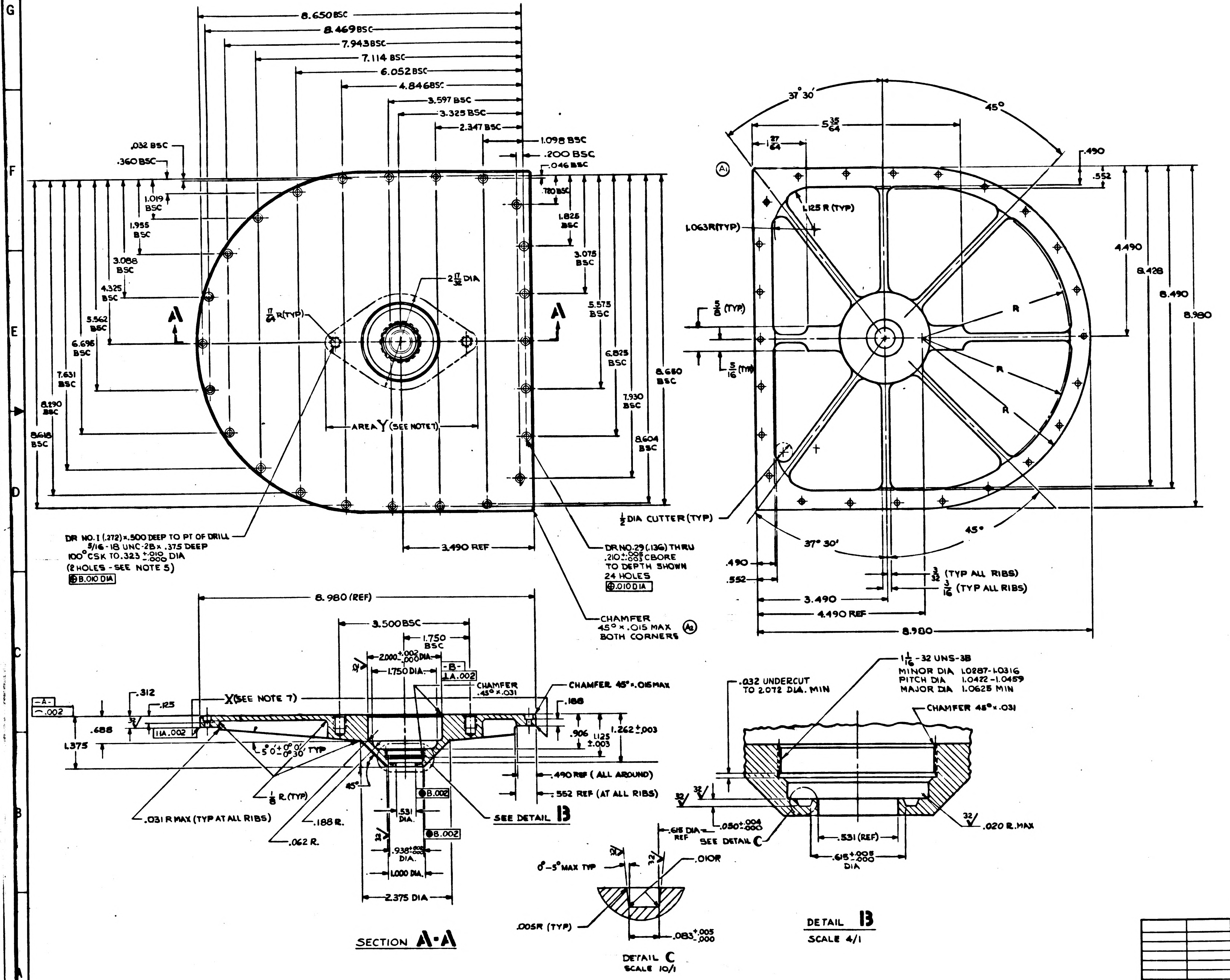
1011590

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	G-6 C-6	1) REMOVED 1.615 R (TYP) PICTORIALLY CHANGED 2) ADDED CHAMFER 45° x .015 MAX	6-16-63 7-4-63	TCRR/6Y1

REVISIONS

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   - a. 63 FINISH ALL OVER.
   - b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. USE BROACHING TOOL PER ND1002121
6. HEAT TREAT (STABILIZE & STRESS RELIEVE) PER ND1002092
7. CHROMATE PRIMER PRETREATMENT COATING IN ACCORDANCE WITH SPEC MIL-C-5541. TWO COATS OF GREY ENAMEL TYPE III, CLASS I CONFORMING TO SPEC MIL-E-15090 MATCHING COLOR CHIP NO.2623 UNDER FEDERAL STANDARD 595 ON SURFACE X (MASK ALL HOLES AND AREA Y)


8.650 BSC
8.469 BSC
7.943 BSC
7.114 BSC
6.052 BSC
4.846 BSC
3.597 BSC
3.325 BSC
2.347 BSC
1.098 BSC
.200 BSC
.046 BSC
.032 BSC
.360 BSC
1.019 BSC
1.955 BSC
3.088 BSC
4.325 BSC
5.562 BSC
6.696 BSC
7.631 BSC
8.290 BSC
8.618 BSC
.780 BSC
1.826 BSC
3.075 BSC
5.575 BSC
6.825 BSC
7.930 BSC
8.604 BSC
8.680 BSC
A
A
2 17/32 DIA
17/64 R (TYP)
AREA Y (SEE NOTE 7)
3.490 REF
DR NO. 1 (.272) x .500 DEEP TO PT OF DRILL
5/16-18 UNC-2B x .375 DEEP
100° CSK TO .323 +.010 -.000 DIA
(2 HOLES - SEE NOTE 5)
⊕ B .010 DIA
DR NO. 29 (.136) THRU
.210 +.005 -.003 CBORE
TO DEPTH SHOWN
24 HOLES
⊕ .010 DIA
CHAMFER
45° x .015 MAX
BOTH CORNERS
A2
A1
37° 30'
45°
5 35/64
27/64
.490
.552
1.125 R (TYP)
1.063 R (TYP)
5/8 (TYP)
1 1/16 (TYP)
R
R
R
4.490
8.428
8.490
8.980
1/2 DIA CUTTER (TYP)
45°
37° 30'
.490
.552
3/32 (TYP ALL RIBS)
3/16 (TYP ALL RIBS)
3.490
4.490 REF
8.980
8.980 (REF)
3.500 BSC
1.750 BSC
2.000 +.002 -.000 DIA
1.750 DIA
-B-
⊥ A .002
CHAMFER .45° x .031
CHAMFER 45° x .015 MAX
-A-
⌒ .002
.312
.125
X (SEE NOTE 7)
∥ A .002
.688
1.375
5° 0' +0° 0' -0° 30' TYP
.188
.906
1.125 ±.003
1.262 ±.003
.490 REF (ALL AROUND)
.552 REF (AT ALL RIBS)
1/8 R (TYP)
45°
.031 R MAX (TYP AT ALL RIBS)
.188 R.
.062 R.
◉ B .002
.531 DIA.
◉ B .002
.938 +.002 -.000 DIA.
1.000 DIA.
2.375 DIA
SEE DETAIL B
32
.615 DIA REF
.010 R
0°-5° MAX TYP
.005 R (TYP)
.083 +.005 -.000
1 1/16-32 UNS-3B
MINOR DIA 1.0287-1.0316
PITCH DIA 1.0422-1.0459
MAJOR DIA 1.0625 MIN
.032 UNDERCUT TO 2.072 DIA. MIN
CHAMFER 45° x .031
.050 +.004 -.000
SEE DETAIL C
.020 R. MAX
.531 (REF)
.615 +.005 -.000 DIA

SECTION A-A

DETAIL C
SCALE 10/1

DETAIL B
SCALE 4/1

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT W''

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011586	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ± .005; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL: BERYLLIUM PER ND1002124 (SEE NOTE 6)
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900720
DRAWN DATE 3-4-63
CHECKED J. SULLIVAN 5-3-63
APPROVAL 5-7-63
APPROVAL 5-3-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PANEL, SEXTANT

CODE IDENT NO.
SIZE E
NASA NUMBER 1011590
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011590

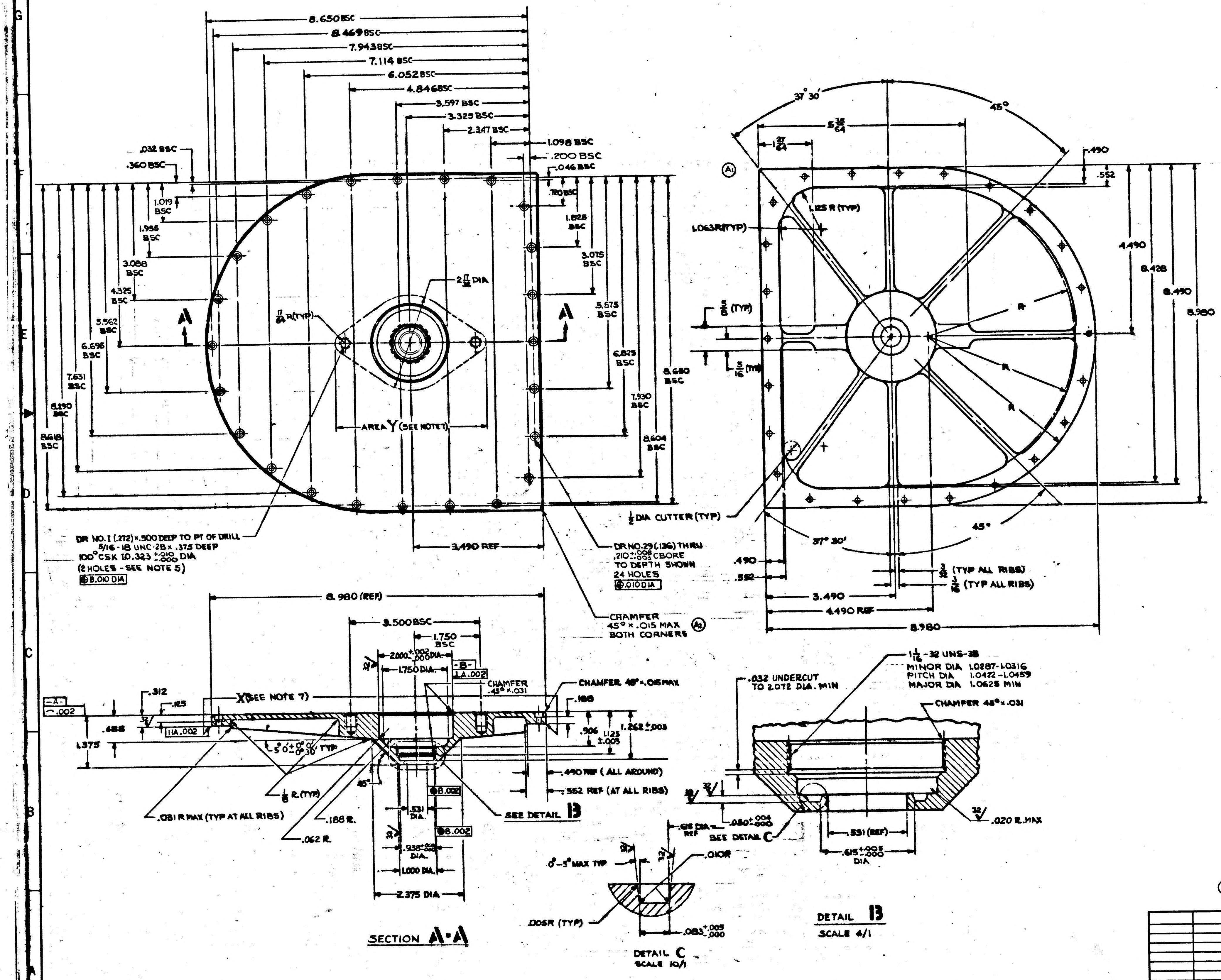
INCHES
PHOTOGRAPHIC SCALE ONLY

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. $\sqrt{}$ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. USE BROACHING TOOL PER ND1002121
6. HEAT TREAT (STABILIZE & STRESS RELIEVE) PER ND1002092
7. CHROMATE PRIMER PRETREATMENT COATING IN ACCORDANCE WITH SPEC MIL-C-5541. TWO COATS OF GREY ENAMEL TYPE III, CLASS I CONFORMING TO SPEC MIL-E-15090 MATCHING COLOR CHIP NO. 26231 UNDER FEDERAL STANDARD 595 ON SURFACE X (MASK ALL HOLES AND AREA Y)

B 1011590

REVISIONS TDRR 0629

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	G-6 C-6	1) REMOVED 1.615 R (TYP) PICTORIALLY CHANGED 2) ADDED CHAMFER 45°×.015 MAX	6-16-63 6/19/63	TDRR/141 L.E.K.
B		REVISED PER TDRR NO. 04629	11/4/63	


8.650 BSC
8.469 BSC
7.943 BSC
7.114 BSC
6.052 BSC
4.846 BSC
3.597 BSC
3.325 BSC
2.347 BSC
1.098 BSC
.200 BSC
.046 BSC
.032 BSC
.360 BSC
.180 BSC
1.019 BSC
1.955 BSC
3.088 BSC
4.325 BSC
5.562 BSC
6.696 BSC
7.631 BSC
8.290 BSC
8.618 BSC
1.828 BSC
3.075 BSC
5.575 BSC
6.825 BSC
7.930 BSC
8.604 BSC
8.680 BSC
$2\frac{11}{32}$ DIA
$\frac{11}{64}$ R (TYP)
A
A
AREA Y (SEE NOTE 7)
3.490 REF
DR NO. I (.272) × .500 DEEP TO PT OF DRILL 5/16-18 UNC-2B × .375 DEEP 100° CSK TO .323 +.010 -.000 DIA (2 HOLES - SEE NOTE 5)
B .010 DIA
DR NO. 29 (.136) THRU .210 +.005 -.000 CBORE TO DEPTH SHOWN 24 HOLES
.010 DIA
CHAMFER 45° × .015 MAX BOTH CORNERS
A
37° 30'
45°
$5\frac{35}{64}$
$1\frac{37}{64}$
.490
.552
1.125 R (TYP)
1.063 R (TYP)
$\frac{5}{8}$ (TYP)
$\frac{3}{16}$ (TYP)
4.490
8.428
8.490
8.980
R
R
R
R
$\frac{1}{2}$ DIA CUTTER (TYP)
37° 30'
45°
.490
.552
$\frac{3}{32}$ (TYP ALL RIBS)
$\frac{3}{16}$ (TYP ALL RIBS)
3.490
4.490 REF
8.980
8.980 (REF)
3.500 BSC
1.750 BSC
2.000 +.002 -.000 DIA
1.750 DIA
-B-
A .002
CHAMFER 45° × .031
CHAMFER 45° × .015 MAX
-A-
.002
.312
.125
X (SEE NOTE 7)
.688
1.375
A .002
5°-0° +0° -30' TYP
.188
.906
1.125 1.005
1.262 ±.003
.490 REF (ALL AROUND)
.562 REF (AT ALL RIBS)
$\frac{1}{8}$ R (TYP)
.531 DIA
B .002
SEE DETAIL B
.081 R MAX (TYP AT ALL RIBS)
.188 R
.062 R
.938 +.002 -.000 DIA
B .002
1.000 DIA
2.375 DIA
45°
SECTION A-A
$1\frac{1}{16}$-32 UNS-2B
MINOR DIA 1.0287-1.0316
PITCH DIA 1.0422-1.0459
MAJOR DIA 1.0625 MIN
.032 UNDERCUT TO 2.072 DIA. MIN
CHAMFER 45° × .031
.080 +.004 -.000
.615 DIA REF
SEE DETAIL C
.531 (REF)
.615 +.005 -.000 DIA
.020 R MAX
32
DETAIL B
SCALE 4/1
0°-5° MAX TYP
.010 R
.005 R (TYP)
.083 +.005 -.000
DETAIL C
SCALE 10/1

Ⓑ

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011586	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING
MATERIAL
BERYLLIUM
PER ND1002125
(SEE NOTE 6)
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900720
DRAWN DATE 2-4-63
CHECKED T. SULLIVAN 8-3-63
APPROVAL 8-7-63
APPROVAL 5-3-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PANEL, SEXTANT

CODE IDENT NO.
SIZE E
NASA NUMBER 1011590
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTES:

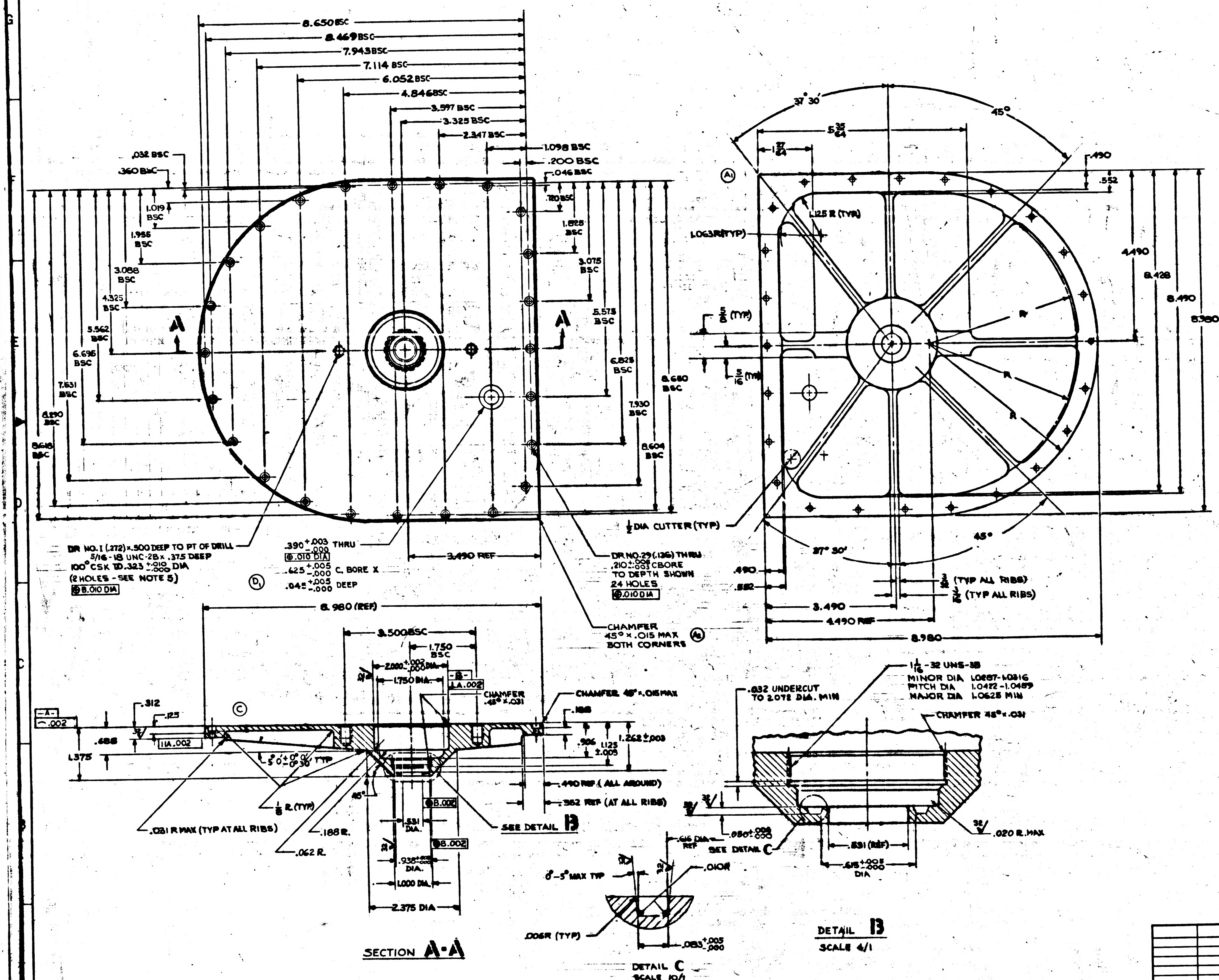
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   - a. 63 FINISH ALL OVER.
   - b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. USE BROACHING TOOL PER ND1002121
6. HEAT TREAT (STABILIZE & STRESS RELIEVE) PER ND1002092

Ⓒ

D 1011590

REVISIONS TDRR 06

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	6-6 C-6	1) REMOVED 1.615 R (TYP) PICTORIALLY CHANGED 2) ADDED CHAMFER 45° x .015 MAX	[illegible]	TDRR [illegible] [illegible]
B		REVISED PER TDRR NO. 04629	[illegible]	[illegible]
C		REVISED PER TDRR # 06003	[illegible] 64	[illegible]
D₁		REVISED PER TDRR NO. 06937	17 MAR 64	[illegible]



8.650 BSC
8.469 BSC
7.943 BSC
7.114 BSC
6.052 BSC
4.846 BSC
3.597 BSC
3.325 BSC
2.347 BSC
1.098 BSC
.200 BSC
.046 BSC
.032 BSC
.360 BSC
A
A
DR NO. 1 (.272) x .500 DEEP TO PT OF DRILL 5/16-18 UNC-2B x .375 DEEP 100° CSK TO .323 +.010 -.000 DIA (2 HOLES - SEE NOTE 5)
.390 +.003 -.000 THRU
.625 +.005 -.000 C. BORE X
.045 +.005 -.000 DEEP
3.490 REF
DR NO. 29 (.136) THRU .210 +.005 -.000 CBORE TO DEPTH SHOWN 24 HOLES
CHAMFER 45° x .015 MAX BOTH CORNERS
37° 30'
45°
1/8 DIA CUTTER (TYP)
1/32 (TYP ALL RIBS)
3/16 (TYP ALL RIBS)
3.490
4.490 REF
8.980
8.980 (REF)
3.500 BSC
1.750 BSC
SEE DETAIL B
.031 R MAX (TYP AT ALL RIBS)
.490 REF (ALL AROUND)
.562 REF (AT ALL RIBS)
1.375
2.375 DIA
1.000 DIA
SECTION A-A
1 1/16-32 UNS-3B MINOR DIA 1.0287-1.0316 PITCH DIA 1.0472-1.0489 MAJOR DIA 1.0625 MIN
.032 UNDERCUT TO 1.072 DIA. MIN
CHAMFER 45° x .031
.020 R. MAX
SEE DETAIL C
DETAIL B
SCALE 4/1
0°-5° MAX TYP
.006R (TYP)
DETAIL C
SCALE 10/1

MASTER

Ⓑ

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATI

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011586	1011006

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± 1/64 DECIMALS ± .005 ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL
BERYLLIUM
PER ND1002125
(SEE NOTE 6)
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 5238690072.0
DRAWN [illegible] DATE [illegible]
CHECKED T. SULLIVAN 5-3-63
APPROVAL [illegible] 5-3-63
APPROVAL [illegible]
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PANEL, SEXTANT

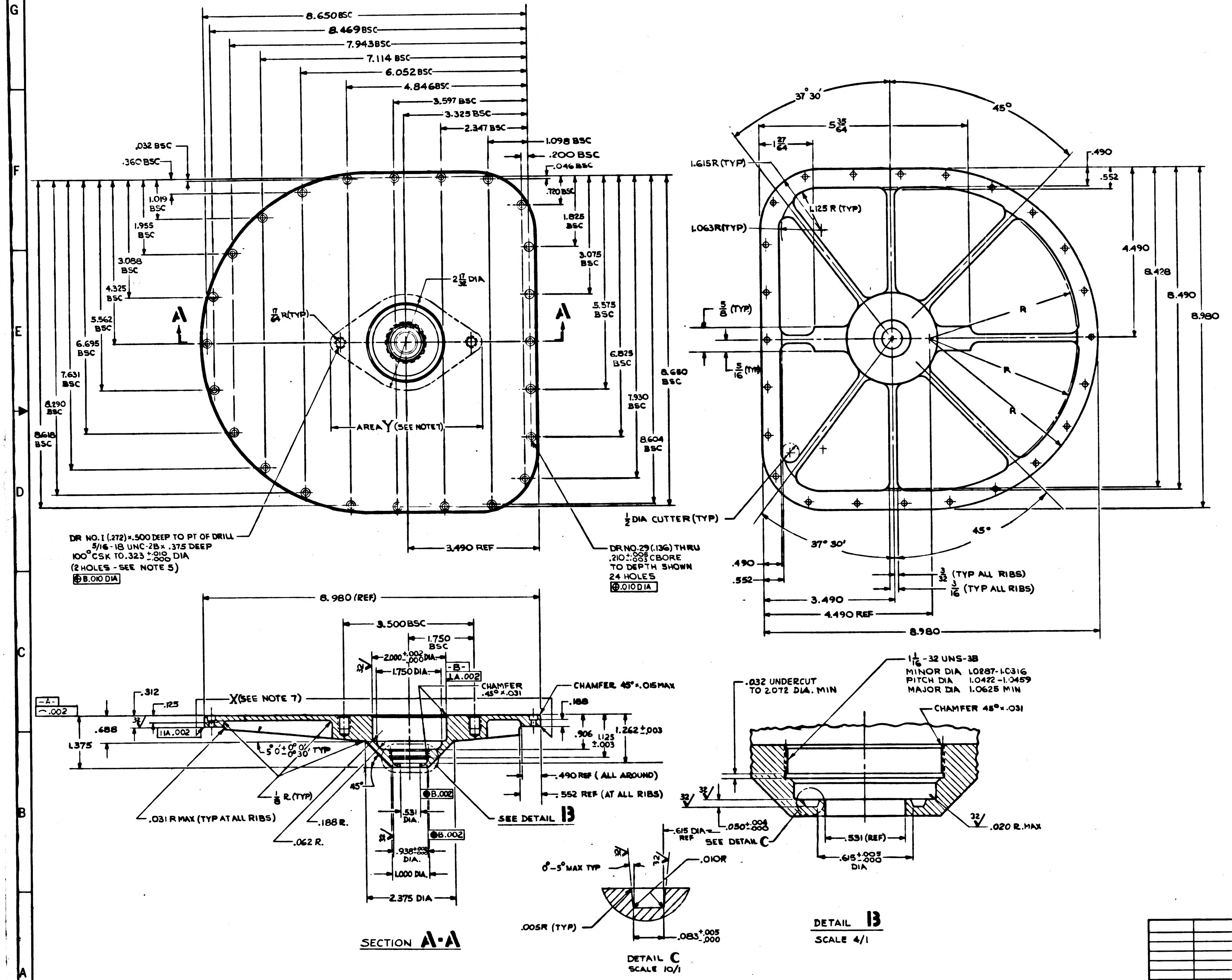
CODE IDENT NO.
SIZE E
NASA NUMBER 1011590
SCALE [illegible]
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

1011590

SYM	ZONE	REVISIONS DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63 FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. USE BROACHING TOOL PER ND1002121
6. HEAT TREAT (STABILIZE & STRESS RELIEVE) PER ND1002092
7. CHROMATE PRIMER PRETREATMENT COATING IN ACCORDANCE WITH SPEC MIL-C-5541. TWO COATS OF GREY ENAMEL TYPE III, CLASS I CONFORMING TO SPEC MIL-E-15090 MATCHING COLOR CHIP NO. 2623 UNDER FEDERAL STANDARD 595 ON SURFACE X (MASK ALL HOLES AND AREA Y)


8.650 BSC
8.469 BSC
7.943 BSC
7.114 BSC
6.052 BSC
4.846 BSC
3.597 BSC
3.325 BSC
2.347 BSC
1.098 BSC
.200 BSC
.046 BSC
.032 BSC
.360 BSC
.720 BSC
1.019 BSC
1.955 BSC
3.088 BSC
4.325 BSC
5.562 BSC
6.695 BSC
7.631 BSC
8.290 BSC
8.618 BSC
1.825 BSC
3.075 BSC
5.575 BSC
6.825 BSC
7.930 BSC
8.604 BSC
8.680 BSC
A
A
$2\frac{17}{32}$ DIA
$\frac{17}{64}$ R(TYP)
AREA Y (SEE NOTE 7)
3.490 REF
DR NO. I (.272) × .500 DEEP TO PT OF DRILL
5/16-18 UNC-2B × .375 DEEP
100° CSK TO .323 $^{+.010}_{-.000}$ DIA
(2 HOLES - SEE NOTE 5)
⊕ B .010 DIA
DR NO. 29 (.136) THRU
.210 $^{+.005}_{-.003}$ CBORE
TO DEPTH SHOWN
24 HOLES
⊕ .010 DIA
37° 30'
45°
$5\frac{35}{64}$
$1\frac{27}{64}$
1.615R (TYP)
1.125 R (TYP)
1.063R (TYP)
$\frac{5}{8}$ (TYP)
$\frac{5}{16}$ (TYP)
.490
.552
4.490
8.428
8.490
8.980
R
R
R
$\frac{1}{2}$ DIA CUTTER (TYP)
45°
37° 30'
.490
.552
$\frac{3}{32}$ (TYP ALL RIBS)
$\frac{3}{16}$ (TYP ALL RIBS)
3.490
4.490 REF
8.980
8.980 (REF)
3.500 BSC
1.750 BSC
2.000 $^{+.002}_{-.000}$ DIA
1.750 DIA
-B-
⊥ A .002
CHAMFER .45° × .031
CHAMFER 45° × .015 MAX
-A-
⌒ .002
.312
.125
X (SEE NOTE 7)
.188
32
.688
1.375
// A .002
5° 0' $^{+0° 0'}_{-0° 30'}$ TYP
.906
1.125 ±.003
1.262 ±.003
.490 REF (ALL AROUND)
.552 REF (AT ALL RIBS)
45°
$\frac{1}{8}$ R. (TYP)
.031 R MAX (TYP AT ALL RIBS)
.188 R.
.062 R.
● B .002
.531 DIA.
● B .002
.938 $^{+.002}_{-.000}$ DIA.
1.000 DIA.
2.375 DIA
SEE DETAIL B
SECTION A-A
.615 DIA REF
SEE DETAIL C
0°-5° MAX TYP
.010R
.005R (TYP)
.083 $^{+.005}_{-.000}$
DETAIL C
SCALE 10/1
.032 UNDERCUT TO 2.072 DIA. MIN
$1\frac{1}{16}$-32 UNS-3B
MINOR DIA 1.0287-1.0316
PITCH DIA 1.0422-1.0459
MAJOR DIA 1.0625 MIN
CHAMFER 45° × .031
.050 $^{+.004}_{-.000}$
.531 (REF)
.615 $^{+.005}_{-.000}$ DIA
.020 R. MAX
DETAIL B
SCALE 4/1

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011586	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
BERYLLIUM
PER ND1002124
(SEE NOTE 6)

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900720

DRAWN DATE 3-4-63
CHECKED T. SULLIVAN 5-3-63
APPROVAL 5-7-63
APPROVAL 5-3-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PANEL, SEXTANT

CODE IDENT NO.
SIZE E
NASA NUMBER 1011590
SCALE 1/1
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

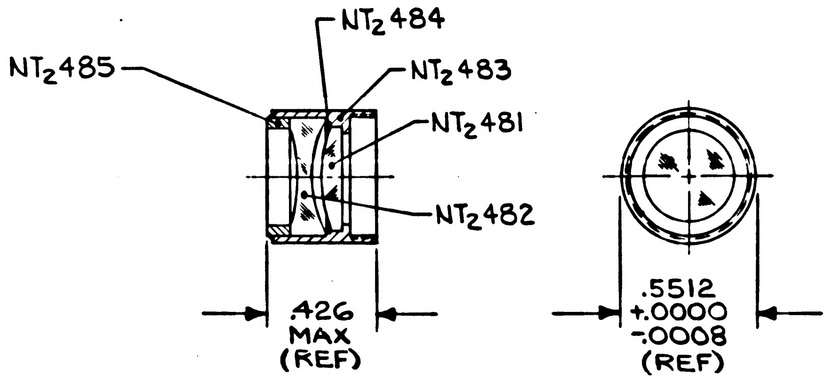
1011590

INCHES
PHOTOGRAPHIC SCALE ONLY

1011591

REVISIONS TDRR 01640			
SYM	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. IDENTIFY USING DWG NO., REVISION LETTER, AND MANUFACTURERS SYMBOL PER MIL-STD-130.
3. OPTICAL DATA:
   BFL = 44.0 ± 1.0 MM
4. PREPARATION FOR DELIVERY PER MIL-P-116 (KES-1003D.1, CLASS I).
5. INSPECT LENS ASSY IN ACCORDANCE WITH MIL-0-13830



ORIGINAL SOURCE OF SUPPLY:
WILD HEERBRUGG INSTRUMENTS INC.
MAIN & COVERT STREETS
PORT WASHINGTON, L.I., N.Y.

VENDOR PART NO.
SEE CALLOUTS ON
DRAWING

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011796	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	± ~	± ~

DO NOT SCALE THIS DRAWING
MATERIAL ~
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 74471374001
DRAWN J. Schiller DATE 3-11-63
CHECKED W. W. Lang 5-28-63
APPROVAL Thornton [illegible] 6-17-63
APPROVAL E. [illegible] 6-17-63
NASA APPROVAL [illegible] 6/19/63
MIT APPROVAL [illegible] 6/19/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
INTERMEDIATE LENS ASSY
SOURCE CONTROL DWG

CODE IDENT NO.
SIZE B
NASA NUMBER 1011591
SCALE 2/1
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

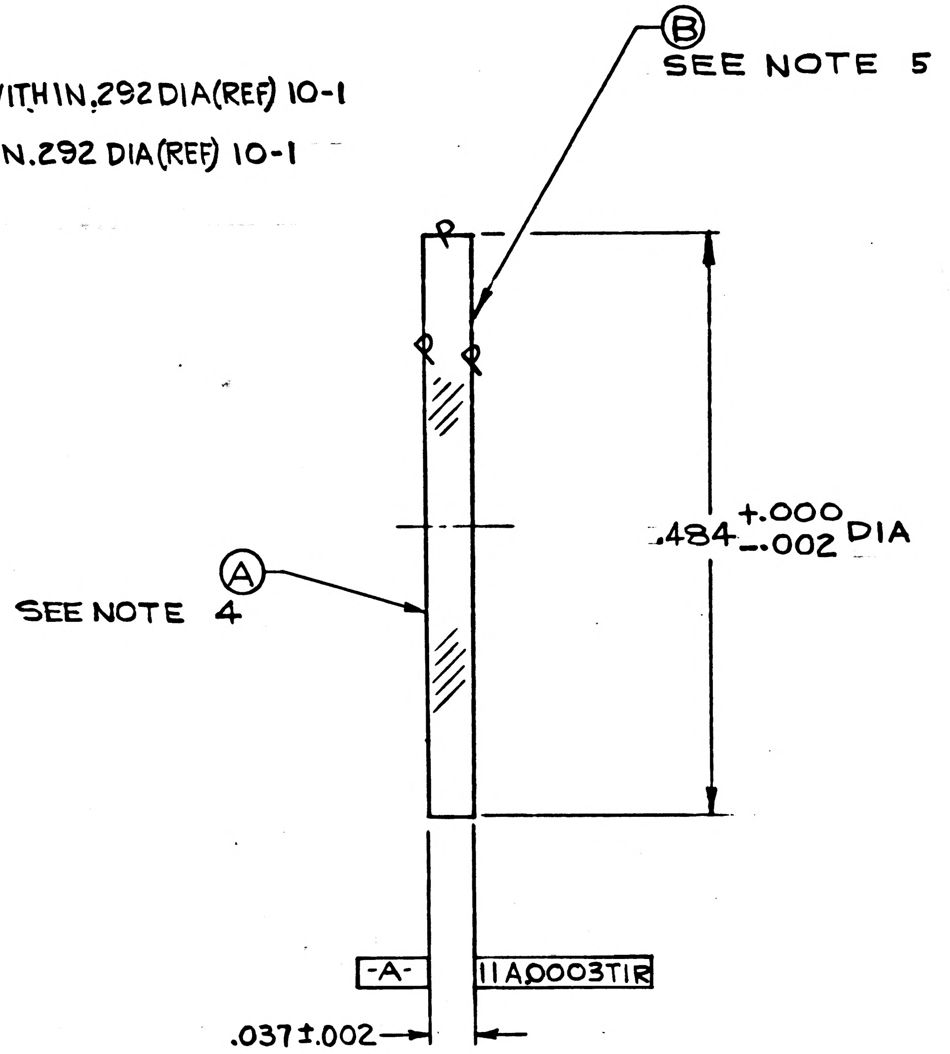
E-153

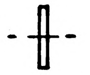
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011592

REVISIONS TDRR 01423				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1- INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2- ELEMENT IN ACCORDANCE WITH SPEC MIL-O-13830.
3- GLASS-BSC 2 OR EQUIVALENT FLATNESS 52 AT 5461 Å.
4- SURFACE QUALITY Ⓐ INNER ZONE WITHIN .292 DIA (REF) 10-1 OUTER ZONE 10-5.
5- SURFACE QUALITY Ⓑ INNER ZONE WITHIN .292 DIA (REF) 10-1 OUTER ZONE 10-5.
6- SURFACES MARKED "P" POLISHED.




ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011594	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± —	± —

DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 3

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 28386900400

DRAWN ED. INSLEY DATE 5-17-63
CHECKED Thornton Hearns 5-27-63
APPROVAL Thornton Hearns 5-27-63
APPROVAL E. Thomp 5-27-63
NASA APPROVAL Jack Barnard
MIT APPROVAL W. [illegible] 31 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE WINDOW, RETICLE, ELEMENT, SXT

CODE IDENT NO.
SIZE C
NASA NUMBER 1011592
SCALE 10/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011593 A

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS TDRR 01423				
A12		REVISED NOTES & SPECS GENERALLY & ADDED TOL. SEE TDRR NO. 02046	7-16-63 7-17-63	

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. ELEMENT IN ACCORDANCE WITH SPEC MIL-0-13830.
3. GLASS-TO BE IN ACCORD WITH GOVT SPEC JAN-G-174 TYPE NO. 573-574, GRADE C. (A1)
4. SURFACE QUAL INNER ZONE=.292 DIA 10-1, OUTER ZONE 10-5. (A2)
5. FLATNESS 5 λ AT 5461 Å. (A3)
6. FIGURE "A" INSCRIPTION (WHEN VIEWED IN DIRECTION ⟶ A) SHOULD BE CENTRALLY LOCATED.
7. SURFACES MARKED "P" POLISHED.
8. ENGRAVING ON THIS SURFACE. (A4)
9. IDENTIFY USING NASA DWG NO. REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND1002019. (A12)

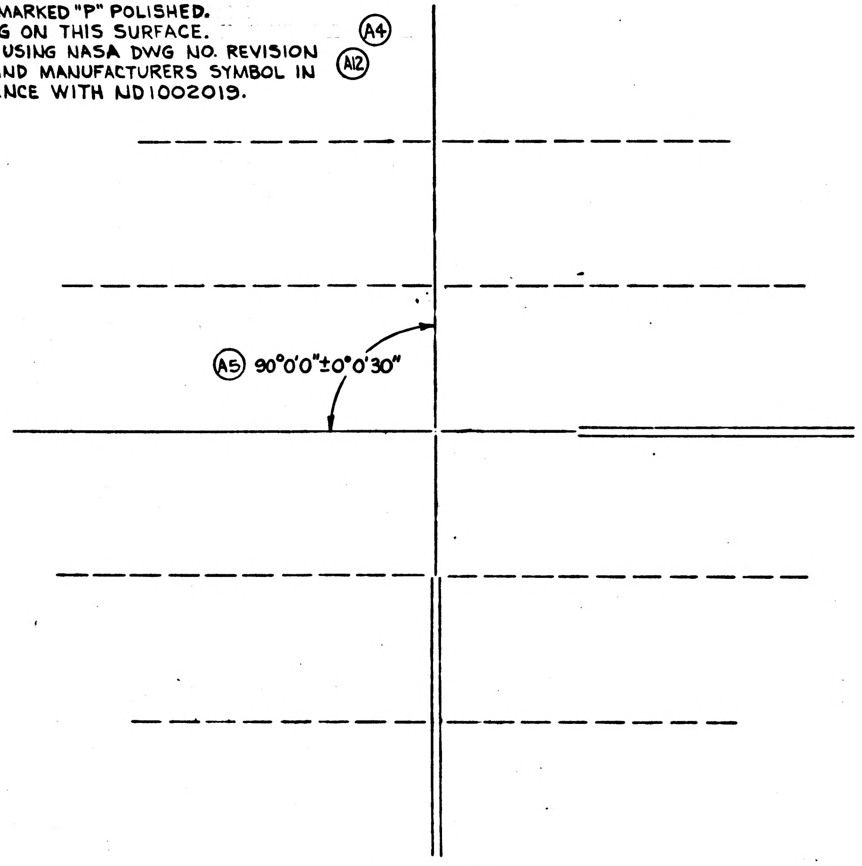
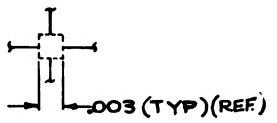
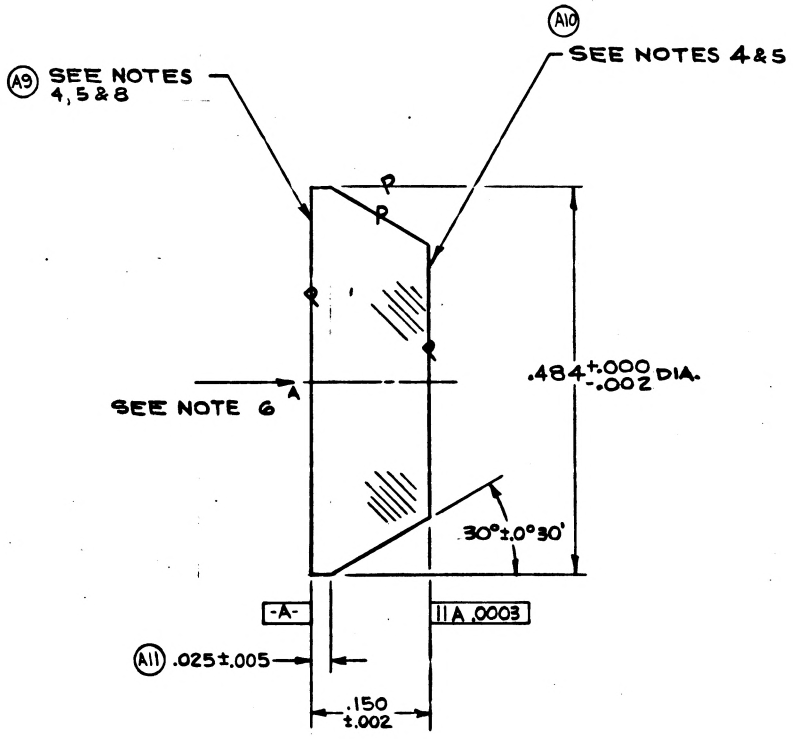


FIGURE A

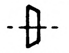


ENLARGED VIEW OF CENTER SPACING



SCALE 10/1

ENGRAVING NOTES:
1- ALL LINE WIDTHS =.00025 ±.00005
2- DASH LINE LENGTHS =.010 ±.001
3- SPACING BETWEEN DASHES =.003±.0006
4- CENTER SPACING =.003±.0003. NO OFFSET OF LINES EXCEEDING .00005 AT CENTER GAP
(A6) 5- SPACING ℄ TO ℄ OF DOUBLE LINES =.003±.0003 SYMMETRICAL WITHIN .00005
6- START OF DOUBLE LINES FROM CENTER=.050±.005
7- DISTANCE OF DASH LINE FROM CENTER=.050±.005 & .100±.005
8- DASH LINES TO BE .003±.0006 AWAY FROM CENTER LINE & DOUBLE LINE
(A7) 9- WHITE OPAQUE FILLER IN ENGRAVING (TITANIUM DIOXIDE IN ANY CONVENIENT VEHICLE).
10- DIA.=.292±.005. OVER ENDS OF LINES
(A8) 11- PATTERN CONCENTRIC WITH .484 DIA WITHIN .002 T.I.R.



ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011594	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 3
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 28386900410
DRAWN ED. INSLEY DATE 5-17-63
CHECKED Thornton Moore 5-27-63
APPROVAL Thornton Moore 5-27-63
APPROVAL E. Thomp 5-27-63
NASA APPROVAL Jack Barnard
MIT APPROVAL 31 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RETICLE, ELEMENT, ENGRAVED, SXT

CODE IDENT NO.
SIZE D
NASA NUMBER 1011593
SCALE AS NOTED
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011593 A

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

	1011593

REVISIONS TDRR 0 423				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. ELEMENT IN ACCORDANCE WITH SPEC MIL-O-13830.
3. GLASS-BSC 2 OR EQUIVALENT
   FLATNESS - 5 λ AT 5461 Å. BOTH SIDES
4. SURFACE QUAL Ⓐ INNER ZONE = .292 DIA (REF) 10-1, OUTER ZONE 10-5.
5. SURFACE QUAL Ⓑ INNER ZONE = .292 DIA (REF) 10-1, OUTER ZONE 10-5.
6. FIGURE "A" INSCRIPTION (WHEN VIEWED IN DIRECTION ⟶ A) SHOULD BE CENTRALLY LOCATED.
7. SURFACES MARKED "P" POLISHED.
8. ENGRAVING ON SURFACE Ⓑ

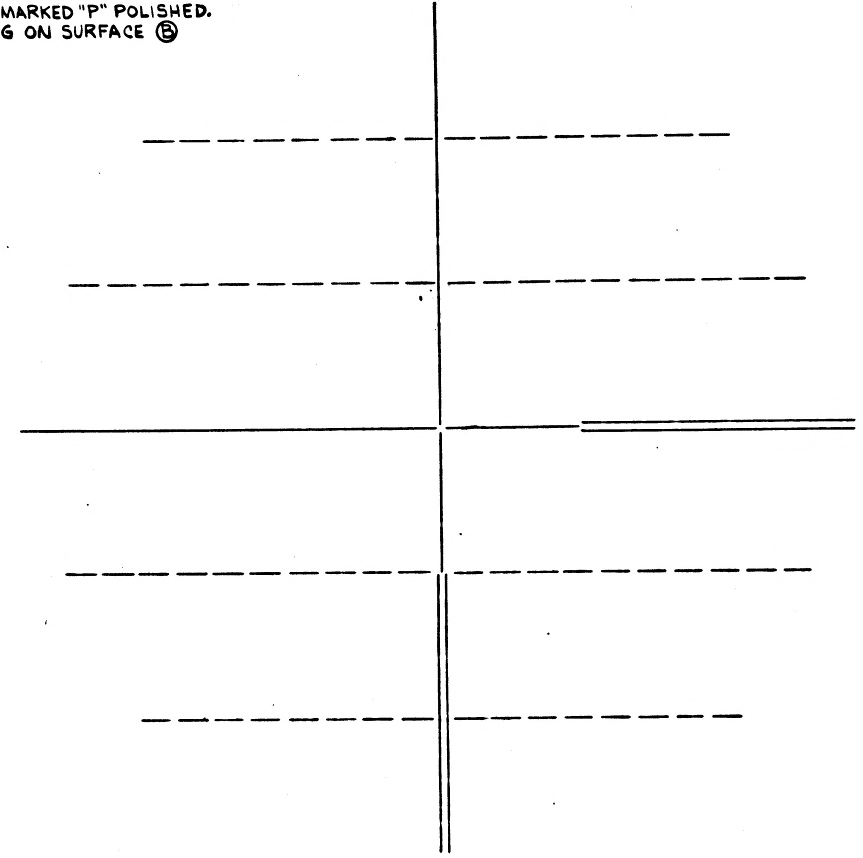
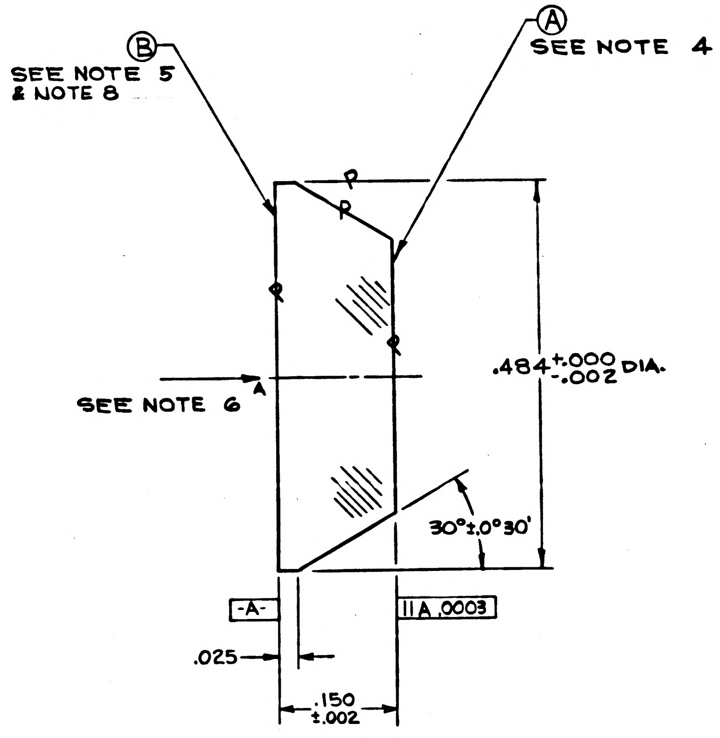
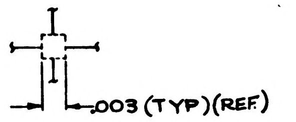


FIGURE A



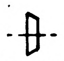
SCALE 10/1



ENLARGED VIEW OF CENTER SPACING

ENGRAVING NOTES:

1- ALL LINE WIDTHS = .00025 ±.00005
2- DASH LINE LENGTHS = .010 ±.001
3- SPACING BETWEEN DASHES = .003 ±.0006
4- CENTER SPACING = .003 ±.0003 NO OFFSET OF LINES EXCEEDING .00005 AT CENTER GAP
5- SPACING BETWEEN DOUBLE LINES = .003 ±.0003 SYMMETRICAL WITHIN .00005
6- START OF DOUBLE LINES FROM CENTER = .050 ±.005
7- DISTANCE OF DASH LINE FROM CENTER = .050 ±.005 & .100 ±.005
8- DASH LINES TO BE .003 ±.0006 AWAY FROM CENTER LINE & DOUBLE LINE
9- WHITE OPAQUE FILLER IN ENGRAVING.
10- DIA. = .292 ±.005. OVER ENDS OF LINES



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011594	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± —	± —

DO NOT SCALE THIS DRAWING

MATERIAL: SEE NOTE 3

CONTRACT:

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 28386900410

DRAWN ED. INSLEY DATE 5-17-63
CHECKED 5-27-63
APPROVAL 5-27-63
APPROVAL E. 5-27-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RETICLE, ELEMENT, ENGRAVED, SXT

CODE IDENT NO.	SIZE	NASA NUMBER
	D	1011593

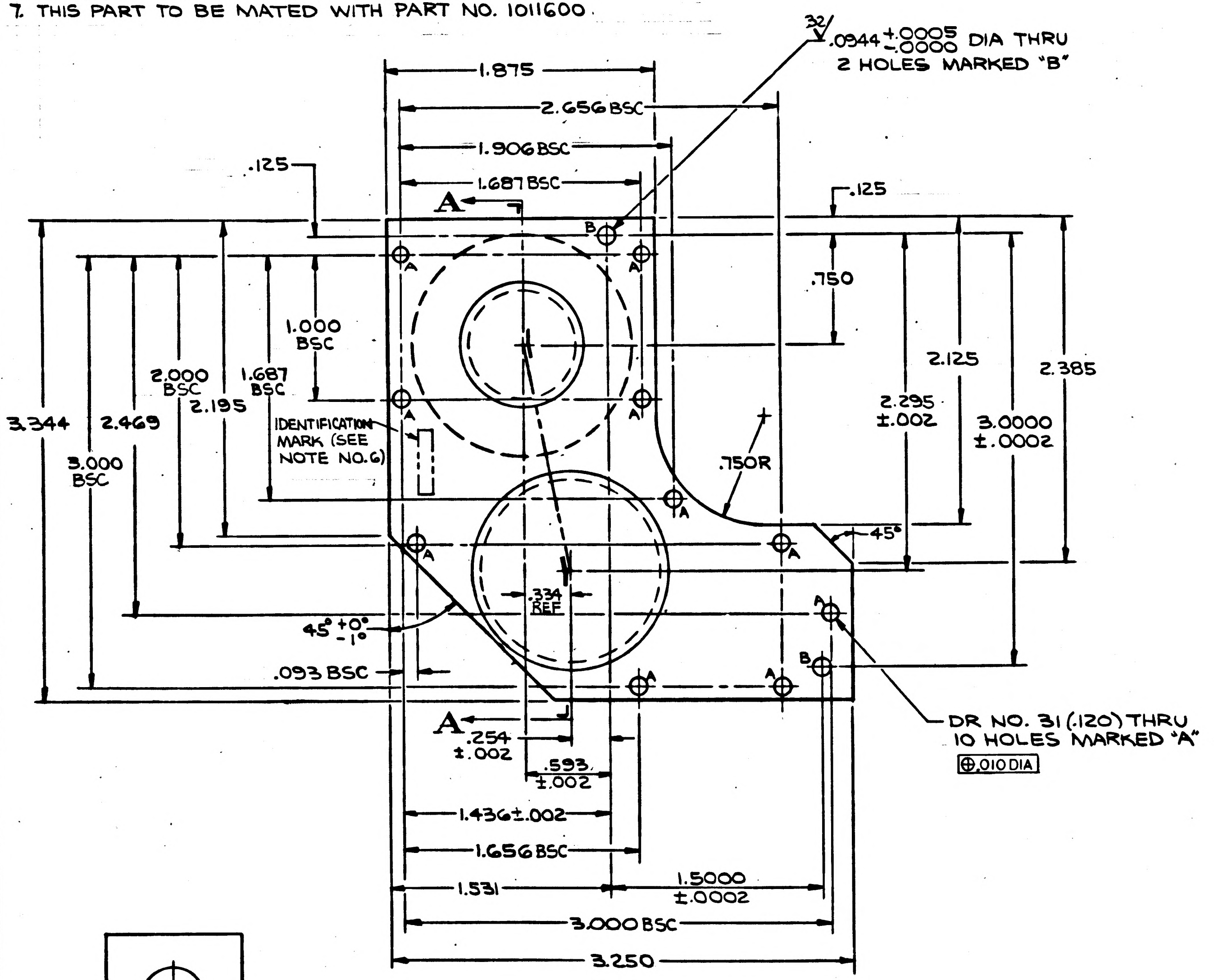
SCALE AS NOTED | WEIGHT CALC ACTUAL | SHEET 1 OF 1

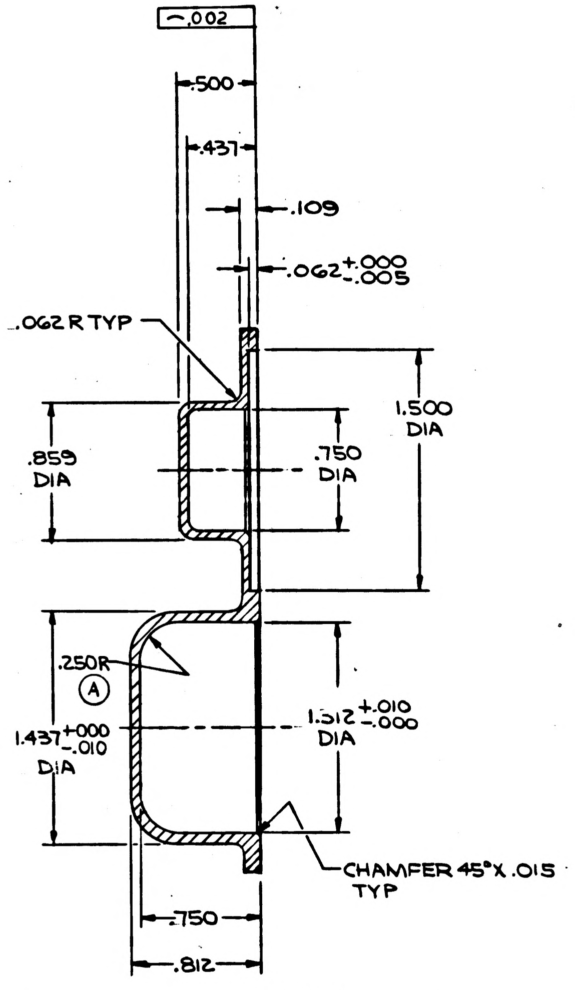
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

A	1011595

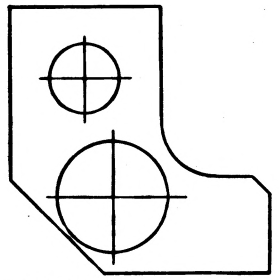
REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	C4	.250R WAS .250R TYP TDRR NO. 01737	6-25-63	WK.

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:-
   a) 63/√ FINISH ALL OVER
   b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. ANODIZE PER MIL-A-8625 TYPE II KPS-1005A.200
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019
7. THIS PART TO BE MATED WITH PART NO. 1011600.


32/ .0344 +.0005 −.0000 DIA THRU
2 HOLES MARKED "B"
1.875
2.656 BSC
1.906 BSC
1.687 BSC
.125
.125
A
A
.750
1.000 BSC
2.000 BSC
1.687 BSC
2.195
2.125
2.385
2.295 ±.002
3.0000 ±.0002
3.344
2.469
3.000 BSC
IDENTIFICATION MARK (SEE NOTE NO. 6)
.750R
45°
45° +0° −1°
.334 REF
.093 BSC
.254 ±.002
.593 ±.002
1.436±.002
1.656 BSC
1.531
1.5000 ±.0002
3.000 BSC
3.250
DR NO. 31 (.120) THRU
10 HOLES MARKED "A"
⊕ .010 DIA
B
A


⌒ .002
.500
.437
.109
.062 +.000 −.005
.062 R TYP
1.500 DIA
.859 DIA
.750 DIA
.250R
Ⓐ
1.437 +.000 −.010 DIA
1.312 +.010 −.000 DIA
CHAMFER 45°X.015 TYP
.750
.812

SECTION A-A



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011706	1011701
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± −	±.005	±1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 2024-T4 FED SPEC QQ-A-268 TEMPER T4

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900730

DRAWN R. BRUNELLE DATE 3-12-63
CHECKED 4-17-63
APPROVAL 4-30-63
APPROVAL E. [illegible] 4-30-63
NASA APPROVAL Jack Barnard
MIT APPROVAL 8 Mar 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
COVER, GEARBOX

CODE IDENT NO.
SIZE D
NASA NUMBER 1011595
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

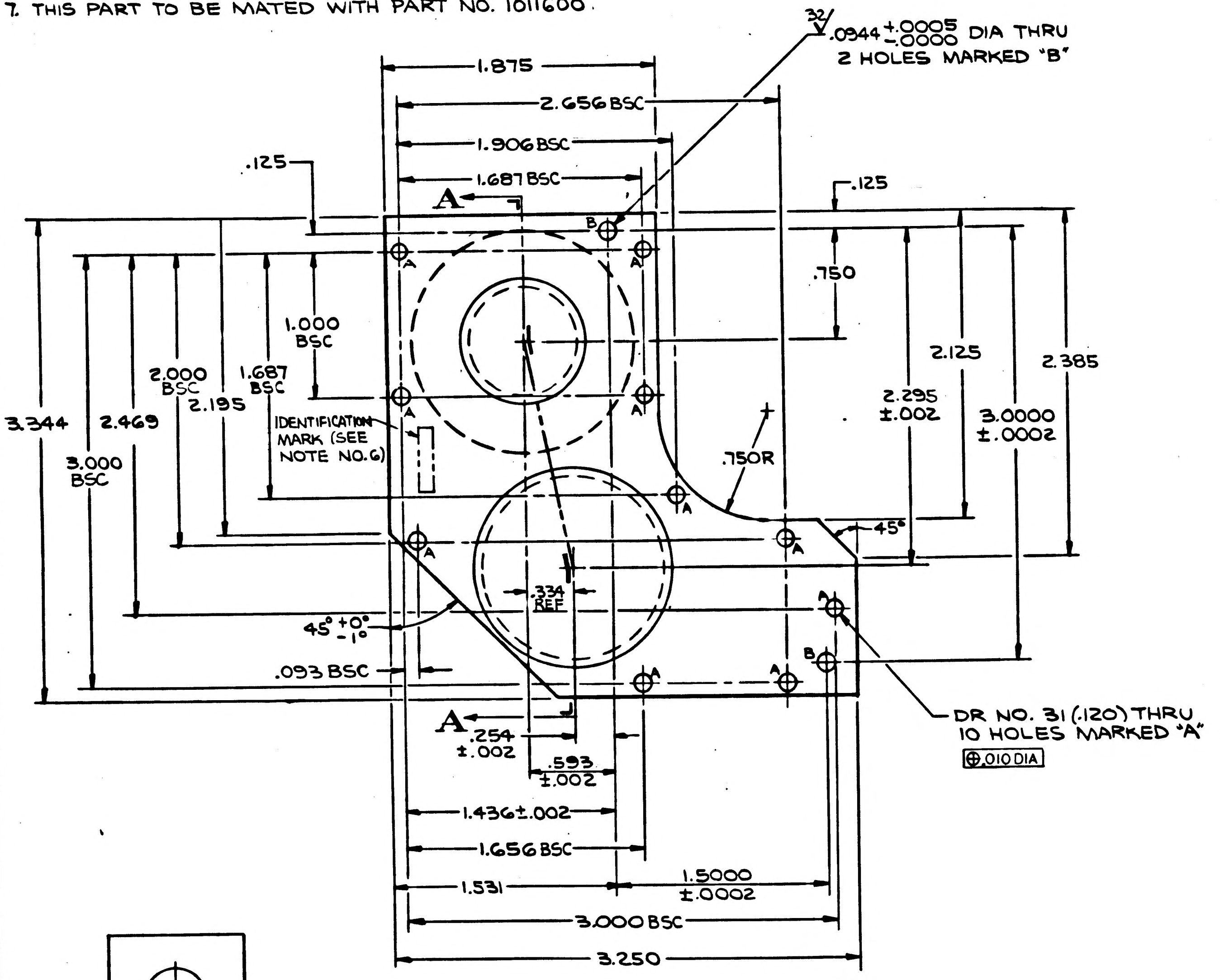
INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

1011595 A

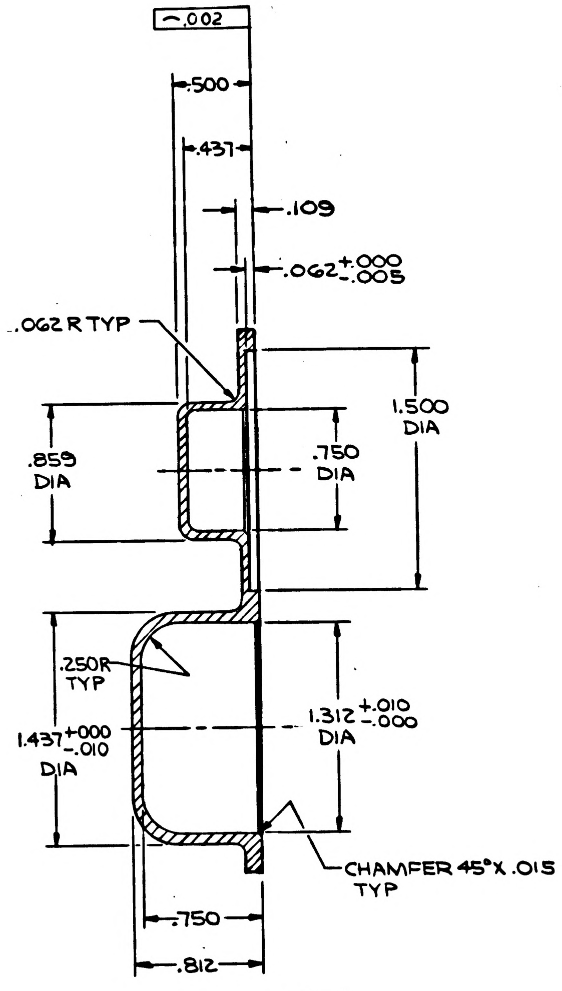
S6S1101

SYM	ZONE	REVISIONS DESCRIPTION	DATE	APPROVAL

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:-
   a) 63√ FINISH ALL OVER
   b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. ANODIZE PER MIL-A-8625 TYPE II KPS-1005A.200
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019
7. THIS PART TO BE MATED WITH PART NO. 1011600.

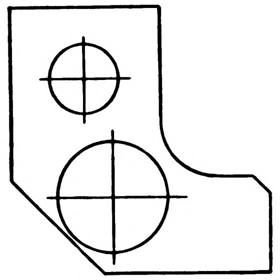


32√ .0944 +.0005 −.0000 DIA THRU 2 HOLES MARKED "B"
1.875
2.656 BSC
1.906 BSC
1.687 BSC
.125
.125
A
A
B
B
.750
1.000 BSC
2.000 BSC
1.687 BSC
2.195
3.344
2.469
3.000 BSC
IDENTIFICATION MARK (SEE NOTE NO.6)
2.125
2.385
2.295 ±.002
3.0000 ±.0002
.750R
45°
.334 REF
45° +0° −1°
.093 BSC
DR NO. 31 (.120) THRU 10 HOLES MARKED "A"
⊕ .010 DIA
.254 ±.002
.593 ±.002
1.436±.002
1.656 BSC
1.531
1.5000 ±.0002
3.000 BSC
3.250



⌒ .002
.500
.437
.109
.062 +.000 −.005
.062 R TYP
1.500 DIA
.859 DIA
.750 DIA
.250R TYP
1.437 +.000 −.010 DIA
1.312 +.010 −.000 DIA
CHAMFER 45° X .015 TYP
.750
.812

SECTION A-A



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011706	1011701

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± −	±.005	± 1°

DO NOT SCALE THIS DRAWING
MATERIAL ALUMINUM ALLOY 2024-T4 FED SPEC QQ-A-268 TEMPER T4
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900730
DRAWN R. BRUNELLE DATE 3-12-63
CHECKED 4-17-63
APPROVAL 9-30-63
APPROVAL E. 4-30-63
NASA APPROVAL
MIT APPROVAL 6 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
COVER, GEARBOX

CODE IDENT NO. SIZE D NASA NUMBER 1011595
SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

1011595

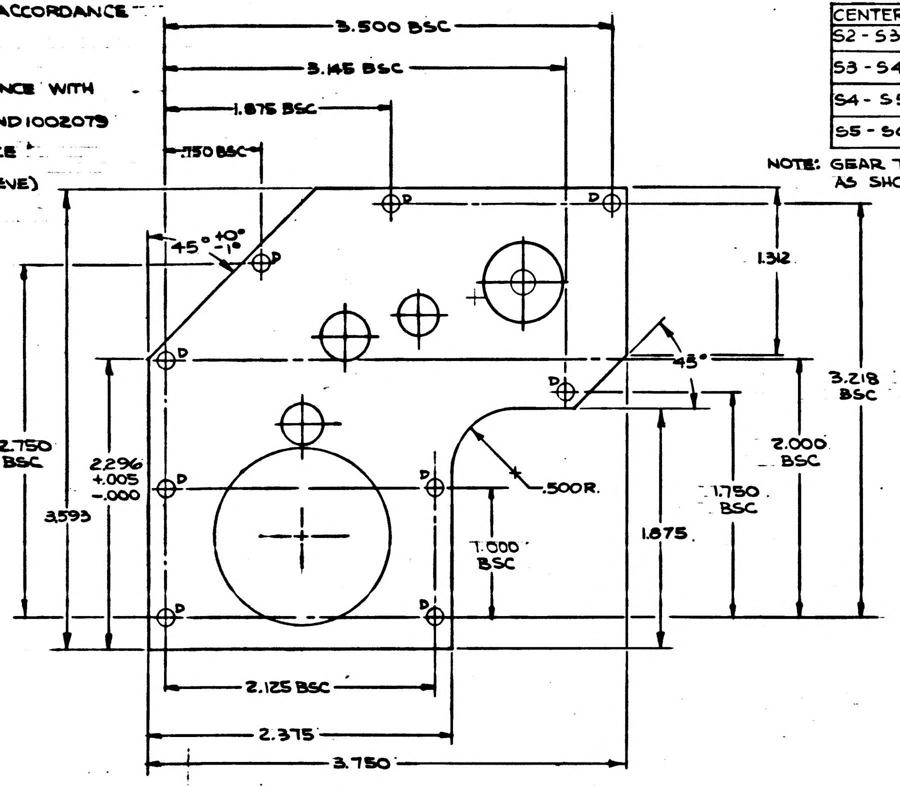
INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

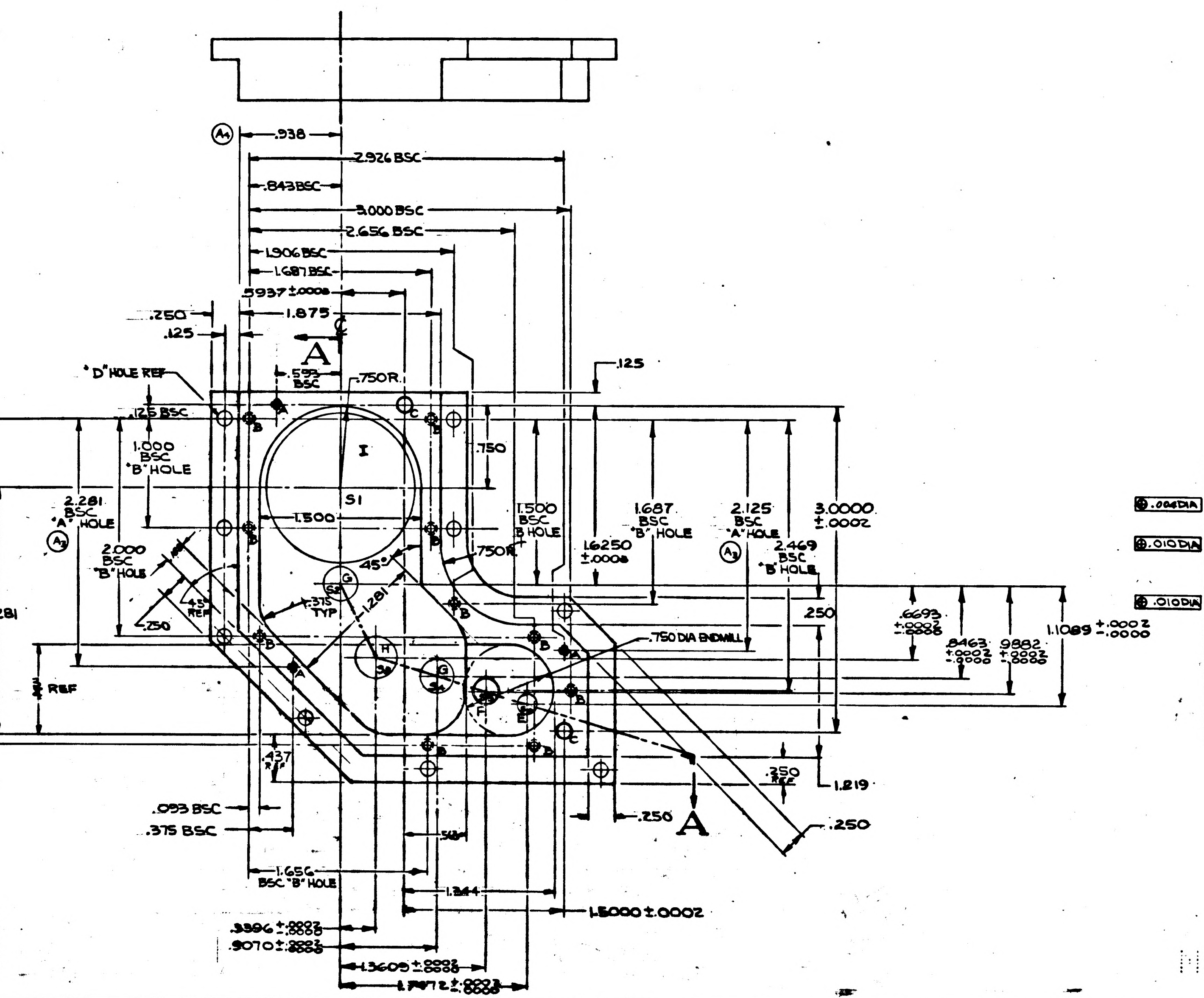
NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:-
   a) 63/ FINISH ALL OVER
   b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. MATERIAL:- BERYLLIUM IN ACCORDANCE WITH MIL-B-21531
6. HEAT TREAT (STABILIZE & STRESS RELIEVE) IN ACCORDANCE WITH ND 1002092
7. ~~IS PART TO BE MATED WITH PART NO. 1011600.~~

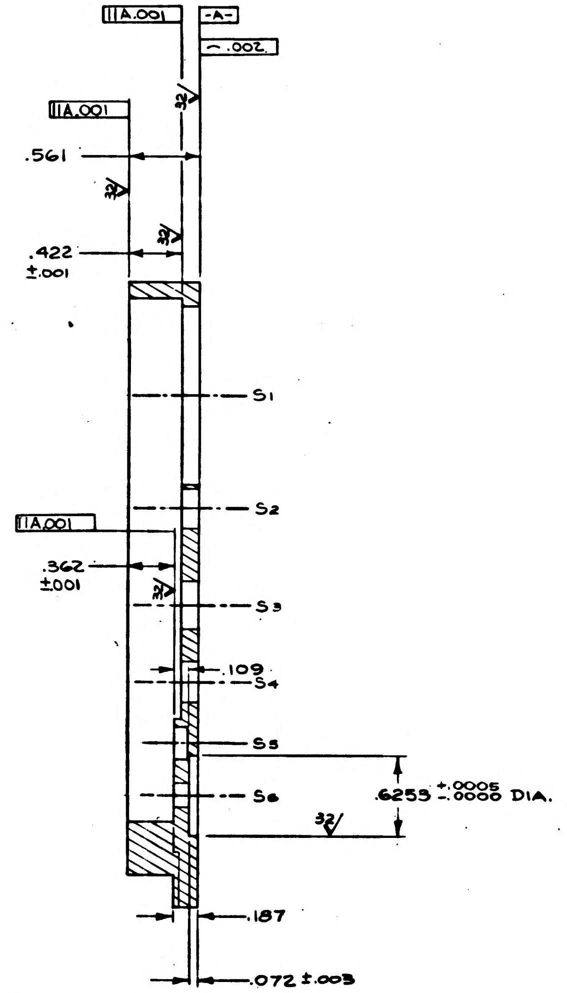
Ⓐ₂

CENTERS	C.D. CHECKING DIM.
S2 - S3	.7503-.7508
S3 - S4	.5941-.5945
S4 - S5	.4753-.4758
S5 - S6	.4044-.4049

NOTE: GEAR TRAINS ARE INDICATED AS SHOWN — — —

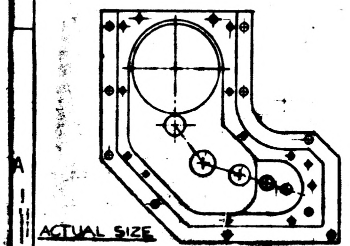

3.500 BSC
3.145 BSC
1.875 BSC
.750 BSC
45° +0° -1°
1.312
45°
3.218 BSC
2.750 BSC
2.296 +.005 -.000
3.593
2.000 BSC
1.750 BSC
1.875
1.000 BSC
.500R.
D
2.125 BSC
2.375
3.750


Ⓐ₄ .938
2.926 BSC
.843 BSC
3.000 BSC
2.656 BSC
1.906 BSC
1.687 BSC
.5937 ±.0008
1.875
.250
.125
A
"D" HOLE REF
.593 BSC
.750R.
.125
.125 BSC
1.000 BSC "B" HOLE
2.281 BSC "A" HOLE
Ⓐ₃
3.000 BSC "B" HOLE
2.000 BSC "B" HOLE
2.281
.750
1.500
S1
I
45°
.375 TYP
1.281
.750R
G
H
S3
S4
S5
F
E
B
C
1.500 BSC "B" HOLE
1.6250 ±.0008
1.687 BSC "B" HOLE
2.125 BSC "A" HOLE
Ⓐ₃
2.469 BSC "B" HOLE
3.0000 ±.0002
.750 DIA ENDMILL
.250
.6693 +.0002 -.0000
.8463 +.0002 -.0000
.9882 +.0002 -.0000
1.1089 +.0002 -.0000
.250 REF
.437 REF
.350 REF
1.219
.250
.250 A
.093 BSC
.375 BSC
1.656 BSC "B" HOLE
.563
1.344
1.5000 ±.0002
.3396 +.0002 -.0000
.9070 +.0002 -.0000
1.3609 +.0002 -.0000
1.7972 +.0002 -.0000


A.001
-A-
.002
32/
A.001
.561
.422 ±.001
S1
S2
A.001
.362 ±.001
S3
.109
S4
S5
S6
.6255 +.0005 -.0000 DIA.
32/
.187
.072 ±.003

SECTION A-A

	HOLE	DESCRIPTION	QUANTITY
.004 DIA	A	DR. NO. 49 (.073) X .375 DEEP REDRILL NO. 38 (.1015) X .018 DEEP 2-56 NC-3B × .250 DEEP Ⓐ₅	3
.010 DIA	B	DR. NO. 44 (.086) X .281 DEEP REDRILL NO. 32 (.116) X .022 DEEP Ⓐ₅ 3-48 NC-3B × .149 DEEP	10
	C	DR NO. 47 (.0785) THRU .0927 +.0005 -.0000 DIA × .218 DEEP	2
.010 DIA	D	DR. THRU NO. 39 (.136)	9
	E	DR 3/16 (.1875) THRU C'BORE OPPOSITE SIDE AS SHOWN 32/ IN SECTION A-A	1
	F	.2501 +.0005 -.0000 DIA TO DEPTH 32/ SHOWN IN SECTION A-A	1
	G	.3126 +.0005 -.0000 DIA. THRU 32/	2
	H	.3751 +.0005 -.0000 DIA. THRU 32/	1
	I	1.375 DIA. THRU	



ACTUAL SIZE

A	1011596

REVISIONS TDRR 60,141				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	A5 G10 C9 C6 D8 B4	1) NEXT ASSY WAS 1011706 2) REMOVED PART IDENT NOTE NO. 7. 3) HOLE LETTER DESIGNATION ON DIMENSIONS 2.281 & 2.125 WAS "B". 4) ADDED DIMENSION .938 5) "A" HOLE WAS 2-56NC-3 "B" HOLE WAS 3-48NC-3 TDRR NO. 01919	6-24-63	

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
Ⓐ₁ 1011725	1011701

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — ; DECIMALS ±.005 ; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL: SEE NOTE NO. 5
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900740
DRAWN W. CABAN DATE 3-12-63
CHECKED 4-12-63
APPROVAL 4-10-63
APPROVAL E. 4-9-63
NASA APPROVAL
MIT APPROVAL 8 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, GEAR
(SEXTANT TRUNNION DRIVE)

CODE IDENT NO.
SIZE E
NASA NUMBER 1011596
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:-
 a) 63/ FINISH ALL OVER
 b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. MATERIAL:- BERYLLIUM IN ACCORDANCE WITH MIL-B-21531
6. HEAT TREAT (STABILIZE & STRESS RELIEVE) IN ACCORDANCE WITH ND 1002092
7. THIS PART TO BE MATED WITH PART NO. 1011600.

(A2)

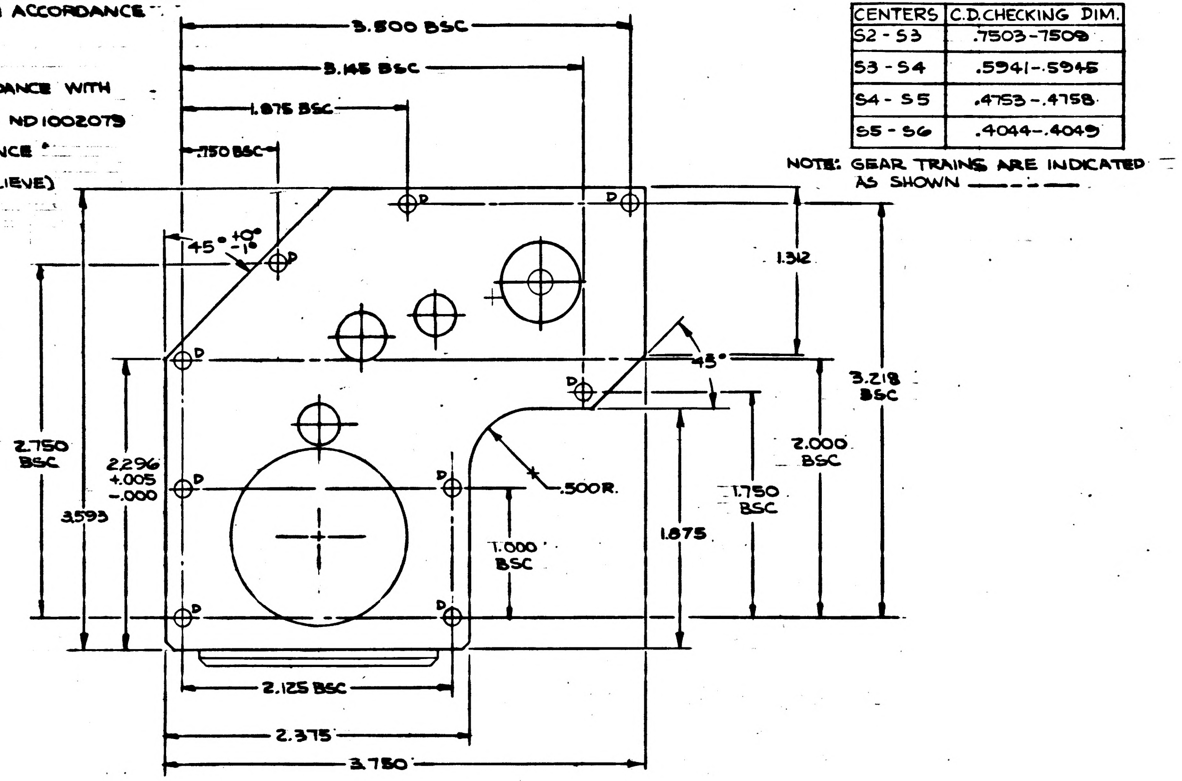
CENTERS	C.D. CHECKING DIM.
S2 - S3	.7503-7508
S3 - S4	.5941-.5945
S4 - S5	.4753-.4758
S5 - S6	.4044-.4049

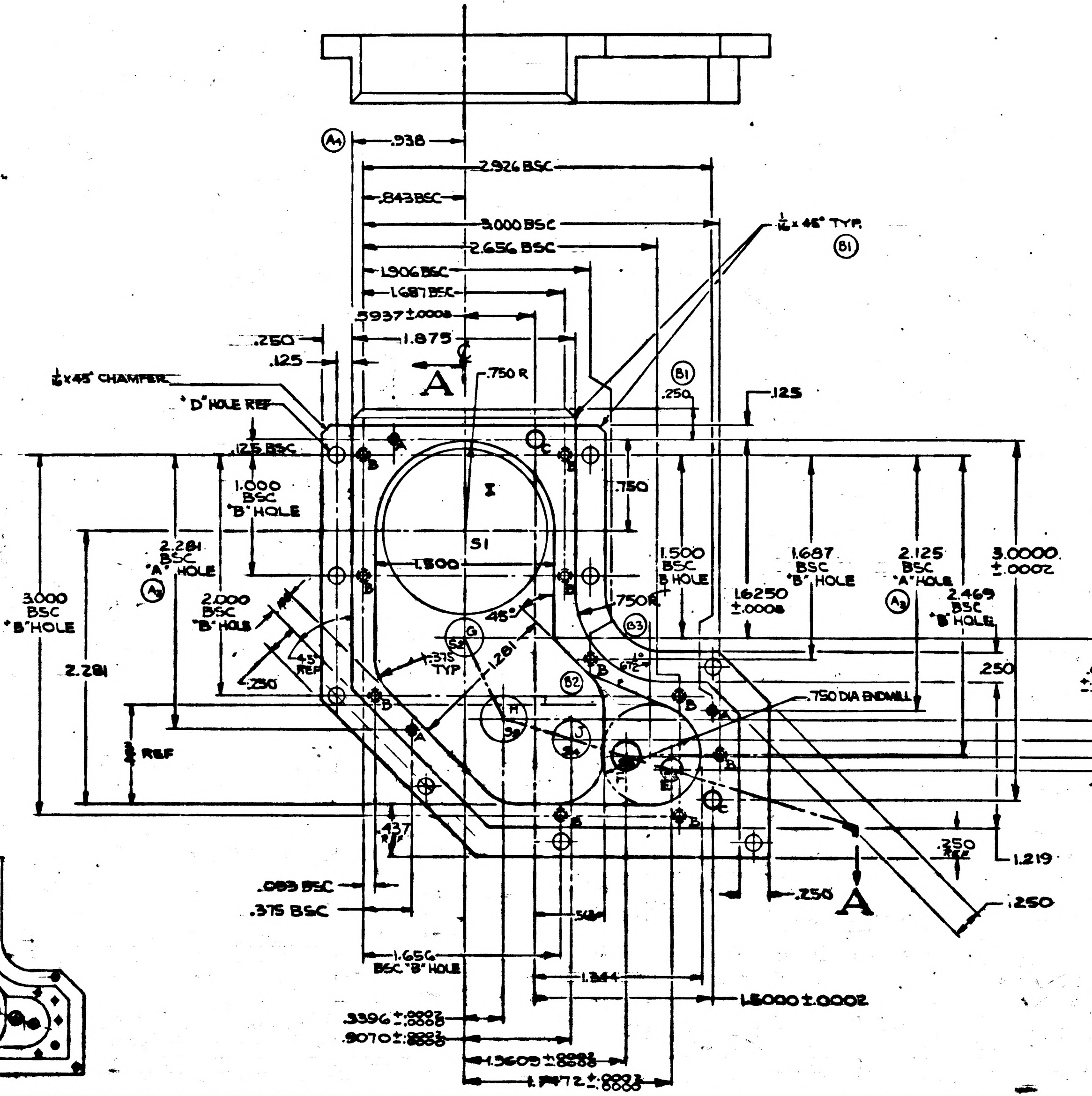
NOTE: GEAR TRAINS ARE INDICATED AS SHOWN — - - —

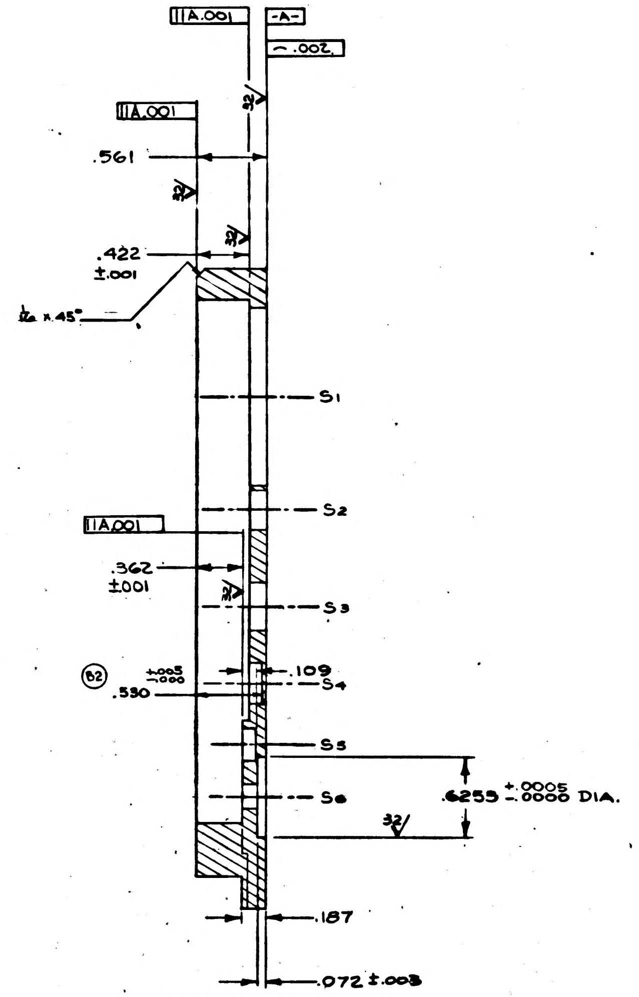
B	96511101

REVISIONS TDRR 00141

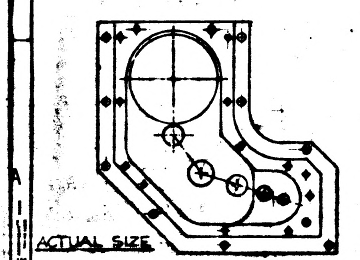
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	A3 B10 C3 C6 D8 B4	1) NEXT ASSY WAS 1011706 2) REMOVED PART IDENT NOTE NO. 7. 3) HOLE LETTER DESIGNATION ON DIMENSIONS 2.281 & 2.125 WAS "B". 4) ADDED DIMENSION .938 5) "A" HOLE WAS 2-56NC-3 "B" HOLE WAS 3-48 NC-3 TDRR NO. 01919	6-24-63	
B3	C7 F4 B-7 B-3 B-7	1) ADDED .250 DIM. & ADDED 1/16 × 45° CHAMFER 2) ADDED .530 DIM. TO S-4. J HOLE WAS G HOLE J HOLE WAS THRU HOLE G HOLE WAS QUAN. 2 3) ADDED 67½° TANGENT END MILL CUT TDRR	7-16-63	


3.500 BSC
3.145 BSC
1.875 BSC
.750 BSC
45° +0° -1°
1.312
45°
3.218 BSC
2.750 BSC
2.296 +.005 -.000
3.593
.500R.
2.000 BSC
1.750 BSC
1.000 BSC
1.875
2.125 BSC
2.375
3.750
D


A
.938
2.924 BSC
.843 BSC
3.000 BSC
2.656 BSC
1.906 BSC
1.687 BSC
.5937 ±.0003
1.875
.250
.125
1/16 × 45° CHAMFER
"D" HOLE REF
.750 R
1/16 × 45° TYP.
.125 BSC
1.000 BSC "B" HOLE
2.281 BSC "A" HOLE
3.000 BSC "B" HOLE
2.000 BSC "B" HOLE
1.500
S1
.750
1.500 BSC "B" HOLE
1.6250 ±.0008
1.687 BSC "B" HOLE
2.125 BSC "A" HOLE
2.469 BSC "B" HOLE
3.0000 ±.0002
.750R
45°
.375 TYP
.281
.250
.750 DIA ENDMILL
.6693 +.0003 -.0000
.8463 +.0003 -.0000
.9882 +.0003 -.0000
1.1089 +.0003 -.0000
2.281
5/8 REF
.437
.250
.083 BSC
.375 BSC
1.656 BSC "B" HOLE
.548
1.344
1.5000 ±.0002
.3396 +.0003 -.0000
.9070 +.0003 -.0000
1.3609 +.0003 -.0000
1.8072 +.0003 -.0000
1.219
.250


A.001
-A-
.002
32/
A.001
.561
.422 ±.001
1/16 × 45°
S1
A.001
S2
.362 ±.001
S3
.530 +.003 -.000
.109
S4
S5
S6
.6255 +.0005 -.0000 DIA.
.187
.072 ±.003

SECTION A-A



ACTUAL SIZE

HOLE	DESCRIPTION	QUANTITY
A	DR. NO 49 (.073) X .375 DEEP REDRILL NO. 38 (.1015) X .018 DEEP 2-56 NC-3B × .250 DEEP (A5)	3
B	DR. NO. 44 (.086) X .281 DEEP REDRILL NO. 32 (.116) X .022 DEEP (A5) 3-48 NC-3B × .149 DEEP	10
C	DR NO. 47 (.0785) THRU .0927 +.0005 -.0000 DIA × .218 DEEP	2
D	DR. THRU NO. 39 (.136)	9
E	DR 3/16 (.1875) THRU C BORE OPPOSITE SIDE AS SHOWN 32/ IN SECTION A-A	1
F	.2501 +.0003 -.0000 DIA TO DEPTH 32/ SHOWN IN SECTION A-A	1
G	.3126 +.0003 -.0000 DIA. 32/	1 (B2)
H	.3751 +.0003 -.0000 DIA. THRU 32/	1
I	1.375 DIA. THRU	1
J	.3126 +.0003 -.0000 DIA TO DEPTH SHOWN IN SECT. AA	1 (B2)

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

(A1)

NEXT ASSY	USED ON
1011725	1011701

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — ; DECIMALS ±.005 ; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL: SEE NOTE NO. 5
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900740
DRAWN W. CABAN DATE 3-12-63
CHECKED 4-12-63
APPROVAL 4-2-63
APPROVAL E. Oberg 4-3-63
NASA APPROVAL
MIT APPROVAL 8 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, GEAR
(SEXTANT TRUNNION DRIVE)

CODE IDENT NO.
SIZE E
NASA NUMBER 1011596
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET OF

1011596 B

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:-
  a) 63/ FINISH ALL OVER
  b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. MATERIAL:- BERYLLIUM IN ACCORDANCE WITH MIL-B-21531
6. HEAT TREAT (STABILIZE & STRESS RELIEVE) IN ACCORDANCE WITH ND 1002092
7. THIS PART TO BE MATED WITH PART NO. 1011600.

(A2)

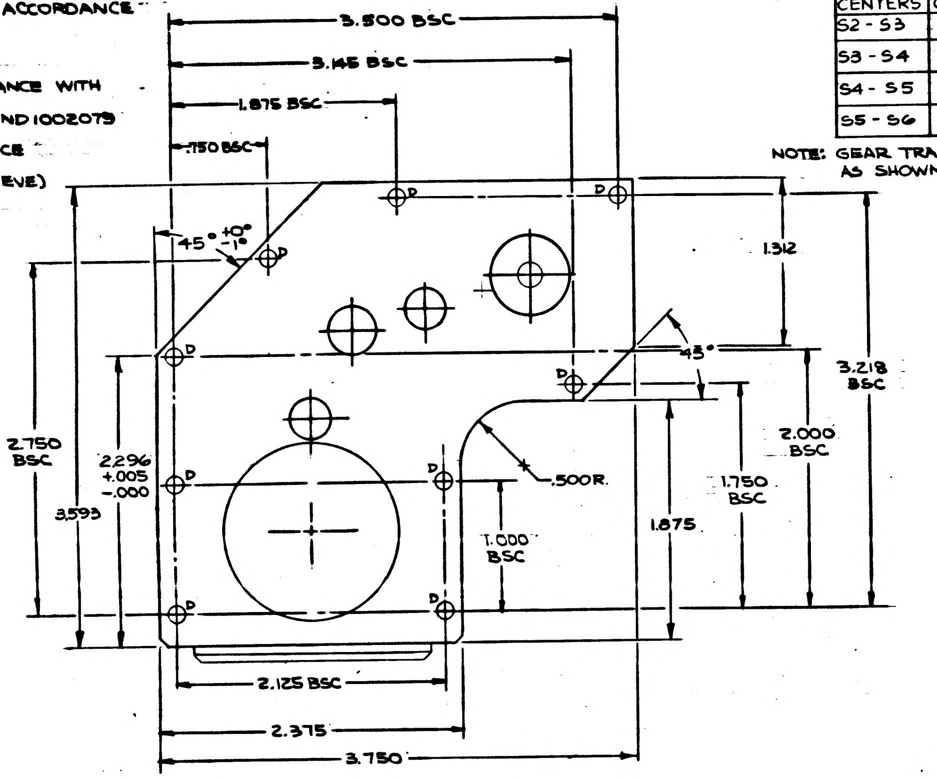
CENTERS	C.D. CHECKING DIM.
S2 - S3	.7503-7509
S3 - S4	.5941-.5945
S4 - S5	.4753-.4758
S5 - S6	.4044-.4049

NOTE: GEAR TRAINS ARE INDICATED AS SHOWN — - - —

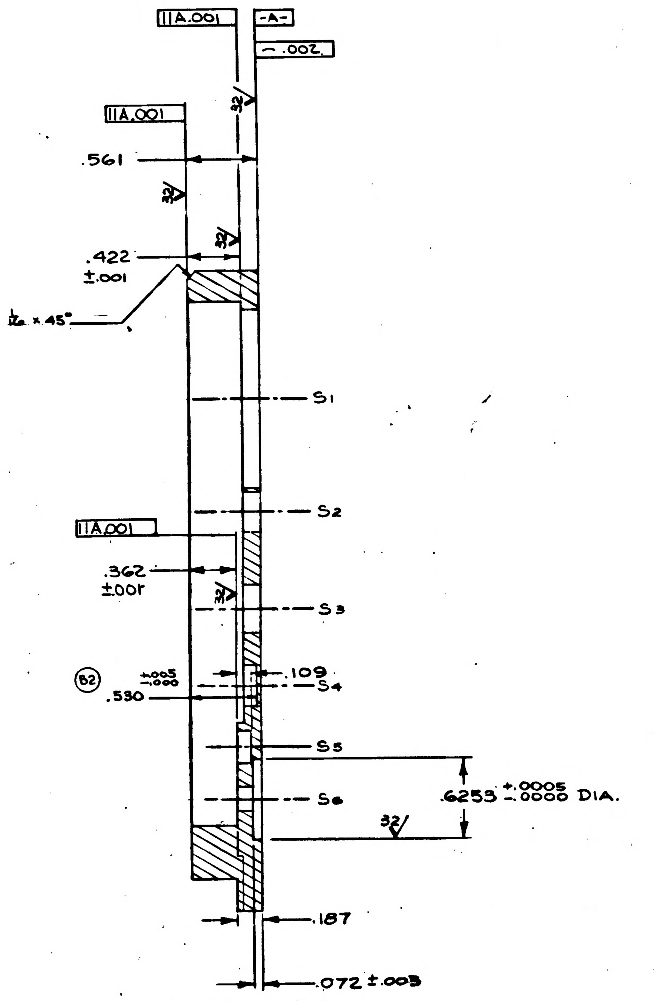
C 965I101

REVISIONS T DRR 001141

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	A3 G10 C2 C6 D8 B4	1) NEXT ASSY WAS 1011706 2) REMOVED PART IDENT NOTE NO. 7. 3) HOLE LETTER DESIGNATION ON DIMENSIONS 2.281 & 2.125 WAS "B". 4) ADDED DIMENSION .938 5) "A" HOLE WAS 2-56NC-3 "B" HOLE WAS 3-48 NC-3 TDRR NO. 07919	6-24-63	[illegible]
B3	C7 F4 B-7 E-3 B-7	1) ADDED .250 DIM. & ADDED 1/16 × 45° CHAMFER 2) ADDED .530 ±.005 DIM. TO S-4. J HOLE WAS G HOLE J HOLE WAS THRU HOLE G HOLE WAS QUAN. 2 3) ADDED 67½° TANGENT END MILL CUT TDRR 02043	7-16-63	[illegible]
C	B3	HOLE D CHANGED FROM DR. NO 39 TO DR NO. 29 TDRR 02251	7-24-6	WK 8/6/6

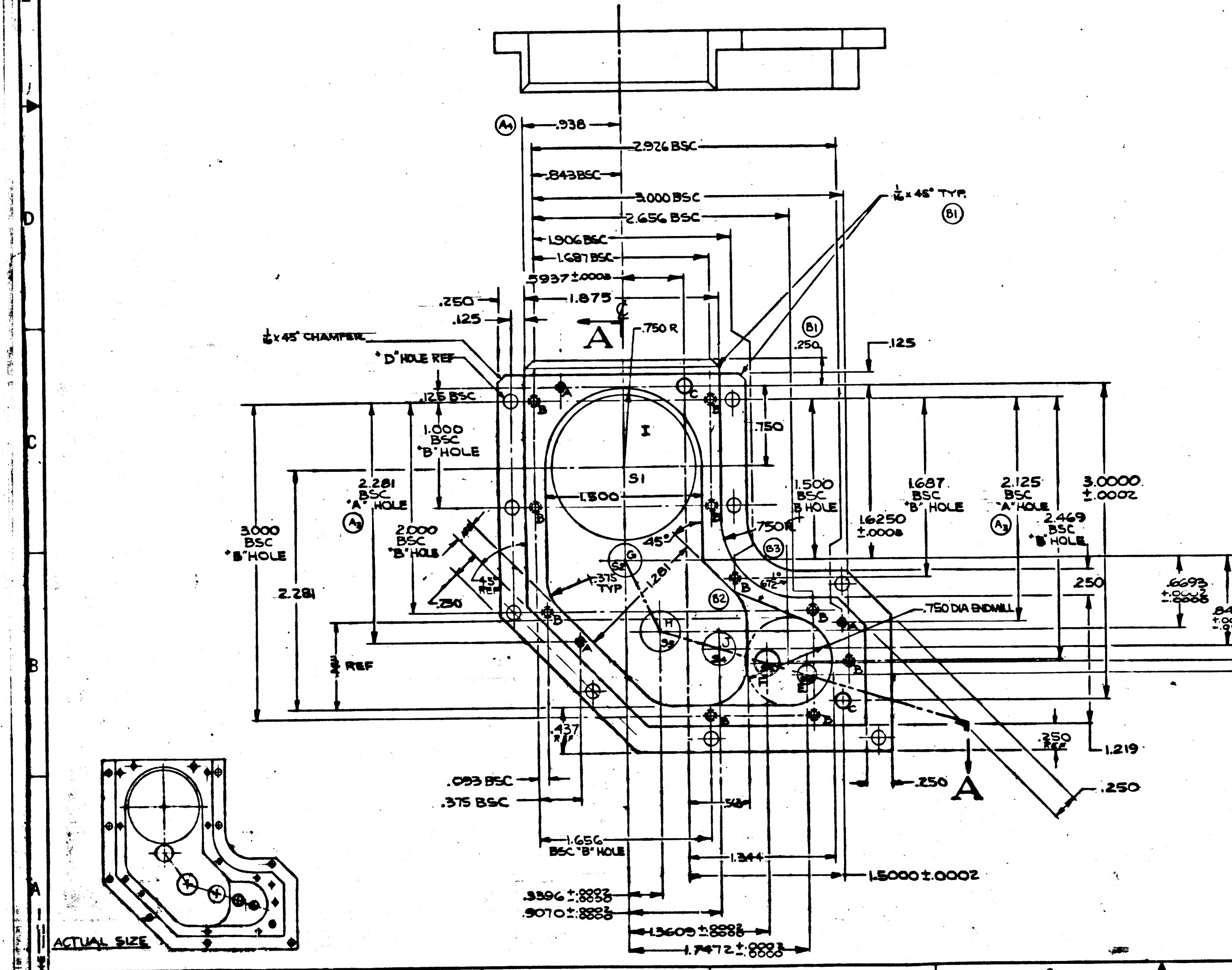


3.500 BSC
3.145 BSC
1.875 BSC
.750 BSC
45° +0° -1°
D
1.312
3.218 BSC
45°
2.000 BSC
1.750 BSC
.500R
2.750 BSC
2.296 +.005 -.000
3.593
1.000 BSC
1.875
2.125 BSC
2.375
3.750



11 A .001
-A-
⌒ .002
32/
.561
.422 ±.001
1/16 × 45°
S1
S2
S3
.362 ±.001
(B2)
.530 +.005 -.000
.109
S4
S5
S6
.6255 +.0005 -.0000 DIA.
.187
.072 ±.003

SECTION A-A



(A4)
.938
2.926 BSC
.843 BSC
3.000 BSC
2.656 BSC
1/16 × 45° TYP.
(B1)
1.906 BSC
1.687 BSC
.5937 ±.0003
1.875
.250
.125
A
.750 R
1/8 × 45° CHAMFER
"D" HOLE REF
.125 BSC
.250
.125
1.000 BSC "B" HOLE
I
S1
1.300
.750
2.281 BSC "A" HOLE
3.000 BSC "B" HOLE
2.000 BSC "B" HOLE
1.500 BSC "B" HOLE
1.6250 ±.0003
1.687 BSC "B" HOLE
2.125 BSC "A" HOLE
2.469 BSC "B" HOLE
3.0000 ±.0002
45°
.750 R
(B3)
.375 TYP
1.281
.250
(B2)
67½°
.750 DIA ENDMILL
.250
.6693 +.0002 -.0000
.8463 +.0002 -.0000
.9882 +.0002 -.0000
1.1089 +.0002 -.0000
2.281
REF
.437 REF
.250
.250
1.219
.093 BSC
.375 BSC
.500
1.656 BSC "B" HOLE
1.344
1.5000 ±.0002
.3596 +.0002 -.0000
.5070 +.0002 -.0000
1.3609 +.0002 -.0000
1.7472 +.0002 -.0000
A
ACTUAL SIZE

	HOLE	DESCRIPTION	QUANTITY	
⊕ .004 DIA	A	DR. NO. 49 (.073) X .375 DEEP REDRILL NO. 38 (.1015) X .018 DEEP 2-56 NC-3B × .250 DEEP (A5)	3	
⊕ .010 DIA	B	DR. NO. 44 (.086) X .281 DEEP REDRILL NO. 32 (.116) X .022 DEEP (A5) 3-48 NC-3B × .149 DEEP	10	
	C	DR NO. 47 (.0785) THRU .0927 ±.0005 DIA × .218 DEEP	2	
⊕ .010 DIA	D	DR. THRU NO. 29 (.136) (C)	9	
	E	DR 3/16 (.1875) THRU C'BORE OPPOSITE SIDE AS SHOWN 32/ IN SECTION A-A	1	
	F	.2501 +.0003 -.0000 DIA TO DEPTH SHOWN IN SECTION A-A 32/	1	
	G	.3126 +.0003 -.0000 DIA. 32/	1	(B2)
	H	.3751 +.0003 -.0000 DIA. THRU 32/	1	
	I	1.375 DIA. THRU	1	
	J	.3126 +.0003 -.0000 DIA. TO DEPTH SHOWN IN SECT. AA	1	(B2)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
(A1) 1011725	1011701

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± 1°

DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE NO. 5
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900740
DRAWN W. CABAN DATE 3-18-63
CHECKED 4-17-63
APPROVAL 4-2-63
APPROVAL E. [illegible] 4-3-63
NASA APPROVAL
MIT APPROVAL 8-4-63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, GEAR
(SEXTANT TRUNNION DRIVE)

CODE IDENT NO.
SIZE E
NASA NUMBER 1011596
SCALE 2/1
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

MASTER

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:-
a) 63/ FINISH ALL OVER
b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. MATERIAL:- BERYLLIUM IN ACCORDANCE WITH MIL-B-21531
6. HEAT TREAT (STABILIZE & STRESS RELIEVE) IN ACCORDANCE WITH ND 1002092
7. THIS PART TO BE MATED WITH PART NO. 1011600.

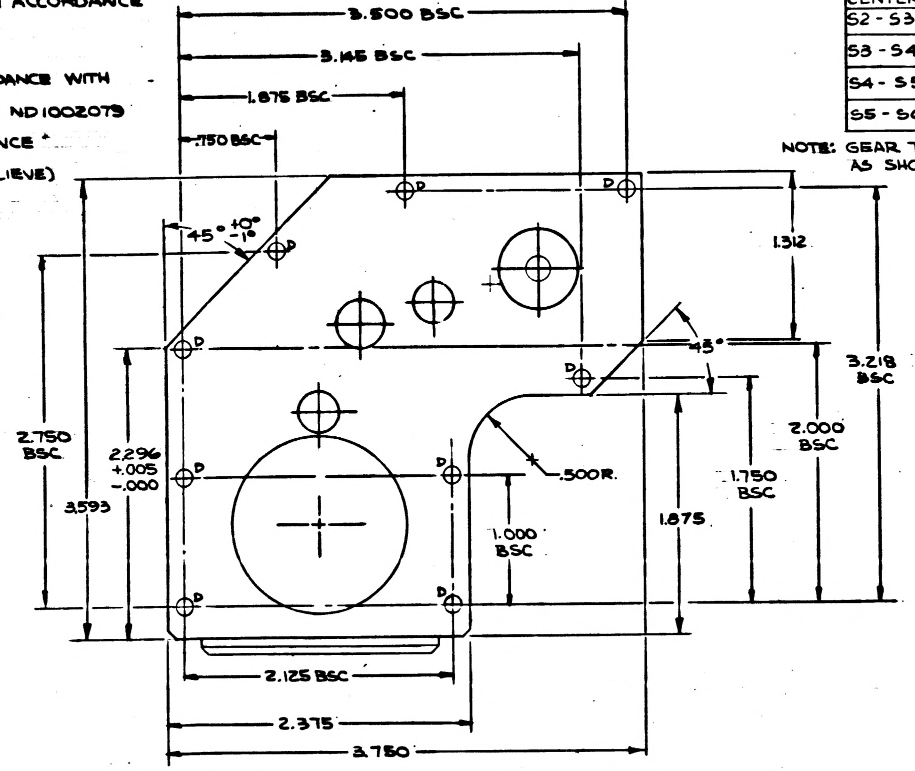
CENTERS	C.D. CHECKING DIM.
S2 - S3	.7503-7509
S3 - S4	.5941-.5945
S4 - S5	.4753-.4758
S5 - S6	.4044-.4049

NOTE: GEAR TRAINS ARE INDICATED AS SHOWN — - - —

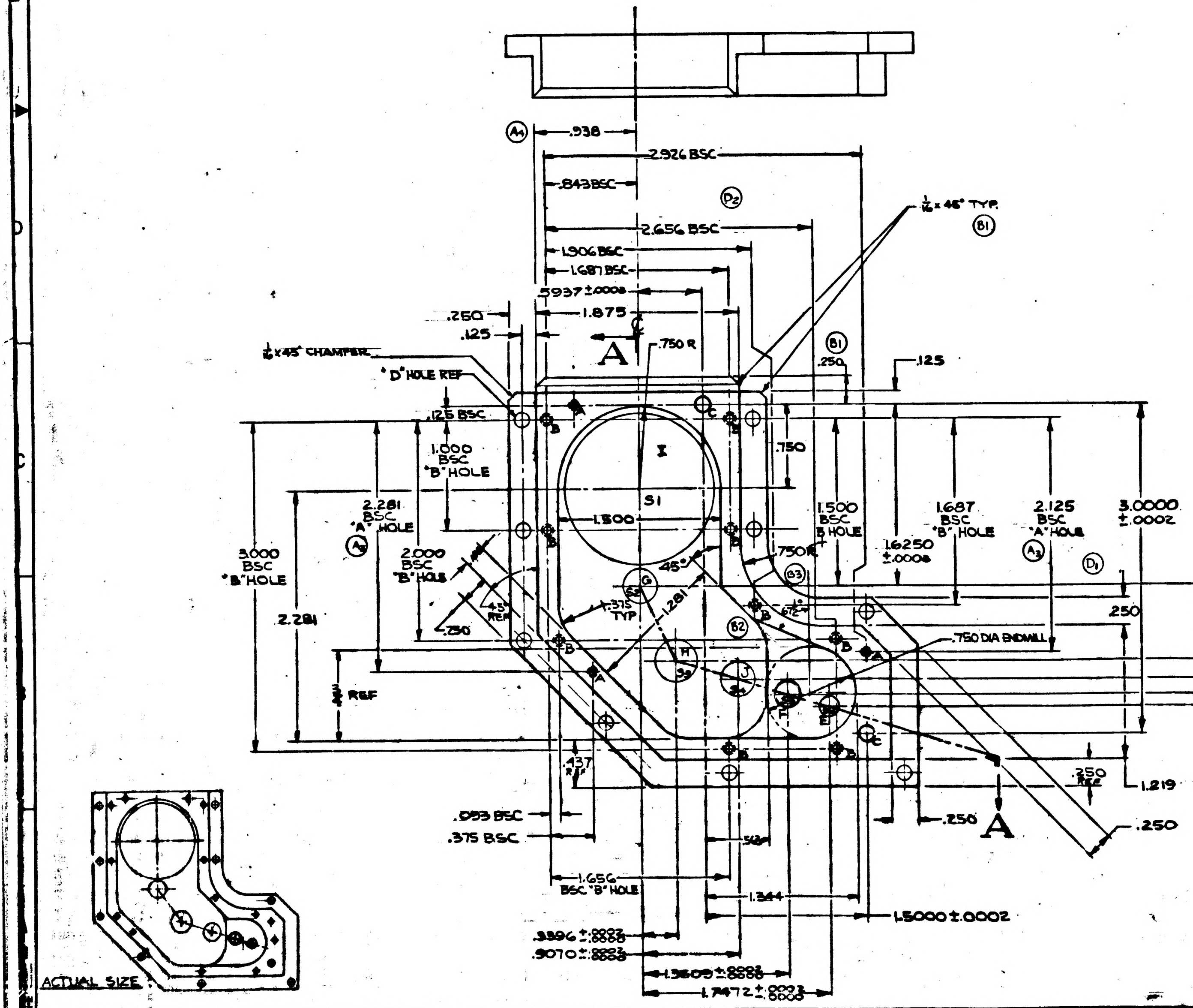
a	9651101

REVISIONS TDRR 00174

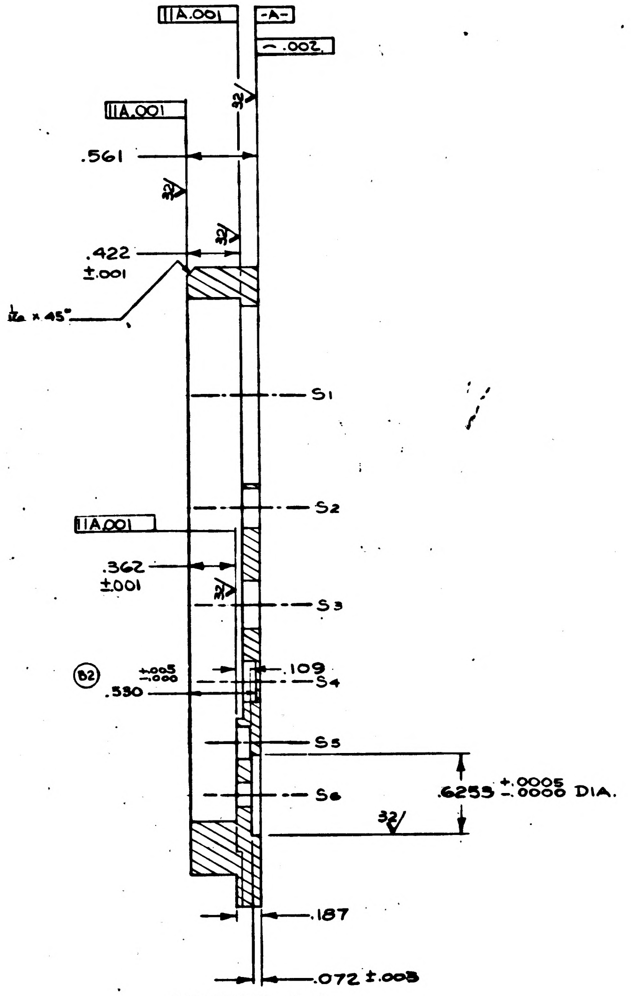
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	A3 B10 C3 C6 D8 B4	1) NEXT ASSY WAS 1011906 2) REMOVED PART IDENT NOTE NO. 7. 3) HOLE LETTER DESIGNATION ON DIMENSIONS 2.281 & 2.125 WAS "B". 4) ADDED DIMENSION .938 5) A HOLE WAS 2-56NC-3 B HOLE WAS 3-48 NC-3 TDRR NO. 07919	6-24-63	
B3	C7 F4 B-7 B-3 B-7	1) ADDED .250 DIM. & ADDED 1/16 × 45° CHAMFER 2) ADDED .530 $^{+.005}_{-.000}$ DIM. TO S-4. J HOLE WAS G HOLE J HOLE WAS THRU HOLE G HOLE WAS QUAN. 2 3) ADDED 67½° TANGENT END MILL CUT TDRR 02043	7-16-63 7/19/63	
C	B3	HOLE D CHANGED FROM DR. NO 39 TO DR NO. 29 TDRR 02251	7-24-63	WK 8/6/63
D3		REVISED PER TDRR NO. 02806	9/26/63	



3.500 BSC
3.145 BSC
1.875 BSC
.750 BSC
45° +0° -1°
D
1.312
45°
3.218 BSC
2.750 BSC
2.296 +.005 -.000
3.593
.500R.
2.000 BSC
1.750 BSC
1.000 BSC
1.875
2.125 BSC
2.375
3.750



.938
2.926 BSC
.843 BSC
2.656 BSC
1/16 × 45° TYP.
1.906 BSC
1.687 BSC
.5937 ±.0005
.250
1.875
.125
.750 R
A
1/8 × 45° CHAMFER
"D" HOLE REF
.125
.125 BSC
1.000 BSC "B" HOLE
.750
2.281 BSC "A" HOLE
S1
1.300
1.500 BSC "B" HOLE
1.687 BSC "B" HOLE
2.125 BSC "A" HOLE
3.0000 ±.0002
3.000 BSC "B" HOLE
2.000 BSC "B" HOLE
.750 R
1.6250 ±.0005
45°
1.375 TYP
1.281
.250
2.281
.250
.6699 +.0003 -.0000
.8463 +.0003 -.0000
.9882 +.0003 -.0000
1.1089 +.0003 -.0000
.750 DIA ENDMILL
3/4 REF
.437
.250
1.219
.053 BSC
.375 BSC
.250
A
.250
1.656 BSC "B" HOLE
1.344
1.5000 ±.0002
.3396 +.0003 -.0000
.9070 ±.0003
1.3609 ±.0003
1.7472 +.0003 -.0000
ACTUAL SIZE



A .001
-A-
.002
32/
A .001
.561
.422 ±.001
1/16 × 45°
S1
S2
A .001
.362 ±.001
S3
.530 +.005 -.000
.109
S4
S5
S6
.6255 +.0005 -.0000 DIA.
.187
.072 ±.003

SECTION A-A

	HOLE	DESCRIPTION	QUANTITY	
⊕ .004 DIA	A	DR. NO. 49 (.073) X .375 DEEP REDRILL NO. 38 (.1015) X .018 DEEP 2-56 NC-3B × .250 DEEP (A5)	3	
⊕ .010 DIA	B	DR. NO. 44 (.086) X .281 DEEP REDRILL NO. 32 (.116) X .022 DEEP (A5) 3-48 NC-3B × .149 DEEP	9	(D3)
	C	DR NO. 47 (.0785) THRU .0927 ±.0005 DIA X .218 DEEP	2	
⊕ .010 DIA	D	DR. THRU NO. 29 (.136) (C)	9	
	E	DR 3/16 (.1875) THRU C'BORE OPPOSITE SIDE AS SHOWN 32/ IN SECTION A-A	1	
	F	.2501 $^{+.0005}_{-.0000}$ DIA TO DEPTH SHOWN IN SECTION A-A 32/	1	
	G	.3126 $^{+.0003}_{-.0000}$ DIA. 32/	1	(B2)
	H	.3751 $^{+.0001}_{-.0002}$ DIA. THRU 32/	1	
	I	1.375 DIA. THRU	1	
	J	.3126 $^{+.0003}_{-.0000}$ DIA. TO DEPTH SHOWN IN SECT. A A	1	(B2)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION

LIST OF PARTS AND MATERIALS

MASTER

NEXT ASSY	USED ON
1011725	1011701

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — ; DECIMALS ± .005 ; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL: SEE NOTE NO. 5
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900740
DRAWN W. CABAN DATE 3-12-63
CHECKED 4-2-63
APPROVAL 4-3-63
APPROVAL E. 4-3-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, GEAR
(SEXTANT TRUNNION DRIVE)

CODE IDENT NO. | SIZE E | NASA NUMBER 1011596
SCALE 2/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

1011596

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:-
   a) 63/ FINISH ALL OVER
   b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. MATERIAL:- BERYLLIUM IN ACCORDANCE WITH ND1002125 (E2)
6. HEAT TREAT (STABILIZE & STRESS RELIEVE) IN ACCORDANCE WITH ND1002114 (E3)
7. THIS PART TO BE MATED WITH PART NO. 1011600.

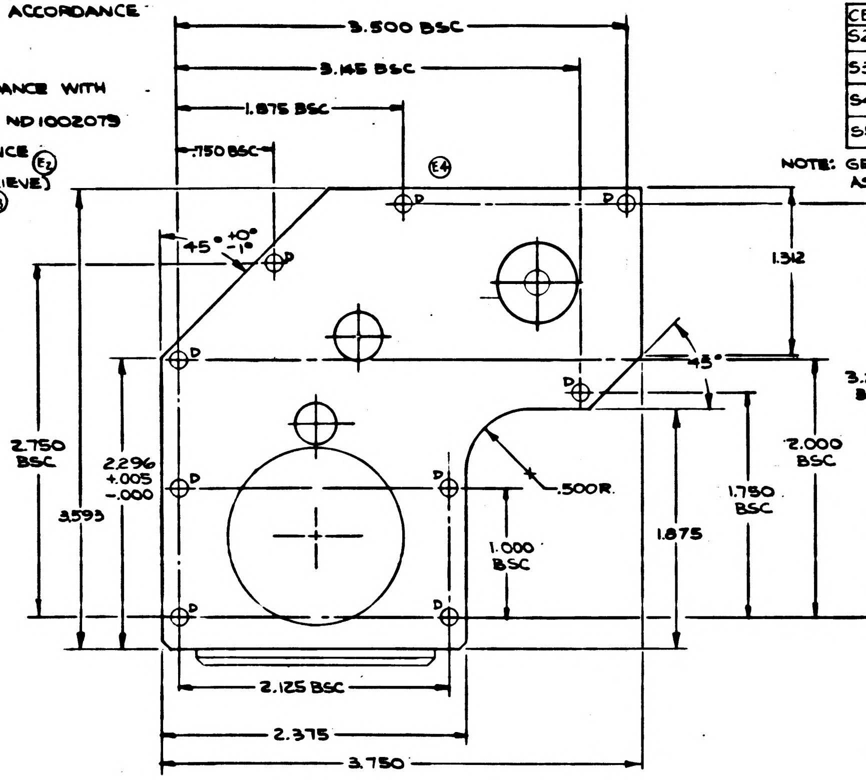
(A2)

CENTERS	C.D. CHECKING DIM.
S2 - S3	.7503-.7509
S3 - S4	.5941-.5945
S4 - S5	.4753-.4758
S5 - S6	.4044-.4049

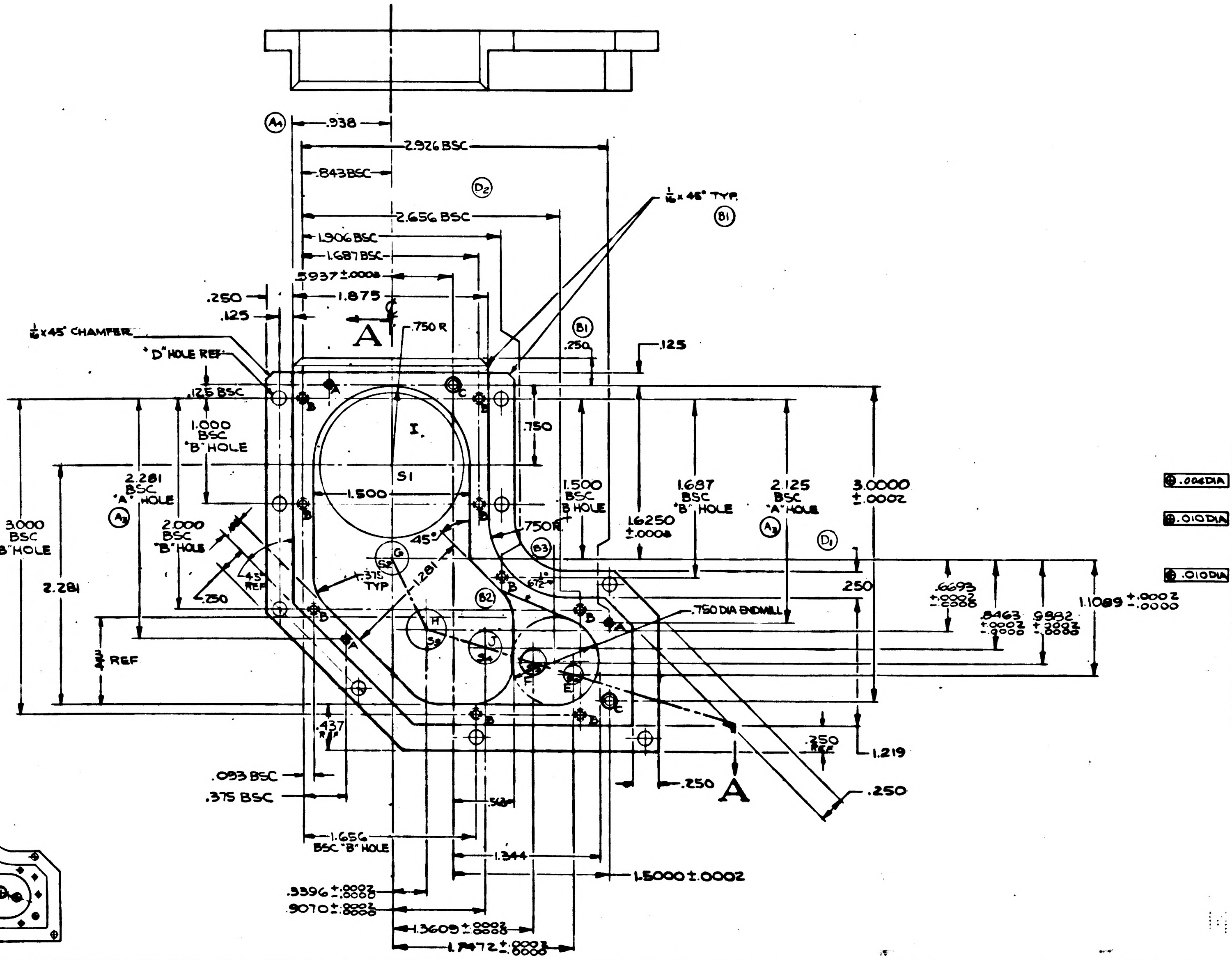
NOTE: GEAR TRAINS ARE INDICATED AS SHOWN

3 | 9651101

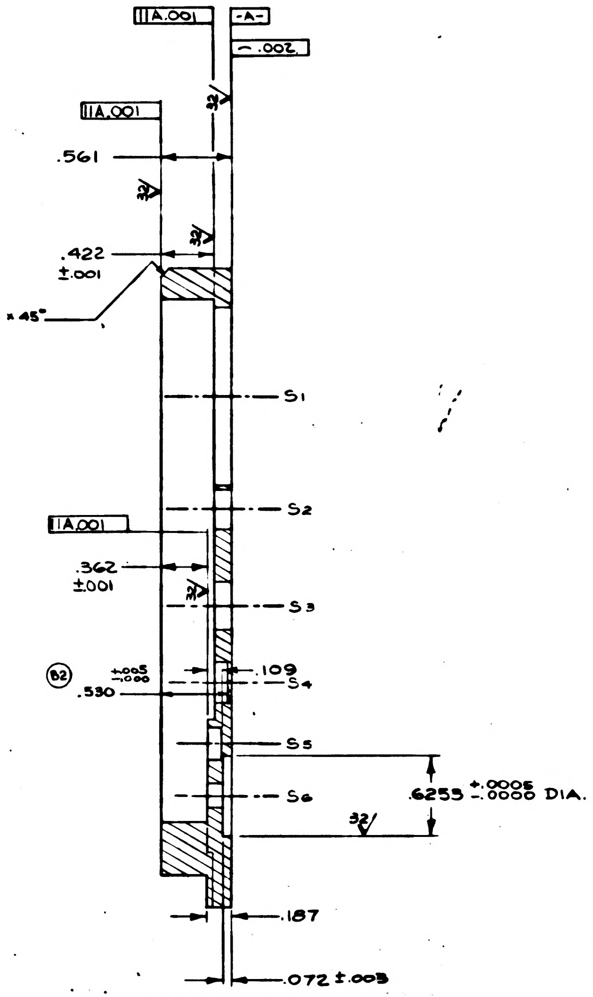
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	A5 B10 C9 C6 D8 B4	1) NEXT ASSY WAS 1011708 2) REMOVED PART IDENT NOTE NO. 7. 3) HOLE LETTER DESIGNATION ON DIMENSIONS 2.281 & 2.125 WAS B 4) ADDED DIMENSION .938 5) A HOLE WAS 2-56NC-3 B HOLE WAS 3-48 NC-3 TDRR NO. 01919	5-24-63	
B3	E7 F4 B7 B-3 B-7	1) ADDED .250 DIM. & ADDED 1/16 × 45° CHAMFER 2) ADDED .530 +.005 -.000 DIM. TO S-4. J HOLE WAS G HOLE J HOLE WAS THRU HOLE G HOLE WAS QUAN 2 3) ADDED 67½° TANGENT END MILL CUT TDRR 02049	7-16-63 7-1-63	
C	B3	HOLE D CHANGED FROM DR. NO 39 TO DR NO. 29 TDRR 02251	7-24-63	W/S 8/6/63
D3		REVISED PER TDRR NO. 02806	9/28/63	
E4		REVISED PER TDRR NO. 07816		



3.500 BSC
3.145 BSC
1.875 BSC
.750 BSC
45° +0° -1°
1.312
45°
3.218 BSC
2.000 BSC
1.750 BSC
1.875
2.750 BSC
2.296 +.005 -.000
3.593
.500R.
1.000 BSC
2.125 BSC
2.375
3.750
D
E4



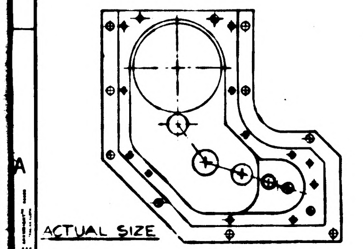
.938
2.926 BSC
.843 BSC
2.656 BSC
1.906 BSC
1.687 BSC
.5937±.0008
1.875
.250
.125
1/16 x 45° TYP.
1/16 x 45° CHAMFER
"D" HOLE REF
.125 BSC
1.000 BSC "B" HOLE
.750 R
.250
.125
A
.750
1.500 BSC "B" HOLE
1.687 BSC "B" HOLE
2.125 BSC "A" HOLE
3.0000 ±.0002
1.6250 ±.0008
2.281 BSC "A" HOLE
3.000 BSC "B" HOLE
2.000 BSC "B" HOLE
1.500
S1
I
45°
.750R
.375 TYP
.281
.250
2.281
3/4 REF
.750 DIA ENDMILL
.250
.6693 +.0002 -.0000
.8463 +.0002 -.0000
.9882 +.0002 -.0000
1.1089 +.0002 -.0000
.437
.093 BSC
.375 BSC
.562
1.656 BSC "B" HOLE
1.344
1.5000±.0002
.3396 +.0002 -.0000
.9070 +.0002 -.0000
1.3609 +.0002 -.0000
1.7472 +.0002 -.0000
.350 REF
1.219
.250
.250
A
A2 B1 B2 B3 D2 D3



A.001
-A-
- .002
32/
A.001
.561
.422 ±.001
1/16 x 45°
S1
S2
A.001
.362 ±.001
S3
B2
.530 +.005 -.000
.109
S4
S5
S6
.6255 +.0005 -.0000 DIA.
.187
.072 ±.003

SECTION A-A

	HOLE	DESCRIPTION	QUANTITY	
⊕ .004 DIA	A	DR. NO 49 (.073) x .375 DEEP REDRILL NO. 38 (.1015) x .018 DEEP 2-56 NC-3B × .250 DEEP (A5)	3	
⊕ .010 DIA	B	DR. NO. 44 (.086) x .281 DEEP REDRILL NO. 32 (.116) x .022 DEEP (A5) 3-48 NC-3B × .149 DEEP	9	(D3)
	C	DR NO. 47 (.0785) THRU, .0934 +.0003 -.0000 DIA × .218 DEEP, CSK 100° X .125 DIA	2	(E1)
⊕ .010 DIA	D	DR THRU NO. 29 (.136) (C)	9	
	E	DR 3/16 (.1875) THRU C'BORE OPPOSITE SIDE AS SHOWN 32/ IN SECTION A-A	1	
	F	.2501 +.0003 -.0000 DIA TO DEPTH SHOWN IN SECTION A-A 32/	1	
	G	.3126 +.0003 -.0000 DIA. 32/	1	(B2)
	H	.3751 +.0003 -.0000 DIA. THRU 32/	1	
	I	1.375 DIA. THRU	1	
	J	.3126 +.0003 -.0000 DIA TO DEPTH SHOWN IN SECT AA	1	(B2)



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION

LIST OF PARTS AND MATERIALS

(A1) 1011725	1011701
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE NO. 5

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900740

DRAWN W. CABAN DATE 3-12-63
CHECKED 4-12-63
APPROVAL 4-9-63
APPROVAL E. 4-8-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, GEAR
(SEXTANT TRUNNION DRIVE)

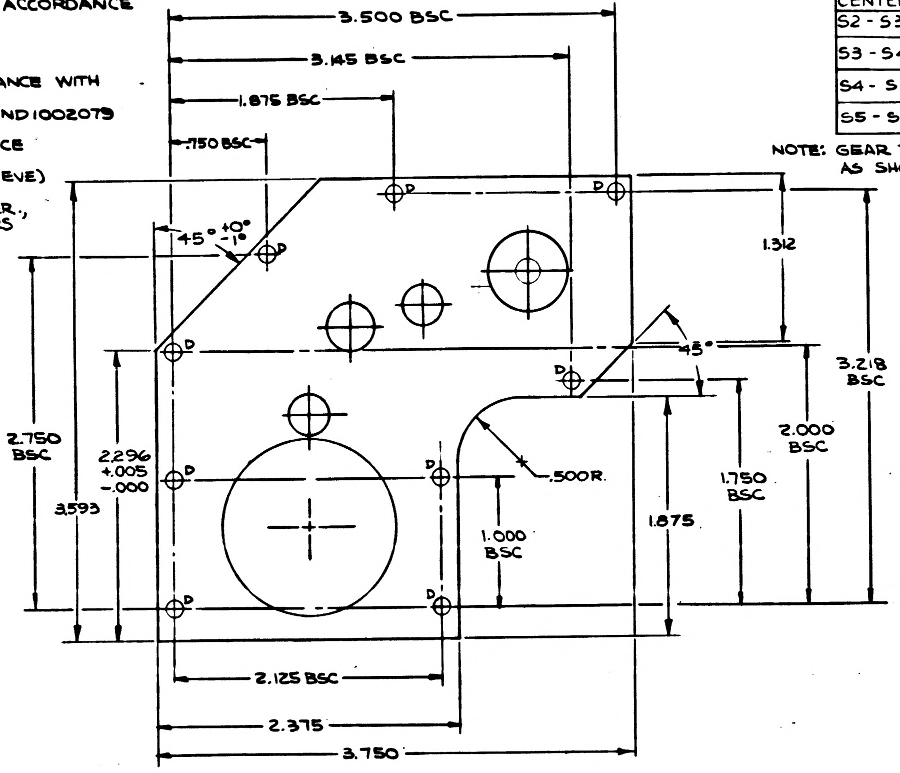
CODE IDENT NO.	SIZE	NASA NUMBER
	E	1011596

SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

	96S1101

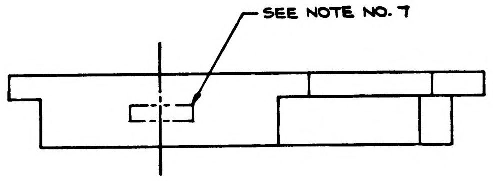
REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

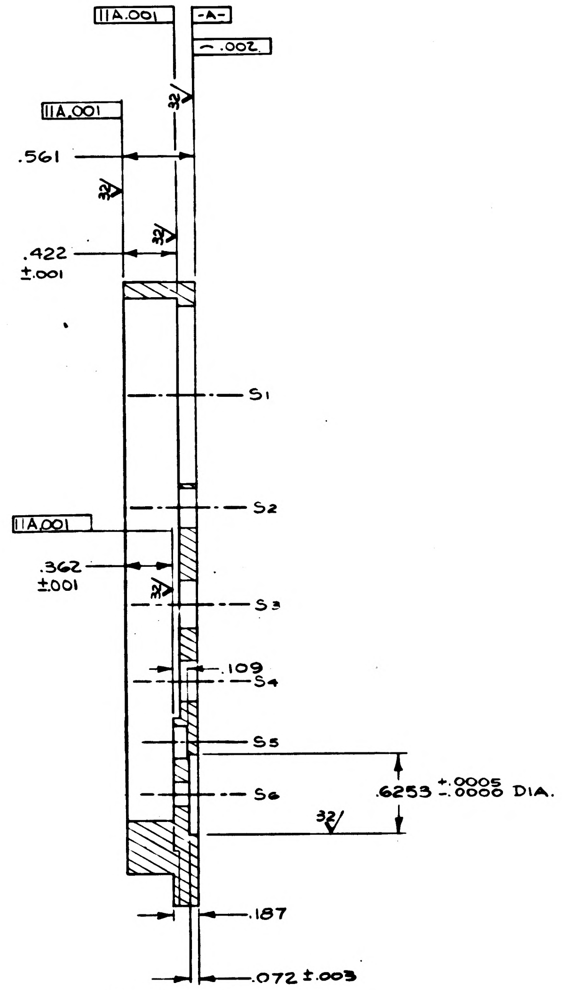
NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078
3. UNLESS OTHERWISE SPECIFIED:-
   a) 63/ FINISH ALL OVER
   b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. MATERIAL: BERYLLIUM IN ACCORDANCE WITH MIL-B-21531
6. HEAT TREAT (STABILIZE & STRESS RELIEVE) IN ACCORDANCE WITH ND1002092
7. IDENTIFY USING NASA DRAWING NUMBER, REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019
8. THIS PART TO BE MATED WITH PART NO. 1011600


3.500 BSC
3.145 BSC
1.875 BSC
.750 BSC
45° +0° -1°
D
1.312
3.218 BSC
45°
2.000 BSC
1.750 BSC
1.875
.500R.
1.000 BSC
2.750 BSC
2.296 +.005 -.000
3.593
2.125 BSC
2.375
3.750

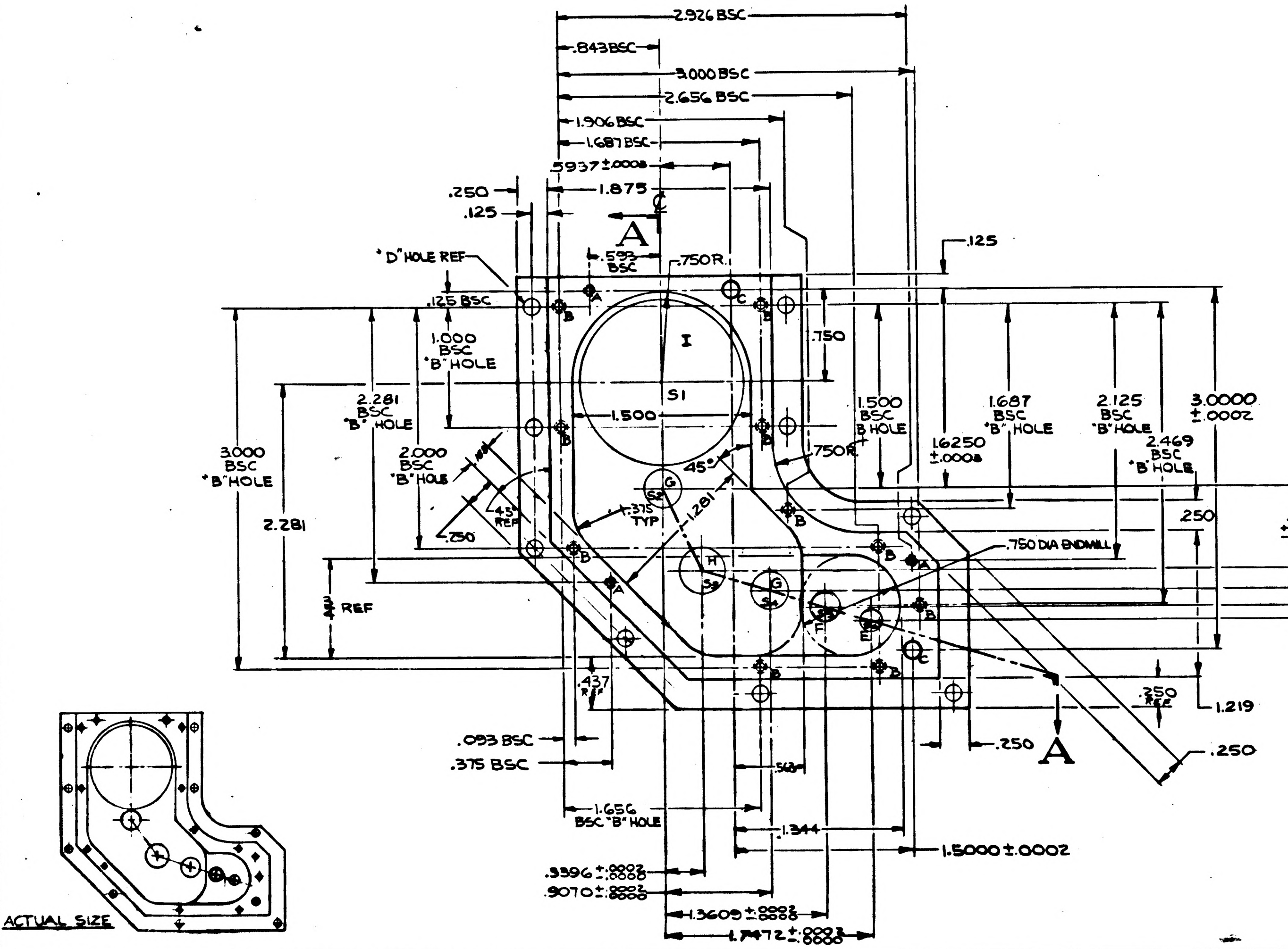
CENTERS	C.D.CHECKING DIM.
S2 - S3	.7503-7509
S3 - S4	.5941-.5945
S4 - S5	.4753-.4758
S5 - S6	.4044-.4049

NOTE: GEAR TRAINS ARE INDICATED AS SHOWN — - - —


SEE NOTE NO. 7


IIA.001
-A-
⌒ .002
.561
32/
.422 ±.001
S1
S2
.362 ±.001
S3
.109
S4
S5
S6
.6253 +.0005 -.0000 DIA.
.187
.072 ±.003

SECTION A-A


2.926 BSC
.843 BSC
3.000 BSC
2.656 BSC
1.906 BSC
1.687 BSC
.5937±.0008
.250
.125
1.875
A
.593 BSC
.750R.
"D" HOLE REF
.125 BSC
1.000 BSC "B" HOLE
I
S1
.750
1.500
2.281 BSC "B" HOLE
2.000 BSC "B" HOLE
3.000 BSC "B" HOLE
45°
.750R
1.500 BSC "B" HOLE
1.6250 ±.0008
1.687 BSC "B" HOLE
2.125 BSC "B" HOLE
2.469 BSC "B" HOLE
3.0000 ±.0002
.125
.375 TYP
1.281
45° REF
.250
2.281
REF
H
G
F
E
C
B
A
D
.750 DIA ENDMILL
.250
.6693 +.0002 -.0000
.8463 +.0002 -.0000
.9882 +.0002 -.0000
1.1089 +.0002 -.0000
.437 REF
.250 REF
1.219
.250
A
.250
.093 BSC
.375 BSC
1.656 BSC "B" HOLE
1.344
.3396 +.0002 -.0000
.9070 +.0002 -.0000
1.3609 +.0002 -.0000
1.7472 +.0003 -.0000
1.5000 ±.0002
ACTUAL SIZE

	HOLE	DESCRIPTION	QUANTITY
⊕ .004DIA	A	DR. NO 49 (.073) X .375 DEEP REDRILL NO. 38(.1015) X .018 DEEP 2-56NC-3 X .250 DEEP	3
⊕ .010DIA	B	DR. NO. 44 (.086) X .281 DEEP REDRILL NO. 32(.116) X .022 DEEP 3-48NC-3 X .149 DEEP	10
	C	DR NO 47(.0785) THRU .0927 +.0005 -.0000 DIA X .218 DEEP	2
⊕ .010DIA	D	DR. THRU NO. 39 (.136)	9
	E	DR 3/16 (.875) THRU C'BORE OPPOSITE SIDE AS SHOWN 32/ IN SECTION A-A	1
	F	.2501 +.0003 -.0000 DIA TO DEPTH 32/ SHOWN IN SECTION A-A	1
	G	.3126 +.0003 -.0000 DIA. THRU 32/	2
	H	.3751 +.0003 -.0000 DIA. THRU 32/	1
	I	1.375 DIA. THRU	1

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011706	1011701
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES: FRACTIONS ± — ; DECIMALS ±.005 ; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE NO. 5
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900740
DRAWN W. CABAN DATE 3-12-63
CHECKED 4-17-63
APPROVAL 4-3-63
APPROVAL E. 4-3-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, GEAR
(SEXTANT TRUNNION DRIVE)

CODE IDENT NO
SIZE E
NASA NUMBER 1011596
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

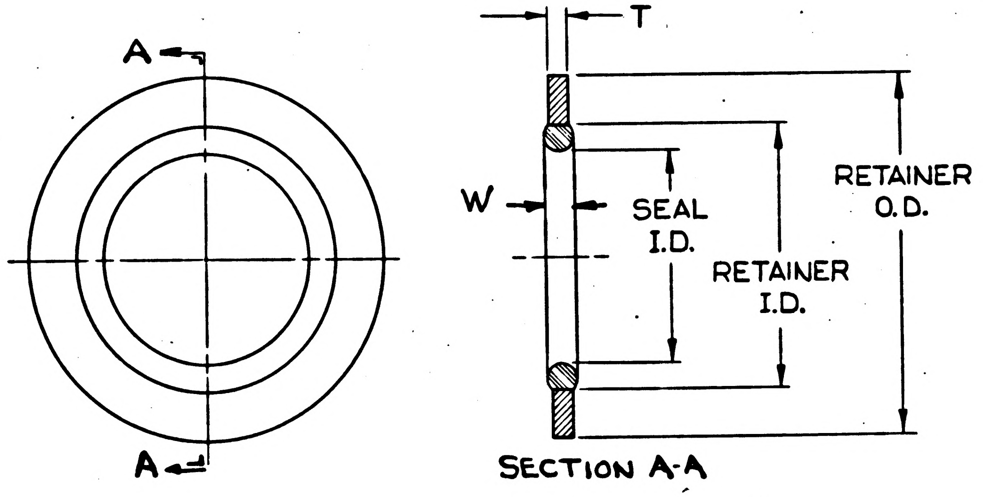
1011596

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

REVISIONS

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

DASH NO.	RUBBER SEAL (O-RING) INSIDE DIA.	RUBBER SEAL (O-RING) W THICKNESS	METAL RETAINER INSIDE DIA	METAL RETAINER OUTSIDE DIA	METAL RETAINER T THICKNESS
-1	.425 ± .004	.070 ± .003	.562 ± .003	.750 ± .010	.050 ± .003
-2	.078 ± .002	.030 ± .002	.136 ± .003	.250 ± .010	.024 ± .002
-3	.100 ± .002	.038 ± .002	.171 ± .003	.312 ± .010	.027 ± .002
-4	.116 ± .002	.038 ± .002	.187 ± .003	.312 ± .010	.027 ± .002
-5	.128 ± .003	.050 ± .002	.224 ± .003	.375 ± .010	.040 ± .003
-6	.154 ± .003	.050 ± .002	.250 ± .003	.375 ± .010	.040 ± .003
-7	.176 ± .003	.050 ± .002	.274 ± .003	.438 ± .010	.040 ± .003
-8	.176 ± .003	.066 ± .003	.312 ± .003	.438 ± .010	.050 ± .003
-9	.239 ± .003	.051 ± .002	.333 ± .003	.500 ± .010	.040 ± .003
-10	.239 ± .003	.070 ± .003	.375 ± .003	.531 ± .010	.050 ± .003
-11	.301 ± .004	.070 ± .003	.437 ± .003	.593 ± .010	.050 ± .003
-12	.364 ± .004	.070 ± .003	.500 ± .003	.687 ± .010	.050 ± .003
-13	.488 ± .004	.070 ± .003	.625 ± .003	.875 ± .010	.050 ± .004
-14	.550 ± .004	.070 ± .003	.687 ± .003	1.062± .010	.050 ± .004
-15	.612 ± .004	.070 ± .003	.750 ± .003	1.188± .010	.050 ± .004
-16	.737 ± .005	.103 ± .003	.947 ± .003	1.312± .010	.075 ± .004
-17	.862 ± .006	.103 ± .003	1.073 ± .003	1.500± .010	.075 ± .004
-18	.987 ± .006	.103 ± .003	1.198 ± .003	1.750± .010	.075 ± .004



SECTION A-A

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   - C. PACKING AND SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-P-116, SUBMETHOD IA-8.
2. INSPECTION AND ACCEPTANCE:
   - A. ITEM SHALL BE MARKED WITH NASA DRAWING NO., DASH NO., REVISION LETTER, MANUFACTURER'S IDENTIFICATION, AND RUBBER CURE DATE IN ACCORDANCE WITH:

     UNITS - PER MIL-STD-130
     PACKING AND SHIPPING CONTAINER - PER MIL-STD-129
   - B. DIMENSIONS AS SHOWN.
3. DESIGN REQUIREMENTS:
   - A. MATERIALS:
     1. SEAL: RUBBER, SYNTHETIC, FUEL AND OIL RESISTANT IN CONFORMITY WITH MILITARY SPECIFICATION MIL-R-6855, CLASSES I, II, AND III, GRADE 60; EXCEPT FOR ORIGINAL ELONGATION.
     2. RETAINER: ALUMINUM ALLOY CONFORMING TO FEDERAL SPECIFICATION QQ-A-287, TYPE 7075 TEMPER T6
   - B. FINISH OF RETAINER: ANODIC COATING, SULFURIC ACID, IN CONFORMITY WITH MIL-A-8625, TYPE II.
   - C. RUBBER SEAL TO BE BONDED TO METAL RETAINER

PROCURE ONLY FROM APPROVED SOURCES
LISTED ON ND 1002034 FOR THIS DRAWING

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL: SEE NOTE 3.A.
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 74453033001 THRU 3018

DRAWN V. Halnowsky DATE 4-18-63
CHECKED 5-6-63
APPROVAL 6-24-63
APPROVAL E. Thorup 8-28-63
NASA APPROVAL 7/1/63
MIT APPROVAL 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PACKING, PREFORMED, RETAINED
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. | SIZE C | NASA NUMBER 1011597
SCALE NONE | WEIGHT | CALC ACTUAL | SHEET 1 OF 1

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011597

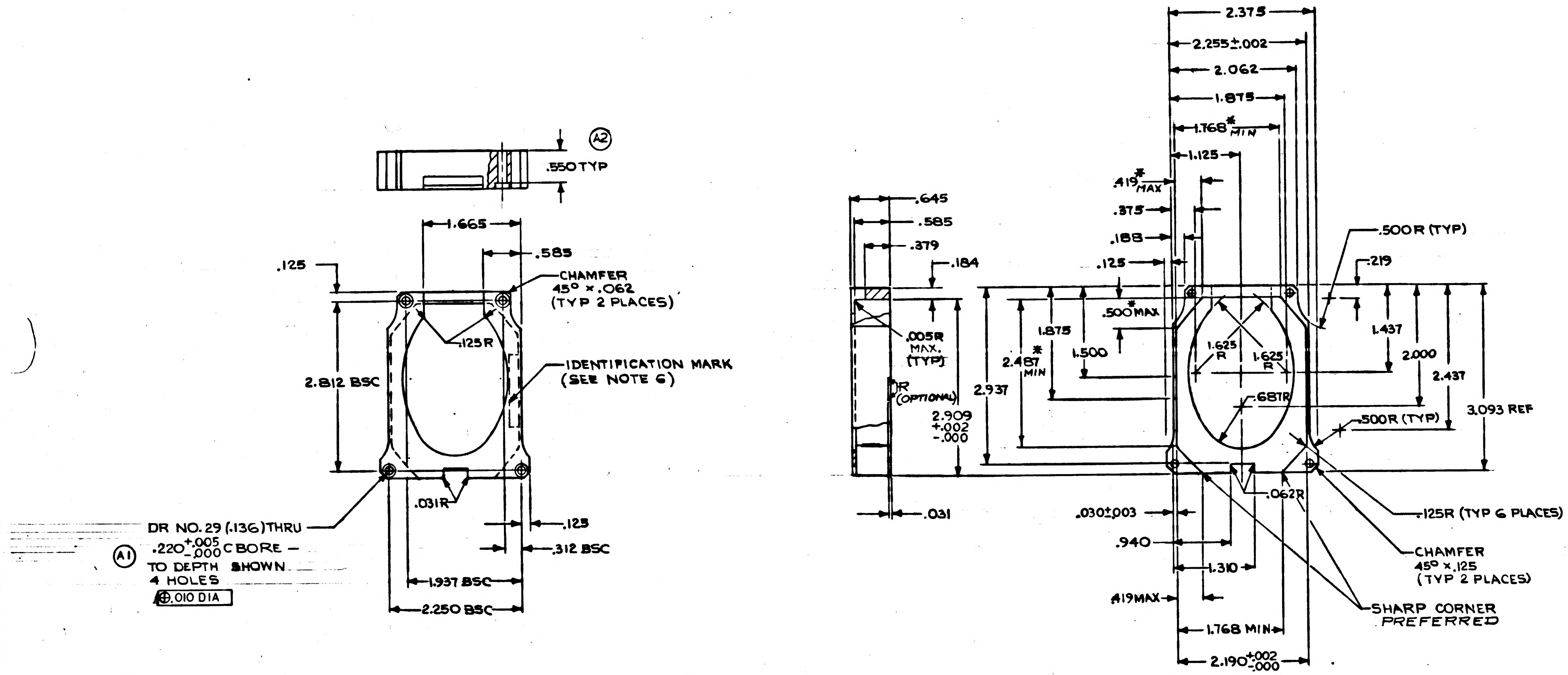
NOTES
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: ANODIZE PER MIL-A-8625, TYPE II (KPS.1005A.200).
6. IDENTIFY USING NASA DRAWING NO. REVISION LETTER & MANUFACTURERS SYMBOL PER ND1002019.

1011598 A

Ⓜ

REVISIONS TDRR 01099

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A2	C8 E6	1) ADDED .220 $^{+.005}_{-.000}$ CBORE 2) ADDED .550 DIM TDRR NO. 02023	7/17/63	



Ⓐ2
.550 TYP
1.665
.585
.125
CHAMFER 45° × .062 (TYP 2 PLACES)
.125R
IDENTIFICATION MARK (SEE NOTE 6)
2.812 BSC
.031R
.125
.312 BSC
DR NO. 29 (.136) THRU
.220 +.005 -.000 C BORE – TO DEPTH SHOWN
4 HOLES
Ⓐ1
⊕ .010 DIA
1.937 BSC
2.250 BSC
.645
.585
.379
.184
.005R MAX. (TYP)
R (OPTIONAL)
2.909 +.002 -.000
2.937
.031
2.375
2.255±.002
2.062
1.875
1.768* MIN
1.125
.419* MAX
.375
.188
.125
.500* MAX
1.875
2.487* MIN
1.500
1.625 R
1.625 R
.681R
.500R (TYP)
.219
1.437
2.000
2.437
3.093 REF
.500R (TYP)
.062R
.125R (TYP 6 PLACES)
.030±.003
.940
1.310
.419 MAX
1.768 MIN
2.190 +.002 -.000
CHAMFER 45° × .125 (TYP 2 PLACES)
SHARP CORNER PREFERRED

✱ DIMENSIONS ARE TO THEORETICAL INTERSECTIONS OF PLANES

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011700	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 2024-T4 FED. SPEC QQ-A-268 TEMPER T4

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900580

DRAWN E. DRAPALA DATE 4-1-63
CHECKED T. SULLIVAN 4-24-63
APPROVAL Thornton 4-26-63
APPROVAL E. Olsen 4-29-63
NASA APPROVAL W. J. Rhine 5-1-63
MIT APPROVAL W. Guffey 1 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RETAINER, BEAM SPLITTER

CODE IDENT NO.
SIZE D
NASA NUMBER 1011598
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

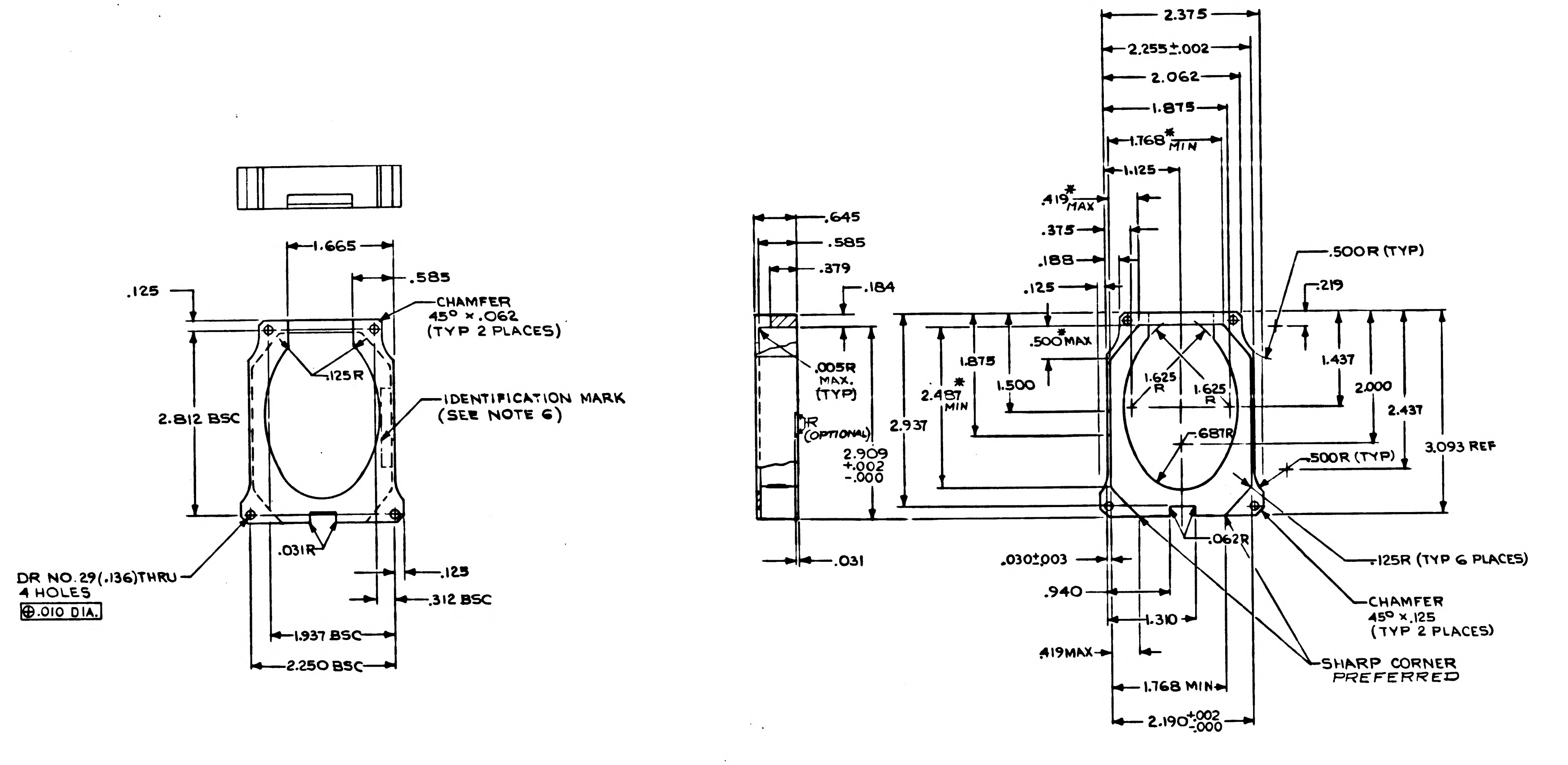
1011598 A

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011598

SYM	ZONE	REVISIONS DESCRIPTION	DATE	APPROVAL

NOTES
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: ANODIZE PER MIL-A-8625, TYPE II (KPS.1005A.200).
6. IDENTIFY USING NASA DRAWING NO. REVISION LETTER & MANUFACTURERS SYMBOL PER ND1002019.



1.665
.585
.125
CHAMFER 45° × .062 (TYP 2 PLACES)
.125R
IDENTIFICATION MARK (SEE NOTE 6)
2.812 BSC
.031R
DR NO. 29 (.136) THRU 4 HOLES
⊕ .010 DIA.
.125
.312 BSC
1.937 BSC
2.250 BSC
.645
.585
.379
.184
.005R MAX. (TYP)
R (OPTIONAL)
2.909 +.002 -.000
2.937
.031
2.375
2.255±.002
2.062
1.875
1.768* MIN
1.125
.419* MAX
.375
.188
.125
.500* MAX
1.875
2.487* MIN
1.500
1.625 R
1.625 R
.500R (TYP)
.219
1.437
2.000
2.437
3.093 REF
.681R
.500R (TYP)
.062R
.125R (TYP 6 PLACES)
.030±.003
.940
1.310
CHAMFER 45° × .125 (TYP 2 PLACES)
.419 MAX
1.768 MIN
SHARP CORNER PREFERRED
2.190 +.002 -.000

* DIMENSIONS ARE TO THEORETICAL INTERSECTIONS OF PLANES

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011700	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — ; DECIMALS ± .005 ; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL ALUMINUM ALLOY 2024-T4 FED. SPEC QQ-A-268 TEMPER T4
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900580
DRAWN E. DRAPALA DATE 4-1-63
CHECKED T. SULLIVAN 4-24-63
APPROVAL 4-26-63
APPROVAL E. Thomas 4-29-63
NASA APPROVAL W.J. Rhine 5-1-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RETAINER, BEAM SPLITTER

CODE IDENT NO. | SIZE D | NASA NUMBER 1011598
SCALE 1/1 | WEIGHT | CALC ACTUAL | SHEET 1 OF 1

INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

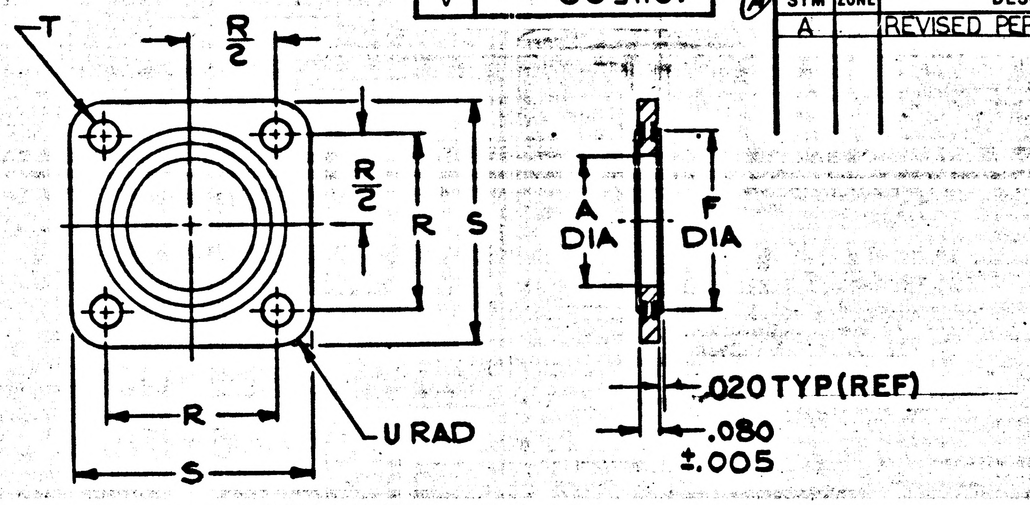
6 | 5 | 4 | 3 | 2 | 1

A 1011599

REVISIONS 02560				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR 10248		

TABLE

DASH NO.	A ±.005	R ±.005	T ±.005	S ±.010	U ±.010	F ±.010
-1	.540	.719	.120	1.000	.141	.735
-2	.395	.594	.120	.875	.141	.565
-3	.670	.812	.120	1.094	.141	.870
-4	.780	.906	.120	1.188	.141	.975
-5	.895	.968	.120	1.296	.172	1.090
-6	1.020	1.062	.120	1.395	.172	1.205
-7	1.162	1.156	.120	1.520	.187	1.330
-8	1.286	1.250	.120	1.650	.187	1.460
-9	1.395	1.375	.147	1.766	.203	1.580
-10	1.645	1.562	.147	2.016	.234	1.820
-11	1.922	1.750	.173	2.280	.266	2.090
-12	2.160	1.937	.173	2.516	.297	2.330
-13	2.400	2.187	.173	2.766	.297	2.575
-14	2.650	2.375	.173	3.016	.328	2.825
-15	2.900	2.625	.173	3.266	.328	3.075
-16	.540	.719	.147	1.000	.141	.735



REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   - C. PACKING AND SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-P-116, SUBMETHOD IA-8. INDIVIDUAL (POLYETHYLENE) BAGS SHALL BE CUSHIONED.
2. INSPECTION AND ACCEPTANCE:
   - A. ITEMS SHALL BE MARKED WITH NASA DRAWING NO., DASH NO., REVISION LETTER, MANUFACTURER'S IDENTIFICATION, AND RUBBER CURE DATE IN ACCORDANCE WITH:

     UNITS - PER MIL-STD-130.
     PACKING AND SHIPPING CONTAINERS - PER MIL-STD-129.
   - B. DIMENSIONS AS SHOWN.
3. DESIGN REQUIREMENTS:
   - A. MATERIALS:
     1. SEAL: SILICONE RUBBER, COLOR RED.
        - (a) HARDNESS - SHORE A DUROMETER 70 ± 5
        - (b) TENSILE STRENGTH - 850 PSI MINIMUM
        - (c) ELONGATION - 50% MAXIMUM
        - (d) COMPRESSION SET OF ORIGINAL DEFLECTION
          - (1) 22 HRS. AT 300°F - 11.8%
          - (2) 22 HRS. AT 350°F - 17.4%
          - (3) 70 HRS. AT 300°F - 21.0%
        - (e) TEMPERATURE RANGE - 80°F TO +375°F.

MASTER

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS + − DECIMALS + − ANGLES + −
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 3.A.
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 744530 34001 THRU 4015
DRAWN G. KRUK DATE 4-18-63
CHECKED V. Tomasala 5-6-63
APPROVAL 6-24-63
APPROVAL E. Thomas 8-2-63
NASA APPROVAL W J Rhine 8-14-63
MIT APPROVAL W Lyffer 1 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PACKING, PREFORMED, RETAINED
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. | SIZE C | NASA NUMBER 1011599
SCALE ~ | WEIGHT CALC ACTUAL | SHEET 1 OF 1

E-184

6 | 5 | 4 | 3 | 2 | 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

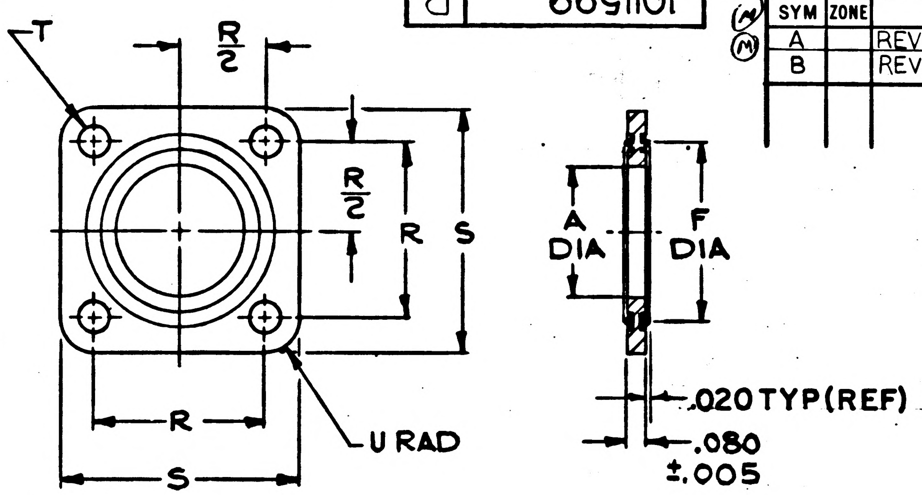
B	1011599

REVISIONS 02560

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR 10248		
B		REVISED PER TDRR. 11226	7-2-64	WP.

TABLE

DASH NO.	A ±.005	R ±.005	T ±.005	S ±.010	U ±.010	F ±.010
-1	.540	.719	.120	1.000	.141	.735
-2	.395	.594	.120	.875	.141	.565
-3	.670	.812	.120	1.094	.141	.870
-4	.780	.906	.120	1.188	.141	.975
-5	.895	.968	.120	1.296	.172	1.090
-6	1.020	1.062	.120	1.395	.172	1.205
-7	1.162	1.156	.120	1.520	.187	1.330
-8	1.286	1.250	.120	1.650	.187	1.460
-9	1.395	1.375	.147	1.766	.203	1.580
-10	1.645	1.562	.147	2.016	.234	1.820
-11	1.922	1.750	.173	2.280	.266	2.090
-12	2.160	1.937	.173	2.516	.297	2.330
-13	2.400	2.187	.173	2.766	.297	2.575
-14	2.650	2.375	.173	3.016	.328	2.825
-[illegible]	2.900	2.625	.173	3.266	.328	3.075
-16	.540	.719	.147	1.000	.141	.735



REQUIREMENTS:

1. **GENERAL:**
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN MD 1015404, CLASS 3.
   - C. PACKING AND SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-P-116, SUBMETHOD IA-8. INDIVIDUAL (POLYETHYLENE) BAGS SHALL BE CUSHIONED.
2. **INSPECTION AND ACCEPTANCE:**
   - A. ITEMS SHALL BE MARKED WITH NASA DRAWING NO., DASH NO., REVISION LETTER, MANUFACTURER'S IDENTIFICATION, AND RUBBER CURE DATE IN ACCORDANCE WITH:

     UNITS - PER MIL-STD-130.
     PACKING AND SHIPPING CONTAINERS - PER MIL-STD-129.
   - B. DIMENSIONS AS SHOWN.
3. **DESIGN REQUIREMENTS:**
   - A. **MATERIALS:**
     1. SEAL: SILICONE RUBBER, COLOR RED.
        - (a) HARDNESS - SHORE A DUROMETER 70 ± 5
        - (b) TENSILE STRENGTH - 850 PSI MINIMUM
        - (c) ELONGATION - 50% MAXIMUM
        - (d) COMPRESSION SET OF ORIGINAL DEFLECTION
          - (1) 22 HRS. AT 300°F - 11.8%
          - (2) 22 HRS. AT 350°F - 17.4%
          - (3) 70 HRS. AT 300°F - 21.0%
        - (e) TEMPERATURE RANGE - 80°F TO +375°F.
     2. RETAINER: ALUMINUM ALLOY 6061 IN CONFORMITY WITH FEDERAL SPECIFICATION QQ-A-327, TEMPER T6.
   - B. FINISH OF RETAINER: CHEMICAL FILM APPLIED IN ACCORDANCE WITH MIL-C-5541.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON MD 1002034 FOR THIS DRAWING

MASTER

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ −	+ −	+ −

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 3.A.

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC 744530 34001
PN THRU 4015

DRAWN G. KRUK DATE 4-18-63
CHECKED V. Iancala 5-6-63
APPROVAL 6-24-63
APPROVAL E. Thomas 8-2-63
NASA APPROVAL W. J. Rhine 8-14-63
MIT APPROVAL 14 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PACKING, PREFORMED, RETAINED
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011599
SCALE ~
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

E-184

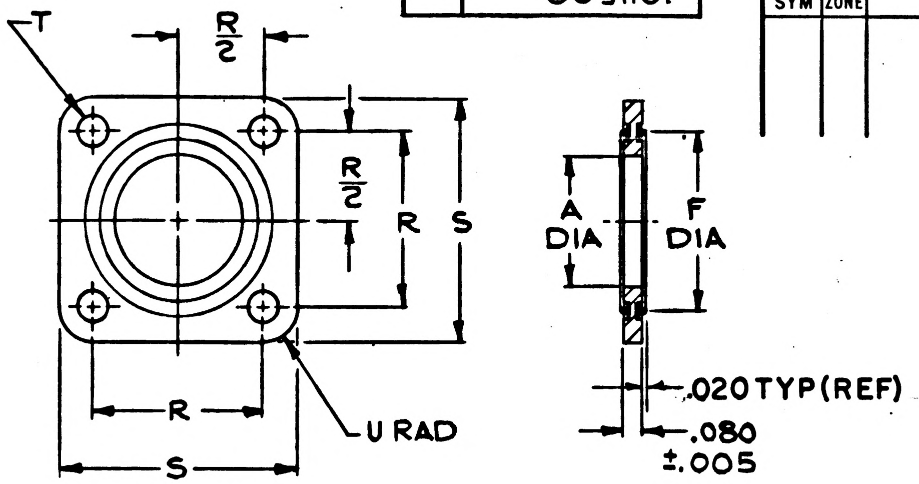
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011599 B

1011599

REVISIONS 02560				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

DASH NO.	A ±.005	R ±.005	T ±.005	S ±.010	U ±.010	F ±.010
-1	.540	.719	.120	1.000	.141	.735
-2	.395	.594	.120	.875	.141	.565
-3	.670	.812	.120	1.094	.141	.870
-4	.780	.906	.120	1.188	.141	.975
-5	.895	.968	.120	1.296	.172	1.090
-6	1.020	1.062	.120	1.395	.172	1.205
-7	1.162	1.156	.120	1.520	.187	1.330
-8	1.286	1.250	.120	1.650	.187	1.460
-9	1.395	1.375	.147	1.766	.203	1.580
-10	1.645	1.562	.147	2.016	.234	1.820
-11	1.922	1.750	.173	2.280	.266	2.090
-12	2.160	1.937	.173	2.516	.297	2.330
-13	2.400	2.187	.173	2.766	.297	2.575
-14	2.650	2.375	.173	3.016	.328	2.825
-15	2.900	2.625	.173	3.266	.328	3.075



REQUIREMENTS:

1. GENERAL:

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.

   C. PACKING AND SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-P-116, SUBMETHOD IA-8.

2. INSPECTION AND ACCEPTANCE:

   A. ITEMS SHALL BE MARKED WITH NASA DRAWING NO., DASH NO., REVISION LETTER, MANUFACTURER'S IDENTIFICATION, AND RUBBER CURE DATE IN ACCORDANCE WITH:

      UNITS - PER MIL-STD-130.
      PACKING AND SHIPPING CONTAINERS - PER MIL-STD-129.

   B. DIMENSIONS AS SHOWN.

3. DESIGN REQUIREMENTS:

   A. MATERIALS:

      1. SEAL: RUBBER, SYNTHETIC, FUEL AND OIL RESISTANT, IN CONFORMITY WITH MILITARY SPECIFICATION MIL-R-6855, CLASSES I, II, AND III, GRADE 60; EXCEPT FOR ORIGINAL ELONGATION.

      2. RETAINER: ALUMINUM ALLOY 6061 IN CONFORMITY WITH FEDERAL SPECIFICATION QQ-A-327, TEMPER T6.

   B. FINISH OF RETAINER: CHEMICAL FILM APPLIED IN ACCORDANCE WITH MIL-C-5541.

MASTER

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ −	+ −	+ −

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 3.A.

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 74453034001 THRU 4015

DRAWN G.KRUK DATE 4-18-63
CHECKED V. Tomsala 5-6-63
APPROVAL J. Sterm 6-24-63
APPROVAL E. Thomas 8-2-63
NASA APPROVAL W J Rhine 8-14-63
MIT APPROVAL W Kupfer 14 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PACKING, PREFORMED, RETAINED
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. SIZE C NASA NUMBER 1011599

SCALE ~ WEIGHT CALC ACTUAL SHEET 1 OF 1

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011599

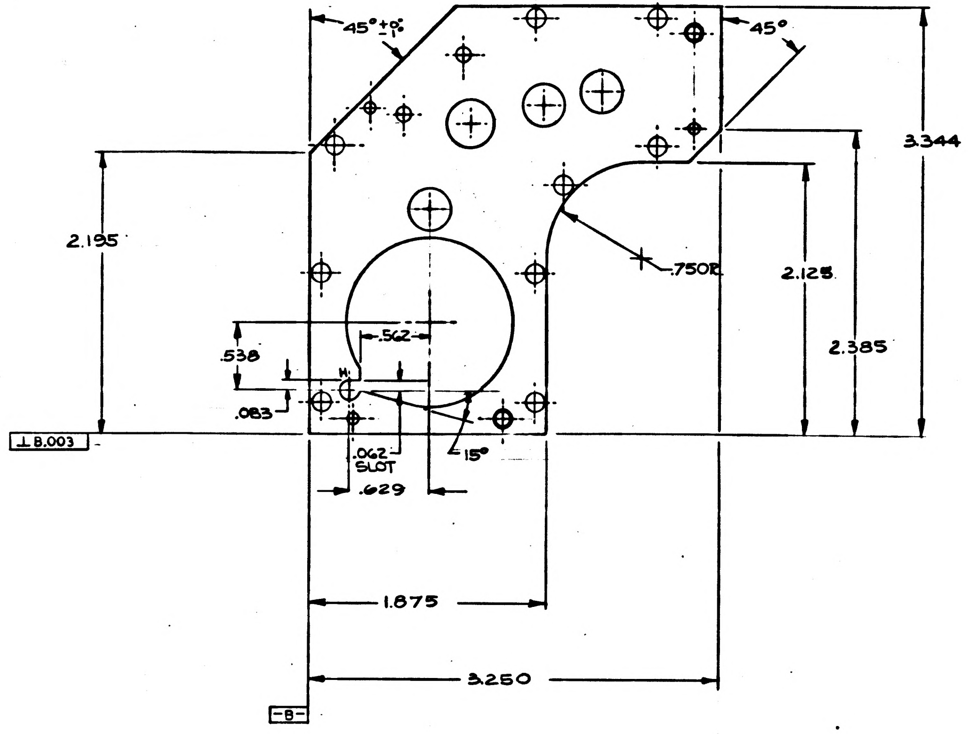
A	0091101

(M)

REVISIONS T PRR 01141

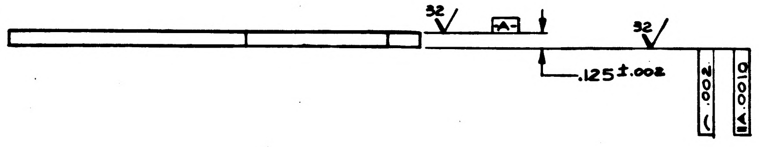
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	A-4	NEXT ASSY WAS 1011725 TDRR NO. 01917	6-28-63	

NOTES:
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:-
   a. 63√ FINISH ALL OVER.
   b. BREAK CORNERS IN ACCORDANCE WITH ND1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. MATERIAL: BERYLLIUM IN ACCORDANCE WITH MIL-B-21521
6. HEAT TREAT IN ACCORDANCE WITH ND 1002092 (STABILIZE & STRESS RELIEVE)
7. THIS PART TO BE MATED WITH PART NO. 1011596


45° ±1/2°
45°
3.344
2.195
.750R
2.125
2.385
.562
.538
.083
H
⊥ B .003
.062 SLOT
15°
.629
1.875
3.250
-B-

CENTERS	C.D CHECKING DIMENSION
S2-S3	.7503-7509
S3-S4	.5941-.5945
S4-S5	.4753-.4758

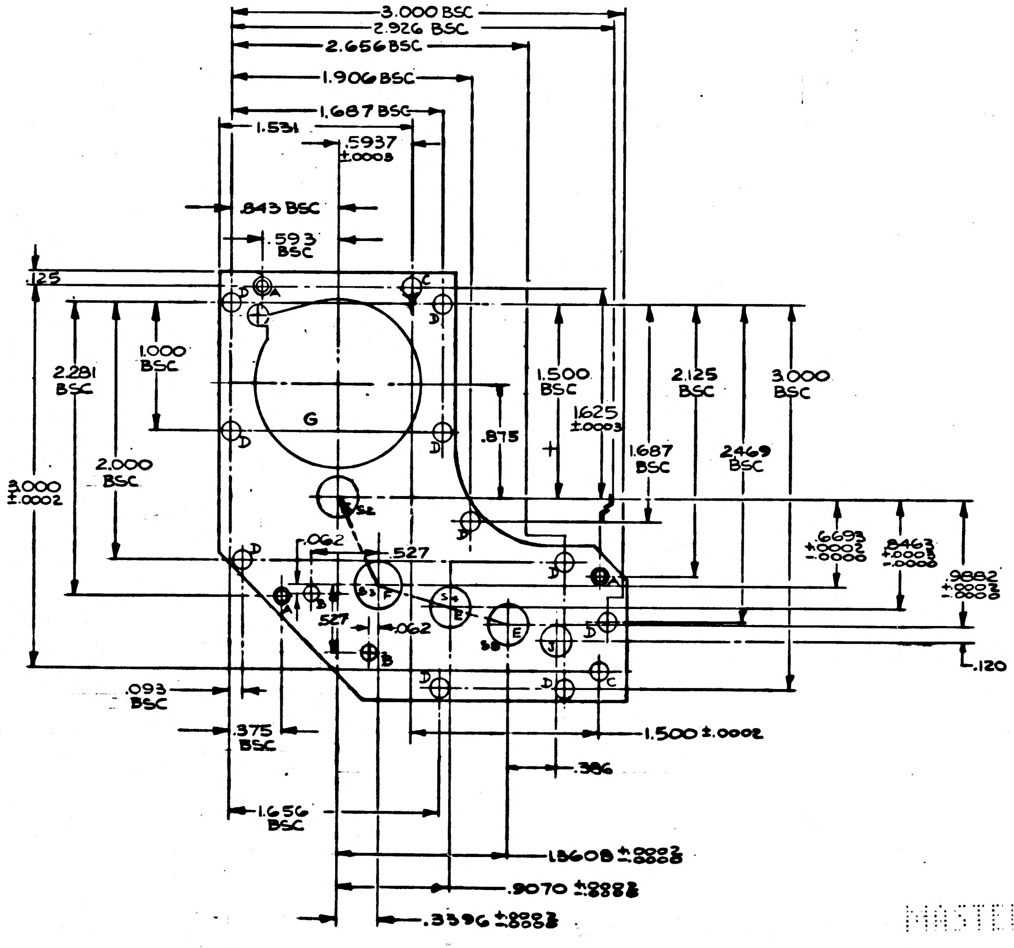
NOTE:-
GEAR TRAINS ARE INDICATED AS SHOWN —··——·—

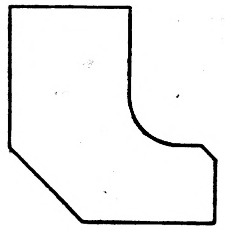

32√
-A-
32√
.125±.002
.002
A .0010

HOLE	DESCRIPTION	QUANTITY
A	DRILL NO 41 (.0960) THRU C'BORE .156 DIA. X .093 DEEP	3
B	.1240 +.0005 −.0000 DIA THRU	2
C	.0944 +.0005 −.0000 DIA THRU	2
D	DRILL NO. 31 (.120) THRU	10
E	.3126 +.0003 −.0000 DIA. THRU 32√	3
F	.3751 +.0003 −.0000 DIA. THRU 32√	1
G	1.312 DIA. THRU	1
H	DR NO. 19 (.1660) THRU	1
J	DR 'E' (.250) THRU	1

⊕ .004 DIA

⊕ .010 DIA


3.000 BSC
2.926 BSC
2.656 BSC
1.906 BSC
1.687 BSC
1.531
.5937 ±.0003
.843 BSC
.593 BSC
.125
2.281 BSC
1.000 BSC
3.000 ±.0002
2.000 BSC
G
A
D
J
1.500 BSC
1.625 ±.0003
.875
1.687 BSC
2.125 BSC
2.469 BSC
3.000 BSC
.6693 +.0002 −.0000
.8463 +.0003 −.0000
.9882 +.0003 −.0000
.062
.527
.527
.062
S2
S3
S4
S5
B
C
E
F
H
.120
.093 BSC
.375 BSC
1.500 ±.0002
.386
1.656 BSC
1.3608 +.0003 −.0000
.9070 +.0003 −.0000
.3396 +.0003 −.0000



ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
(A) 1011795	1011796

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE NO 5

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52 38690 0750

DRAWN W. CABAN DATE 3-13-63
CHECKED 4-17-63
APPROVAL 4-30-63
APPROVAL E. 4-30-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PLATE, BEARING.
(SEXTANT TRUNNION DRIVE)

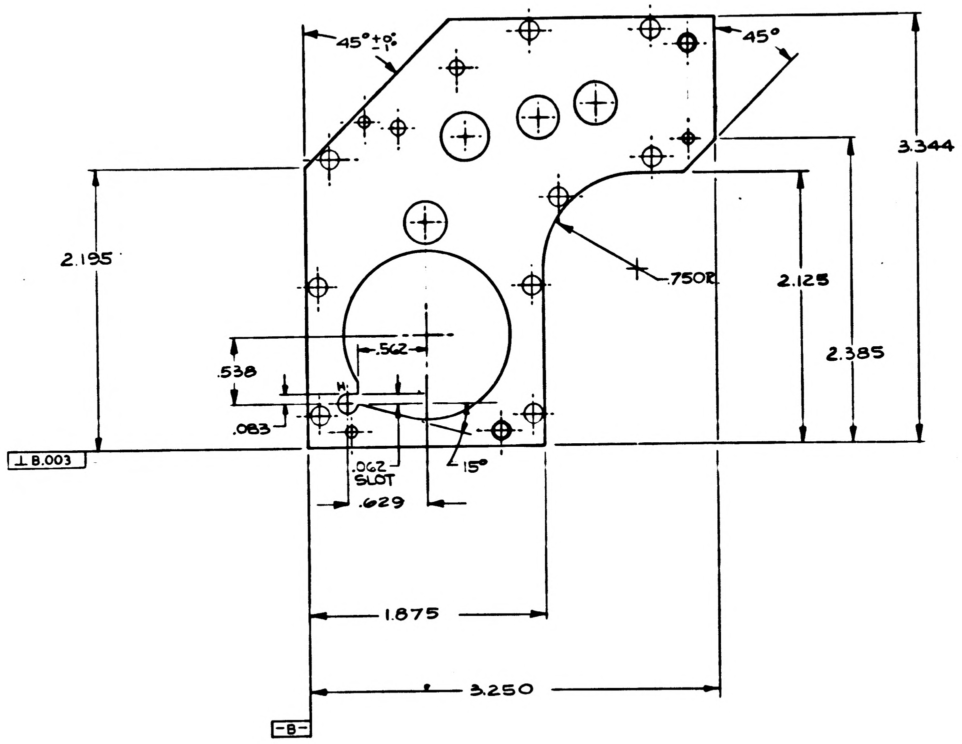
CODE IDENT NO.
SIZE E
NASA NUMBER 1011600
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011600-A

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

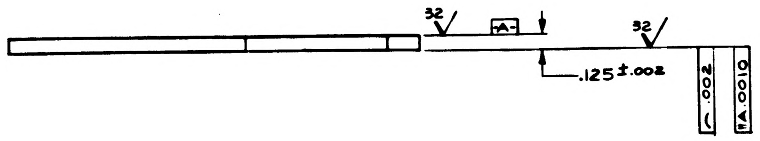
REVISIONS

NOTES:
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER.
   b. BREAK CORNERS IN ACCORDANCE WITH ND1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. MATERIAL: BERYLLIUM IN ACCORDANCE WITH MIL-B-21531
6. HEAT TREAT IN ACCORDANCE WITH ND 1002092 (STABILIZE & STRESS RELIEVE)
7. THIS PART TO BE MATED WITH PART NO. 1011595

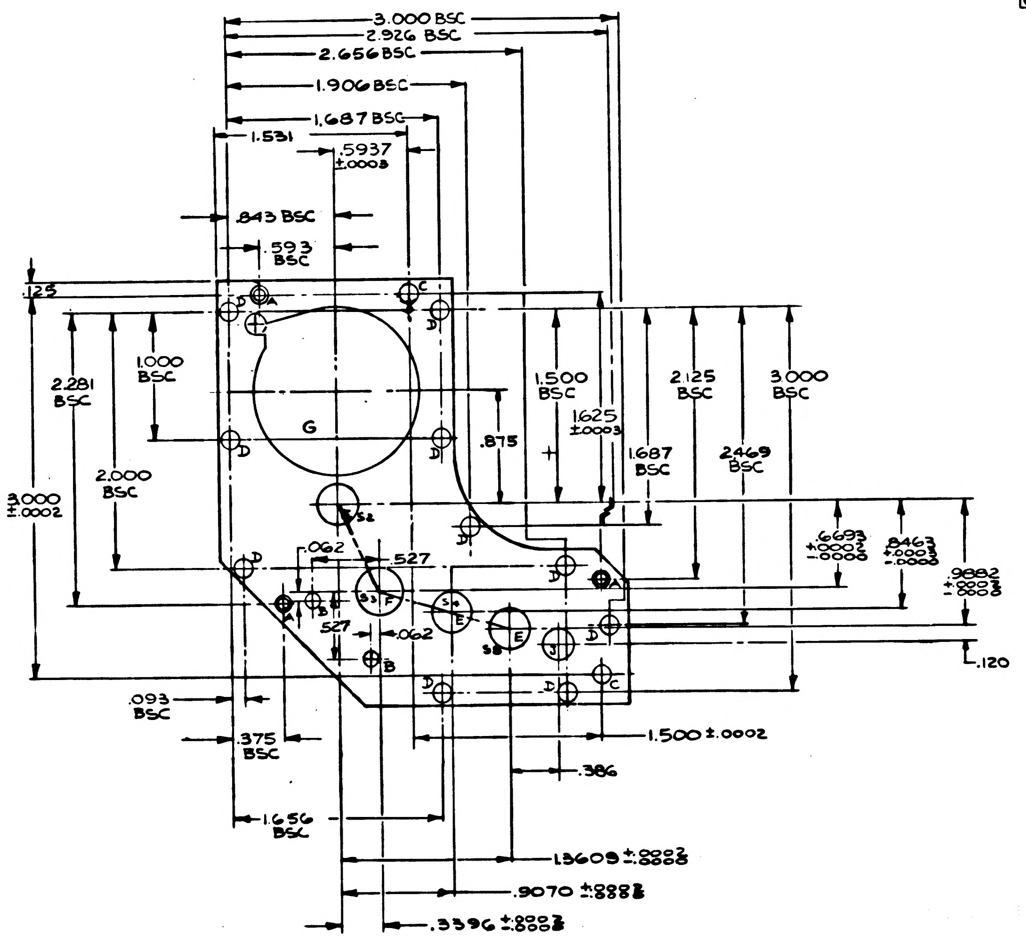

45° ±0°
45°
3.344
2.195
.750R
2.125
2.385
.562
.538
.083
.062 SLOT
15°
.629
1.875
3.250
⊥ B .003
-B-

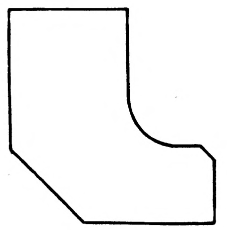
CENTERS	C.D CHECKING DIMENSION
S2-S3	.7503-7509
S3-S4	.5941-5945
S4-S5	.4753-.4758

NOTE:-
GEAR TRAINS ARE INDICATED AS SHOWN ——·——


32√
-A-
32√
.125 ±.002
.002
.0010

	HOLE	DESCRIPTION	QUANTITY
⊕ .004 DIA	A	DRILL NO 41 (.0960) THRU CBORE .156 DIA. X .093 DEEP	3
	B	.1240 +.0005 −.0000 DIA THRU	2
	C	.0944 +.0005 −.0000 DIA THRU	2
⊕ .010 DIA	D	DRILL NO. 31 (.120) THRU	10
	E	.3126 +.0003 −.0000 DIA. THRU 32√	3
	F	.3751 +.0003 −.0000 DIA. THRU 32√	1
	G	1.312 DIA. THRU	1
	H	DR NO. 19 (.1660) THRU	1
	J	DR "E" (.250) THRU	1


3.000 BSC
2.926 BSC
2.656 BSC
1.906 BSC
1.687 BSC
1.531
.5937 ±.0003
.843 BSC
.593 BSC
.125
1.000 BSC
2.281 BSC
2.000 BSC
3.000 ±.0002
G
1.500 BSC
1.625 ±.0003
.875
1.687 BSC
2.125 BSC
2.469 BSC
3.000 BSC
.6693 +.0002 −.0000
.8463 +.0003 −.0000
.9883 +.0003 −.0000
.120
.062
.527
.527
.062
S2 S3 S4 S5
A B C D E F H J
.093 BSC
.375 BSC
1.500 ±.0002
.386
1.656 BSC
1.3609 +.0002 −.0000
.9070 +.0003 −.0000
.3396 +.0003 −.0000



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ± .005 ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE NO 5
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52 38690 0750
DRAWN W. CABAN DATE 3-13-63
CHECKED 4-17-63
APPROVAL 9-30-63
APPROVAL 1-10-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PLATE, BEARING
(SEXTANT TRUNNION DRIVE)

CODE IDENT NO
SIZE E
NASA NUMBER 1011600
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

NEXT ASSY	USED ON
1011725	1011706

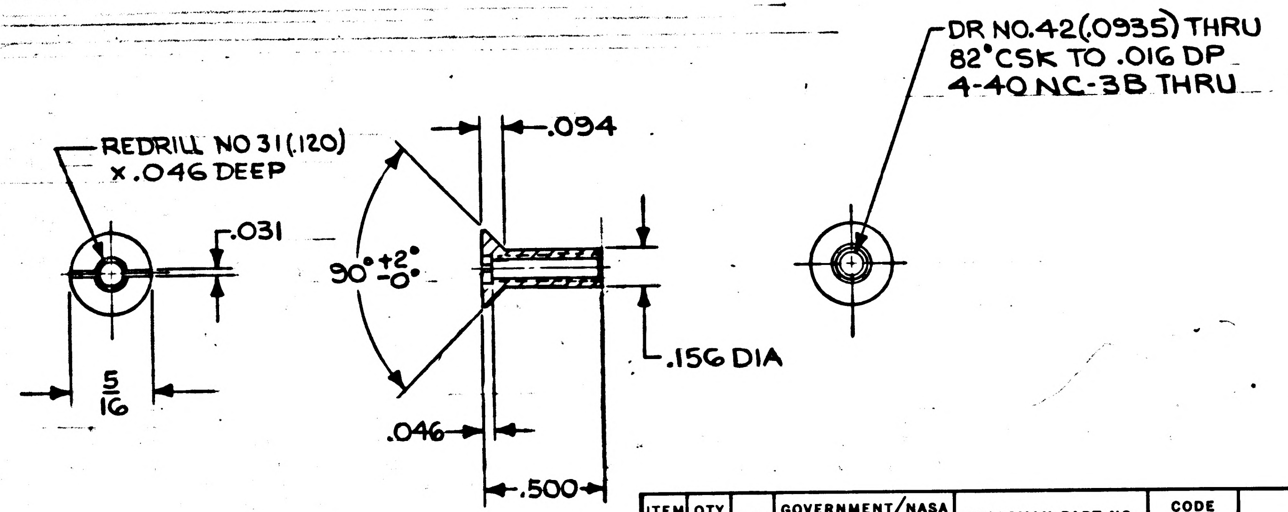
APPLICATION

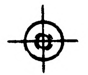
INCHES
PHOTOGRAPHIC SCALE ONLY

A	1011602

REVISIONS 01369			
SYM	DESCRIPTION	DATE	APPROVAL
A	FED. SPEC. WAS QQ-S-766 TDRR NO. 02246	7-24-63	WAK 8/6/63

NOTES
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORD WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:
   a. 63/ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORD WITH ND 1002078
4. REMOVE BURRS IN ACCORD WITH ND1002079
5. FINISH: PASSIVATE PER MIL-STD-171 (KPS.10051.200)





ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011000	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	±.005	± ½

DO NOT SCALE THIS DRAWING

MATERIAL CORROSION RESISTING STEEL FED. SPEC QQ-S-763 CLASS 304, COND A (A)

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK

KIC PN 57386901010

DRAWN F. Schiller DATE 3-13-63
CHECKED E. Thomp 5-24-63
APPROVAL J. Thushman 5-24-63
APPROVAL E. Thomp 5-24-63

NASA APPROVAL Jack Barnard

MIT APPROVAL W Kupfer 24 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
NUT,
SLOTTED FLAT CSK HEAD

CODE IDENT NO.	SIZE	NASA NUMBER
	B	1011602

SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

E-153

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

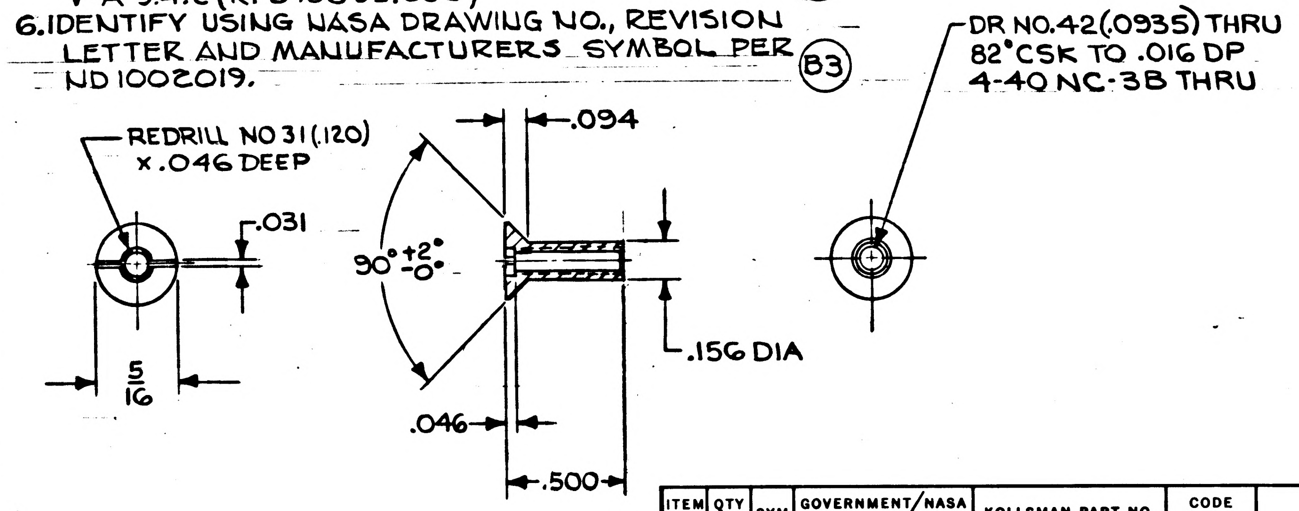
1011602 B

REVISIONS 01369

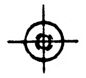
SYM	DESCRIPTION	DATE	APPROVAL
A	FED. SPEC WAS QQ-S-766 TDRR NO. 02246	7-24-63	WAK 8/6/63
B3	REVISED PER TDRR NO. 02687	8/21/63	

NOTES

1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORD WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:
   - a. 63√ FINISH ALL OVER.
   - b. BREAK SHARP CORNERS IN ACCORD WITH ND 1002078
4. REMOVE BURRS IN ACCORD WITH ND1002079
5. FINISH: PASSIVATE PER MIL-STD-171 PER TABLE V-A 5.4.2 (KPS 10051.200) (B2)
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019. (B3)



(B1)



ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	±.005	± ½

DO NOT SCALE THIS DRAWING

MATERIAL CORROSION RESISTANT STEEL FED. SPEC QQ-S-763 CLASS 303, COND A (A)

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901010

DRAWN F. Schiller DATE 3-13-63
CHECKED E. Thomp 5-24-63
APPROVAL [illegible] 5-24-63
APPROVAL E. Thomp 5-24-63
NASA APPROVAL Jack Barnard
MIT APPROVAL W Kupfer 24 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
NUT,
SLOTTED FLAT CSK HEAD

CODE IDENT NO. | SIZE B | NASA NUMBER 1011602

SCALE 2/1 | WEIGHT | CALC ACTUAL | SHEET 1 OF 1

E-153

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

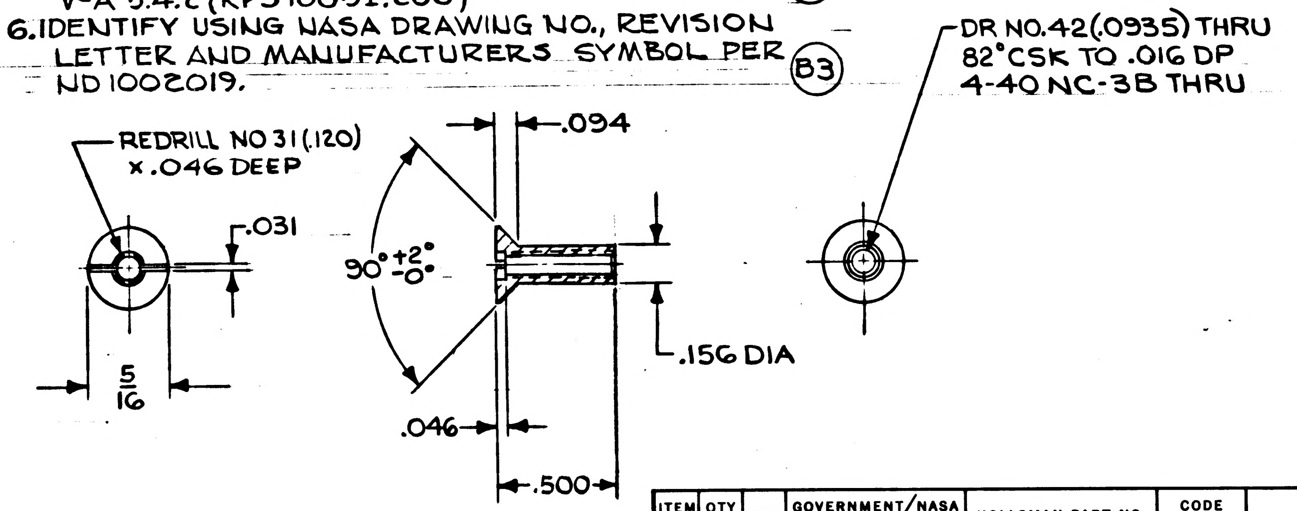
1011602 C

REVISIONS 01369

SYM	DESCRIPTION	DATE	APPROVAL
A	FED. SPEC WAS QQ-S-766 TDRR NO. 02246	7-24-63	WAK 8/6/63
B_3	REVISED PER TDRR NO. 02687	8/21/63	
C_1	REVISED PER TDRR NO. 03354	9/20/63	9/26

NOTES

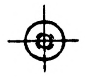
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORD WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:
   - a. 63√ FINISH ALL OVER.
   - b. BREAK SHARP CORNERS IN ACCORD WITH ND 1002078
4. REMOVE BURRS IN ACCORD WITH ND1002079
5. FINISH: PASSIVATE PER MIL-STD-171 PER TABLE V-A 5.4.2 (KPS 10051.200) (B2)
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019. (B3)



(B1)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS



ACTUAL SIZE

MASTER

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ±.005; ANGLES ± ½
DO NOT SCALE THIS DRAWING
MATERIAL CORROSION RESISTANT STEEL FED. SPEC QQ-S-763 CLASS 304, COND A (A)
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901010

DRAWN F. Schiller DATE 3-13-63
CHECKED E. Thomp 5-24-63
APPROVAL G. Tuschman 5-24-63
APPROVAL E. Thomp 5-24-63
NASA APPROVAL Jack Barnes
MIT APPROVAL W Kupfer 24 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
NUT,
SLOTTED FLAT CSK HEAD

CODE IDENT NO.
SIZE B
NASA NUMBER 1011602
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-153

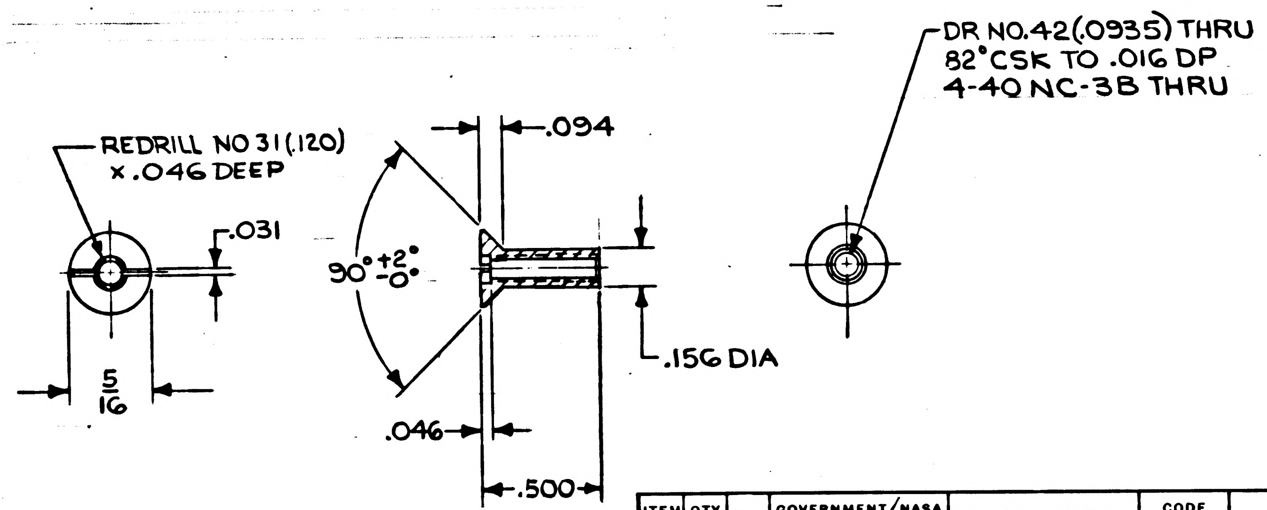
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

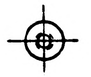
1011602

REVISIONS 01369			
SYM	DESCRIPTION	DATE	APPROVAL

NOTES

1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORD WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:
   - a. 63/ FINISH ALL OVER.
   - b. ✓ BREAK SHARP CORNERS IN ACCORD WITH ND 1002078
4. REMOVE BURRS IN ACCORD WITH ND1002079
5. FINISH: PASSIVATE PER MIL-STD-171 (KPS.1005I.200)





ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011000	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	±.005	± ½

DO NOT SCALE THIS DRAWING

MATERIAL STAINLESS STEEL AISI 304 FED. SPEC QQ-S-766 CLASS 304, COND A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901010

DRAWN F. Schiller DATE 3-13-63
CHECKED E. Thomp 5-24-63
APPROVAL G. Hirschmann 5-24-63
APPROVAL E. Thomp 5-24-63

NASA APPROVAL Jack Barnard
MIT APPROVAL W Kupfer 24 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
NUT,
SLOTTED FLAT CSK HEAD

CODE IDENT NO.	SIZE	NASA NUMBER
	B	1011602
SCALE 2/1	WEIGHT CALC ACTUAL	SHEET 1 OF 1

E-153

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

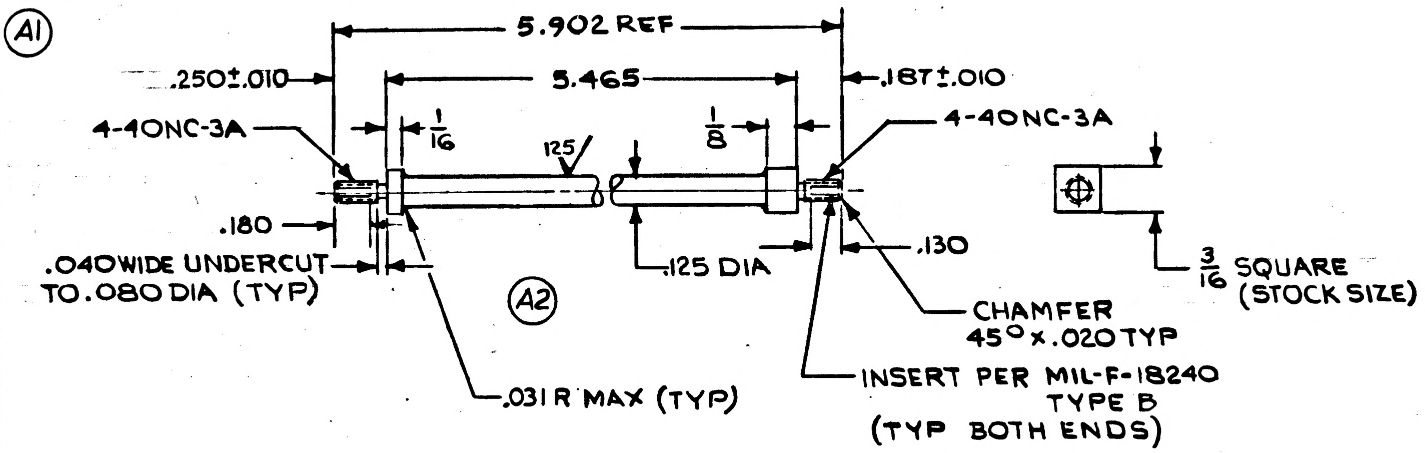
1011603 A

NOTES:
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORD WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
a. 63√ FINISH ALL OVER.
b. BREAK SHARP CORNERS IN ACCORD WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: PASSIVATE PER MIL-STD-171, FIN 5.4.2 (KPS.10051.200).
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019.

REVISIONS 01369

SYM	DESCRIPTION	DATE	APPROVAL
A₃	REVISED PER TDRR NO. 03984	17 Oct 63	WR

Ⓜ


A1
5.902 REF
.250±.010
5.465
.187±.010
4-40NC-3A
1/16
125
1/8
4-40NC-3A
.180
.040 WIDE UNDERCUT TO .080 DIA (TYP)
.125 DIA
.130
3/16 SQUARE (STOCK SIZE)
A2
CHAMFER 45° x .020 TYP
INSERT PER MIL-F-18240 TYPE B (TYP BOTH ENDS)
.031 R MAX (TYP)

A3

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

ACTUAL SIZE

MASTER

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING
MATERIAL CORROSION RESISTING STEEL FED. SPEC QQ-S-763 CLASS 303, COND. A
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 53386900040
DRAWN E. DRAPALA DATE 5-24-63
CHECKED E. Dhong 5-24-63
APPROVAL 5-24-63
APPROVAL E. Dhong 5-24-63
NASA APPROVAL Jack Barnard
MIT APPROVAL 24 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
TITLE ROD, THREADED
CODE IDENT NO.
SIZE B
NASA NUMBER 1011603
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

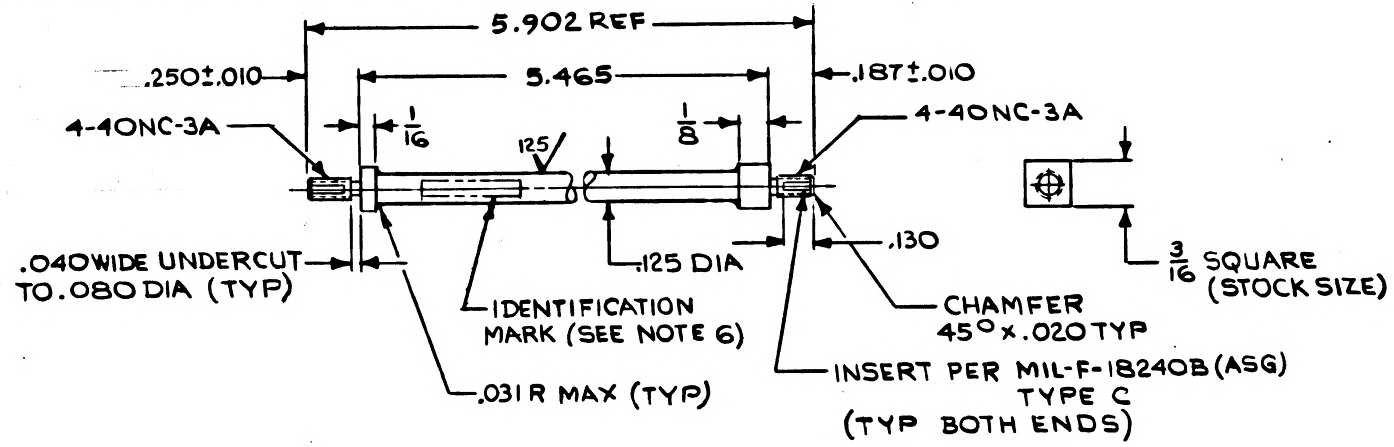
E-183

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011603

REVISIONS 01369			
SYM	DESCRIPTION	DATE	APPROVAL

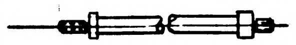
NOTES:
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORD WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORD WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: PASSIVATE PER MIL-STD-171 (KPS.10051.200).
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND100219.



5.902 REF
.250±.010
5.465
.187±.010
4-40NC-3A
1/16
125√
1/8
4-40NC-3A
.040 WIDE UNDERCUT TO .080 DIA (TYP)
.125 DIA
.130
3/16 SQUARE (STOCK SIZE)
IDENTIFICATION MARK (SEE NOTE 6)
CHAMFER 45° x .020 TYP
INSERT PER MIL-F-18240B (ASG) TYPE C (TYP BOTH ENDS)
.031 R MAX (TYP)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS


ACTUAL SIZE

MASTER

1011000	1011000
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL STAINLESS STEEL ASI 303 FED. SPEC QQ-S-763 CLASS 303, COND. A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 53386900040

DRAWN E. DRAPALA DATE 5-24-63
CHECKED E. Dhong 5-24-63
APPROVAL 5-24-63
APPROVAL E. Dhong 5-24-63
NASA APPROVAL Jack Barnard
MIT APPROVAL 24 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
ROD, THREADED

CODE IDENT NO.	SIZE	NASA NUMBER
	B	1011603
SCALE 2/1	WEIGHT CALC ACTUAL	SHEET 1 OF 1

E-153

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

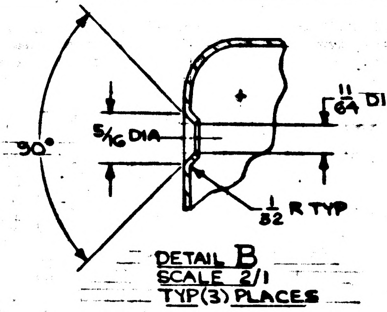
NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   - a. 63/ FINISH ALL OVER.
   - b. √ BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. IDENTIFY USING NASA DWG NO. REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND1002019. Ⓐ

1011604 A

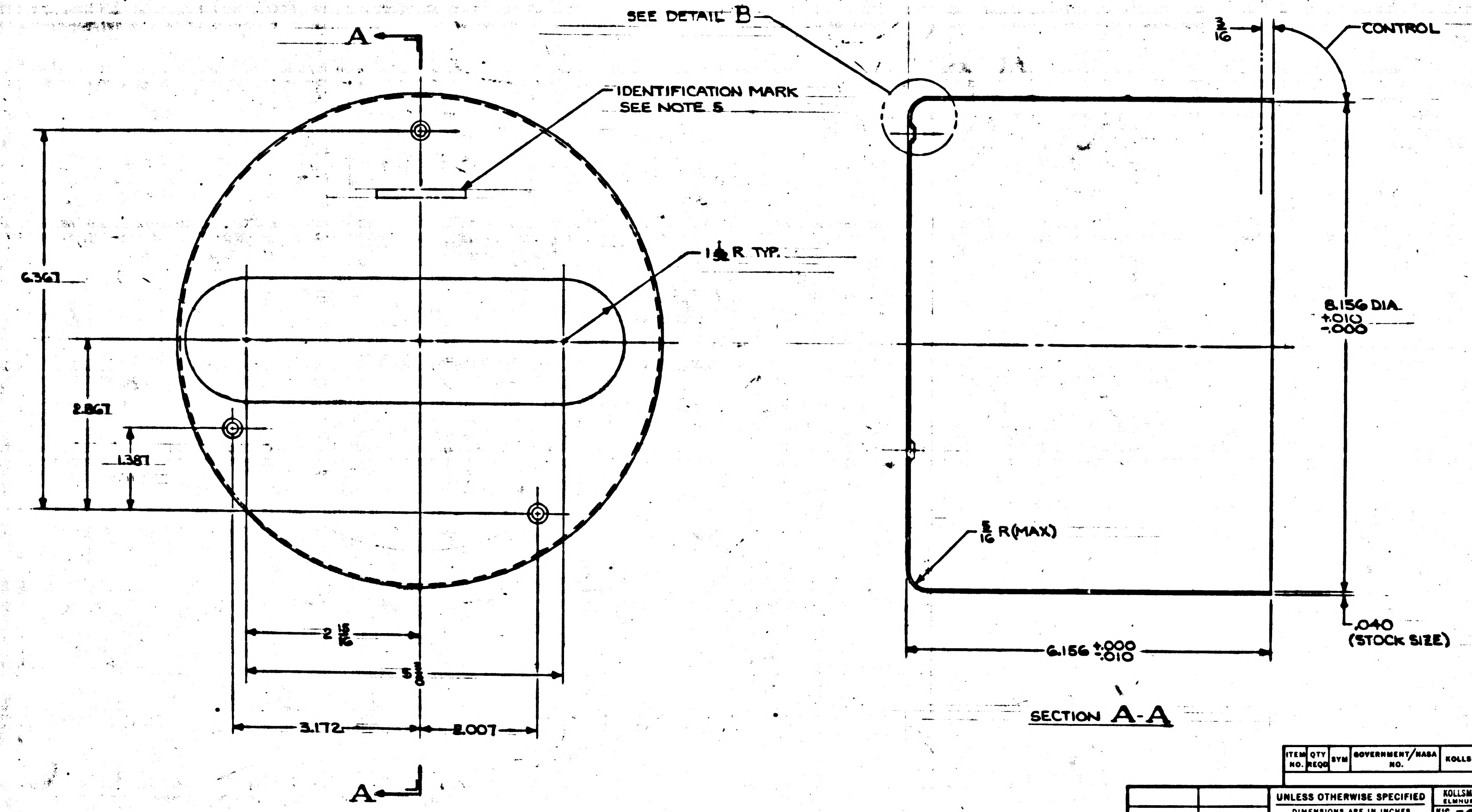
REVISIONS 01369

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR NO. 08611		



30°
5/16 DIA
11/64 DIA(MIN)
1/32 R TYP

DETAIL B
SCALE 2/1
TYP(3) PLACES



A
SEE DETAIL B
IDENTIFICATION MARK
SEE NOTE 5
1 5/32 R TYP.
6.367
2.867
1.387
2 15/16
5 7/8
3.172
2.007
A
3/16
CONTROL
8.156 DIA. +.010 -.000
5/16 R(MAX)
.040 (STOCK SIZE)
6.156 +.000 -.010

SECTION A-A

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	±.005	± 1°

DO NOT SCALE THIS DRAWING
MATERIAL ALUMINUM ALLOY 5052-O FED. SPEC QQ-A-318 TEMPER O
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 50386900070
DRAWN DATE
CHECKED W. W. Lane 5-22-63
APPROVAL 5-22-63
APPROVAL E. Moore 5-22-63
NASA APPROVAL
MIT APPROVAL 2/4/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

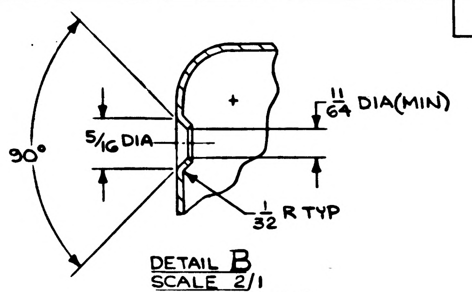
TITLE
COVER,
SEXTANT HEAD

CODE IDENT NO.
SIZE D
NASA NUMBER 1011604
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

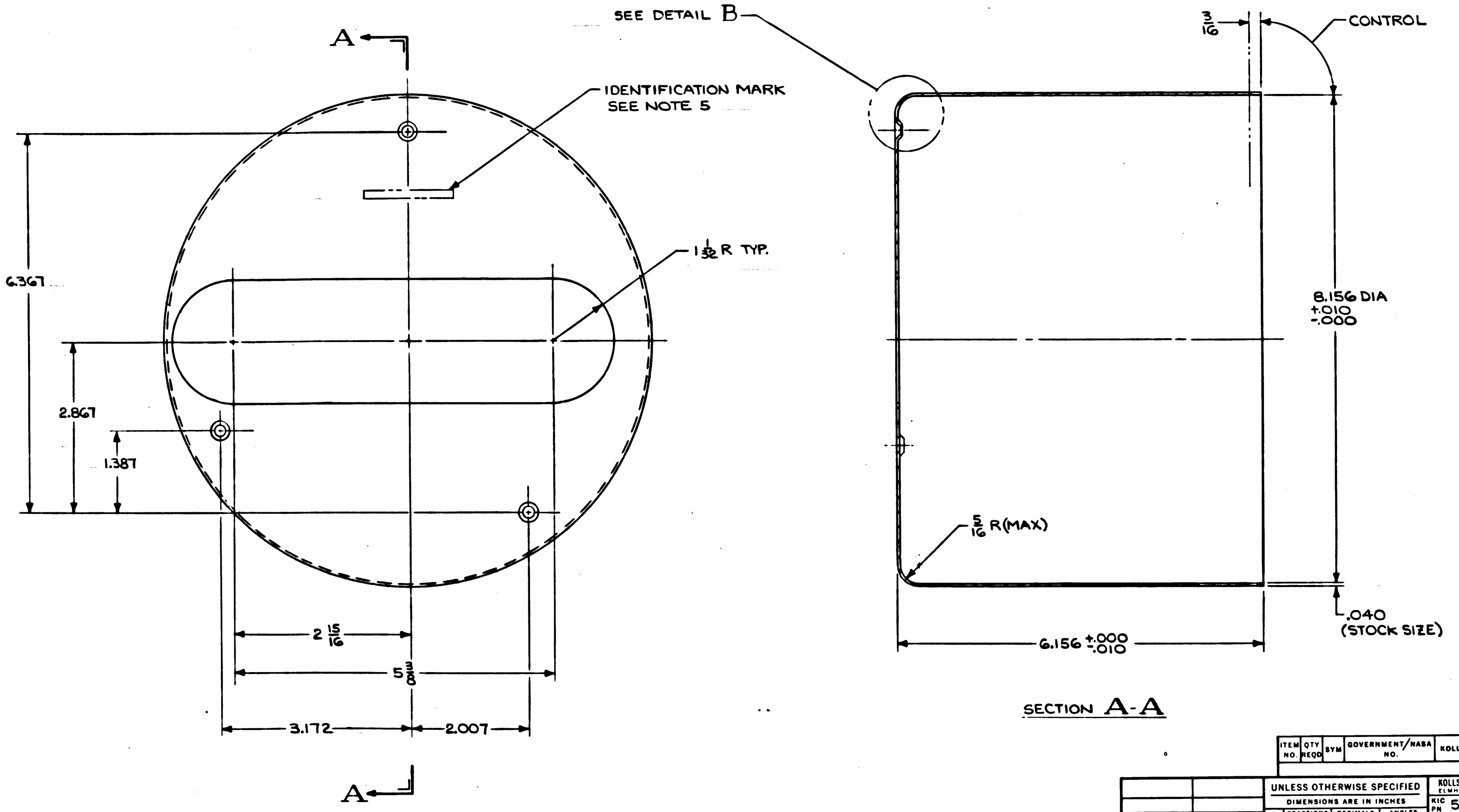
1011604

SYM	ZONE	REVISIONS DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63/ FINISH ALL OVER.
   b. √BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. IDENTIFY USING NASA DWG NO. REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND1002019.
6. FINISH: PENDING


90°
5/16 DIA
11/64 DIA(MIN)
1/32 R TYP

DETAIL B
SCALE 2/1
TYP(3) PLACES


A
SEE DETAIL B
IDENTIFICATION MARK
SEE NOTE 5
1 1/32 R TYP.
6.367
2.867
1.387
2 15/16
5 3/8
3.172
2.007
A
3/16
CONTROL
8.156 DIA
+.010
-.000
5/16 R(MAX)
.040
(STOCK SIZE)
6.156 +.000 -.010

SECTION A-A

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	±.005	± 1°

DO NOT SCALE THIS DRAWING
MATERIAL ALUMINUM ALLOY 5052-O FED. SPEC QQ-A-318 TEMPER O
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 50386900070
DRAWN F. Schiller DATE 3-14-63
CHECKED W. W. Lang 5-22-63
APPROVAL 5-22-63
APPROVAL E. Thomp 5-22-63
NASA APPROVAL
MIT APPROVAL 2-4-64

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
COVER,
SEXTANT HEAD

CODE IDENT NO. SIZE D NASA NUMBER 1011604
SCALE 1/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011606	A

REVISIONS TDRR 01140				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		GENERAL CHANGES SEE TDRR NO. 02253		WK 8/6/63

REQUIREMENTS.

1. GENERAL.

(A1)

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND1015404, CLASS 1.

C. MATERIALS:
BALLS AND RINGS - CORROSION-RESISTING STEEL
FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A
Rc56 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243.
RETAINER - LINEN BASE PHENOLIC, POROSITY = 1-1/2% MIN.

D. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.

E. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171, (KPS-1005I.200).
THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 5 RMS MAX. FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.

F. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.

G. LUBRICATE PER ND1002090.

H. MANUFACTURER SHALL MARK DATE WHEN BEARING WAS LUBRICATED ON EACH PACKAGE.

I. PARTS PREPARED FOR DELIVERY PER MIL-P-116 (KES-1003D.1, CLASS 1).

J. PARTS SHALL BE MARKED FOR IDENTIFICATION IN ACCORDANCE WITH ND1002019.

K. MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION IDENTIFYING TYPE OF PHENOLIC, CHEMICAL COMPOSITION, POROSITY AND METHOD OF MEASUREMENT, OF RETAINER MATERIAL.

2. DESIGN DETAIL.

A. ANGULAR CONTACT, NON-SEPARABLE.

B. BALLS SHALL BE 1/8 INCH DIAMETER AND SHALL BE WITHIN .000025 MAX. OF EACH OTHER.

C. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.

D. RADIAL RUNOUT OF INNER RING = .0002 TIR MAX.
RADIAL RUNOUT OF OUTER RING = .0003 TIR MAX.
AXIAL RUNOUT OF INNER RING = .0002 TIR MAX.
AXIAL RUNOUT OF OUTER RING = .0003 TIR MAX.

E. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.

ECCENTRICITY TO BE CODED TO NEAREST .000050 INCREMENT PER TABLE II AND PACKAGES MARKED ACCORDINGLY.

F. BORES AND O.D.'S TO BE CODED TO NEAREST .0001 PER TABLE I AND PACKAGES MARKED ACCORDINGLY.

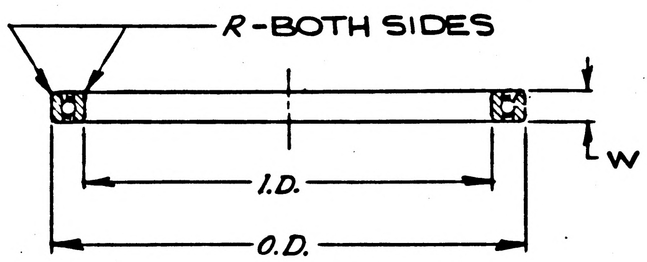
G. DIMENSIONS SHOWN APPLY AT 68°F.

H. CONTACT ANGLE = 25° (REF).

I. BEARINGS MAY BE OUT OF ROUND BY .001 BEFORE MOUNTING.

(A3)

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



NASA DASH NO.	K.I.C. DASH NO.	I.D. +.0000 -.0003	O.D. +.0000 -.0004	W +.000 -.002	R +.020 -.000	MIN NO. BALLS	MAX STARTING TORQUE	
							TORQUE GM-CM	APPLIED THRUST POUNDS
-1	2240	3.5000	4.0000	.250	.015	60	70	15
-2	2720	4.2500	4.7500	.250	.015	75	85	15

(A2)

TABLE I

TOL RANGE ID \ OD	.0000 -.0001	-.0001 -.0002	-.0002 -.0003	-.0003 -.0004
.0000 -.0001	11	12	13	14
-.0001 -.0002	21	22	23	24
-.0002 -.0003	31	32	33	34

TABLE II

TOL RANGE I.R. \ O.R.	.000000 .000050	.000050 .000100	.000100 .000150	.000150 .000200	.000200 .000250	.000250 .000300
.000000 .000050	A A	A B	A C	A D	A E	A F
.000050 .000100	B A	B B	B C	B D	B E	B F
.000100 .000150	C A	C B	C C	C D	C E	C F
.000150 .000200	D A	D B	D C	D D	D E	D F

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
	MULTIPLE

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ -	+ -	+ -

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 1C

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC 30205772240
PN THRU 2720

DRAWN C. SCRICCO DATE 4-4-63
CHECKED (S) V. Tomaca 4-29-63
APPROVAL Thornton Slemm 5-3-63
APPROVAL E. Dhong 5-3-63
NASA APPROVAL Jack Barnard
MIT APPROVAL W Kupfer 8 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BEARING, BALL, ANNULAR
(ANGULAR CONTACT NONSEPARABLE)
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. | SIZE C | NASA NUMBER 1011606
SCALE ~ | WEIGHT CALC. ACTUAL | SHEET 1 OF 1

MASTER

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

B	9091101

REVISIONS TDRR 01140

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		GENERAL CHANGES SEE TDRR NO. 02253		WK 8/6/63
B		REVISED PER TDRR NO. 04366	31 Oct 63	WK.

REQUIREMENTS.

1. GENERAL.

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND1015404, CLASS 1.

(A1)

C. MATERIALS:
BALLS AND RINGS - CORROSION-RESISTING STEEL
FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A
Rc56 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243.
RETAINER - LINEN BASE PHENOLIC, POROSITY = 1-1/2% MIN.

D. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.

E. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171, (KPS-10051.200).
THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 5 RMS MAX. FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.

F. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.

G. LUBRICATE PER ND1002090.

H. MANUFACTURER SHALL MARK DATE WHEN BEARING WAS LUBRICATED ON EACH PACKAGE.

I. PARTS PREPARED FOR DELIVERY PER MIL-P-116 (KES-1003D.1, CLASS 1).

J. PARTS SHALL BE MARKED FOR IDENTIFICATION IN ACCORDANCE WITH ND1002019.

K. MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION IDENTIFYING TYPE OF PHENOLIC, CHEMICAL COMPOSITION, POROSITY AND METHOD OF MEASUREMENT, OF RETAINER MATERIAL.

2. DESIGN DETAIL.

A. ANGULAR CONTACT, NON-SEPARABLE.

B. BALLS SHALL BE 1/8 INCH DIAMETER AND SHALL BE WITHIN .000025 MAX. OF EACH OTHER.

C. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.

D. RADIAL RUNOUT OF INNER RING = .0002 TIR MAX.
RADIAL RUNOUT OF OUTER RING = .0003 TIR MAX.
AXIAL RUNOUT OF INNER RING = .0002 TIR MAX.
AXIAL RUNOUT OF OUTER RING = .0003 TIR MAX.

E. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.

ECCENTRICITY TO BE CODED TO NEAREST .000050 INCREMENT PER TABLE II AND PACKAGES MARKED ACCORDINGLY.

F. BORES AND O.D.'S TO BE CODED TO NEAREST .0001 PER TABLE I AND PACKAGES MARKED ACCORDINGLY.

G. DIMENSIONS SHOWN APPLY AT 68°F.

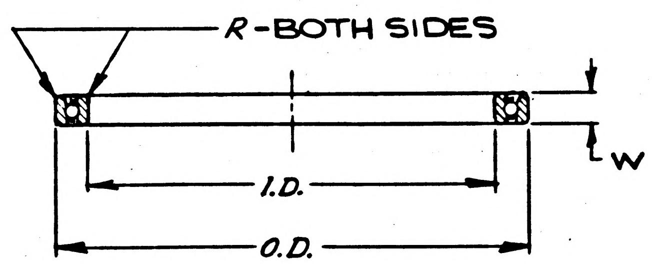
H. CONTACT ANGLE = 25° (REF).

I. BEARINGS MAY BE OUT OF ROUND BY .002 BEFORE MOUNTING. (B)

(A3)

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER



NASA DASH NO.	K.I.C. DASH NO.	I.D. +.0000 -.0003	O.D. +.0000 -.0004	W +.000 -.002	R +.020 -.000	MIN NO. BALLS	MAX STARTING TORQUE	
							TORQUE GM-CM	APPLIED THRUST POUNDS
—1	2240	3.5000	4.0000	.250	.015	60	70	15
—2	2720	4.2500	4.7500	.250	.015	75	85	15

(A2)

TABLE I

TOL RANGE OD / ID	.0000 -.0001	-.0001 -.0002	-.0002 -.0003	-.0003 -.0004
.0000 -.0001	11	12	13	14
-.0001 -.0002	21	22	23	24
-.0002 -.0003	31	32	33	34

TABLE II

TOL RANGE O.R. / I.R.	.000000 .000050	.000050 .000100	.000100 .000150	.000150 .000200	.000200 .000250	.000250 .000300
.000000 .000050	A A	A B	A C	A D	A E	A F
.000050 .000100	B A	B B	B C	B D	B E	B F
.000100 .000150	C A	C B	C C	C D	C E	C F
.000150 .000200	D A	D B	D C	D D	D E	D F

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

	MULTIPLE
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± −	± −	± −

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 1C

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 30205772240 THRU 2720

DRAWN C. SCRICCO DATE 4-1-63
CHECKED (S) V. Tomaca 4-29-63
APPROVAL Thornton Sllem 5-3-63
APPROVAL E. Thomp 5-3-63
NASA APPROVAL Jack Barnard
MIT APPROVAL W Kupfer 8 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BEARING, BALL, ANNULAR
(ANGULAR CONTACT NONSEPARABLE)
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011606
SCALE ~
WEIGHT CALC. ACTUAL
SHEET 1 OF 1

E-184

C 9091101

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS TDRR 01140				
A3		GENERAL CHANGES SEE TDRR NO. 02253		WK 8/6/63
B		REVISED PER TDRR NO. 04366	31 Oct 63	WK.
C		REPLACED BY REV D 12809 WITH CHANGES PER TDRR	9-22-64	WK

REQUIREMENTS.

1. GENERAL.

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND1015404, CLASS 1.

Ⓐ1

C. MATERIALS:
BALLS AND RINGS - CORROSION-RESISTING STEEL
FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A
Rc56 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243.
RETAINER - LINEN BASE PHENOLIC, POROSITY = 1-1/2% MIN.

D. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.

E. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171, (KPS-10051.200).
THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 5 RMS MAX. FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.

F. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.

G. LUBRICATE PER ND1002090

H. MANUFACTURER SHALL MARK DATE WHEN BEARING WAS LUBRICATED ON EACH PACKAGE.

I. PARTS PREPARED FOR DELIVERY PER MIL-P-116 (KES-10030.1, CLASS 1)

J. PARTS SHALL BE MARKED FOR IDENTIFICATION IN ACCORDANCE WITH ND1002019. CLASS 1).

K. MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION IDENTIFYING TYPE OF PHENOLIC, CHEMICAL COMPOSITION POROSITY AND METHOD OF MEASUREMENT, OF RETAINER MATERIAL.

2. DESIGN DETAIL.

A. ANGULAR CONTACT, NON-SEPARABLE.

B. BALLS SHALL BE 1/8 INCH DIAMETER AND SHALL BE WITHIN .000025 MAX. OF EACH OTHER.

C. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.

D. RADIAL RUNOUT OF INNER RING = .0002 TIR MAX.
RADIAL RUNOUT OF OUTER RING = .0003 TIR MAX.
AXIAL RUNOUT OF INNER RING = .0002 TIR MAX.
AXIAL RUNOUT OF OUTER RING = .0003 TIR MAX.

E. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.

ECCENTRICITY TO BE CODED TO NEAREST .000050 INCREMENT PER TABLE II AND PACKAGES MARKED ACCORDINGLY.

F. BORES AND O.D.'S TO BE CODED TO NEAREST .0001 PER TABLE I AND PACKAGES MARKED ACCORDINGLY.

G. DIMENSIONS SHOWN APPLY AT 68°F.

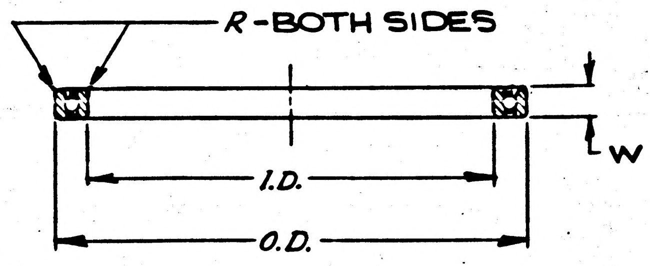
H. CONTACT ANGLE = 25° (REF).

I. BEARINGS MAY BE OUT OF ROUND BY .002 BEFORE MOUNTING. Ⓑ

Ⓐ3

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER



NASA DASH NO.	K.I.C. DASH NO.	I.D. +.0000 -.0003	O.D. +.0000 -.0004	W +.000 -.002	R +.020 -.000	MIN NO. BALLS	MAX STARTING TORQUE	
							TORQUE GM-CM	APPLIED THRUST POUNDS
-1	2240	3.5000	4.0000	.250	.015	60	70	15
-2	2720	4.2500	4.7500	.250	.015	75	85	15

Ⓐ2

TABLE I

TOL RANGE ID \ OD	.0000 -.0001	-.0001 -.0002	-.0002 -.0003	-.0003 -.0004
.0000 -.0001	11	12	13	14
.0001 -.0002	21	22	23	24
.0002 -.0003	31	32	33	34

TABLE II

TOL RANGE I.R. \ O.R.	.000000 .000050	.000050 .000100	.000100 .000150	.000150 .000200	.000200 .000250	.000250 .000300
.000000 .000050	A A	A B	A C	A D	A E	A F
.000050 .000100	B A	B B	B C	B D	B E	B F
.000100 .000150	C A	C B	C C	C D	C E	C F
.000150 .000200	D A	D B	D C	D D	D E	D F

Ⓒ REPLACED BY REV Ⓓ WITH CHANGES

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
	MULTIPLE

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS + − DECIMALS + − ANGLES + −
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 1C
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 30205772240 THRU 2720
DRAWN C. SCRICCO DATE 4-4-63
CHECKED Ⓢ V. Tomala 4-29-63
APPROVAL Thornton Kearns 5-3-63
APPROVAL E. Thomp 5-3-63
NASA APPROVAL Jack Bassard
MIT APPROVAL W Kupfer 8 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE BEARING, BALL, ANNULAR (ANGULAR CONTACT NONSEPARABLE) SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011606
SCALE ~
WEIGHT CALC. ACTUAL
SHEET 1 OF 1

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

D	9091101

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
D	REDRAWN AND REPLACES REV C WITH CHANGES PER TDRR 12809	9-22-64	WH

REQUIREMENTS

1. GENERAL

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND 1015404, CLASS 1.

   C. PACKAGING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III.

   MARKING OF EXTERIOR SHIPPING CONTAINER SHALL INCLUDE NASA DRAWING NUMBER, LATEST REVISION LETTER AND DASH NUMBER.

2. INSPECTION AND ACCEPTANCE

   A. MECHANICAL REQUIREMENTS

      1. PARTS SHALL BE MARKED PER ND 1002019 WITH THE NASA DRAWING NUMBER, LATEST REVISION LETTER, DASH NUMBER AND MANUFACTURER'S IDENTIFICATION.

         MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART OR PACKAGE.

      2. PARTS SHALL BE INDIVIDUALLY PACKAGED IN SEPARATE MOISTURE-PROOF BAGS OF POLYETHYLENE OR OTHER SUITABLE MATERIAL AND ENCLOSED IN INDIVIDUAL BOXES.

      3. MANUFACTURER SHALL MARK DATE OF LUBRICATION ON EACH UNIT PACKAGE.

      4. ANGULAR CONTACT, NON-SEPARABLE BEARING WITH PHENOLIC RETAINER.

      5. MECHANICAL DIMENSIONS: AS SHOWN (APPLY AT 68°F) TABLE I.

      6. TORQUE: MAX STARTING TORQUE AND THRUST LOAD AS SHOWN IN TABLE II.

      7. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.

         ECCENTRICITY TO BE CODED PER TABLE III AND PACKAGES MARKED ACCORDINGLY.

      8. BORES AND O.D.'S TO BE CODED PER TABLE IV AND PACKAGES MARKED ACCORDINGLY.

      9. BEARINGS MAY BE OUT OF ROUND BY .002 BEFORE MOUNTING.

3. DESIGN REQUIREMENTS

   A. MATERIALS

      1. BALLS AND RINGS: CORROSION RESISTING STEEL, FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A, RC 56 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243.

      2. RETAINER: LINEN BASE PHENOLIC IN ACCORDANCE WITH MIL-P-79, TYPE FBE, FORM R EXCEPT FOR SPECIFIC GRAVITY AND WATER ABSORPTION. POROSITY TO BE 1-1/2% MIN.

         MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION SPECIFYING POROSITY AND METHOD OF MEASUREMENT.

   B. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171, FINISH NO. 5.4.

   C. THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 5 RMS MAX FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.

   D. RADIAL AND AXIAL RUNOUT

      1. RADIAL RUNOUT OF INNER RING = .0002 TIR MAX
      2. RADIAL RUNOUT OF OUTER RING = .0003 TIR MAX
      3. AXIAL RUNOUT OF INNER RING = .0002 TIR MAX
      4. AXIAL RUNOUT OF OUTER RING = .0003 TIR MAX

   E. BALLS SHALL BE 1/8 INCH DIAMETER AND SHALL BE WITHIN .000025 OF EACH OTHER.

   F. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.

   G. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORANCE WITH ABEC 7.

   H. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.

   I. LUBRICATE PER ND 1002077 (VACUUM IMPREGNATION METHOD).

   J. CONTACT ANGLE = 25° (REF).

Ⓓ REPLACES REV Ⓒ WITH CHANGES

MASTE

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

KIC NO	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
30205772240 THRU 2720				
	LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DWG. NO. CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
MATERIAL SEE NOTE 3A	DRAWN M.MENZORIO DATE 3-6-64 CHECKED J.E.Kelly 3/6/64 APPROVAL APPROVAL E. Thomp 9/22/64	BEARING, BALL, ANNULAR (ANGULAR CONTACT NON SEPARABLE) SPECIFICATION CONTROL DWG	
HEAT TREATMENT ~	NASA APPROVAL W. J. Rhine 9-22-64	CODE IDENT NO.	SIZE C · NASA DRAWING NO. 1011606
FINAL FINISH ~	MIT APPROVAL	SCALE ~ · WT	SHEET 1 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

4 3 2 1

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D 9091101

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
D	THIS SHEET ADDED PER TDRR 12809	9-22-64	WK

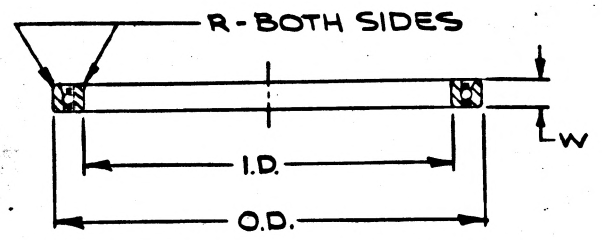


TABLE I DIMENSIONS

NASA DASH NO	I.D. +.0000 -.0003	O D +.0000 -.0004	W +.000 -.002	R +.020 -.000	MIN NO BALLS
-1	3.5000	4.0000	.250	.015	60
-2	4.2500	4.7500	.250	.015	75
-3	3.2500	3.7500	.250	.015	60
-4	3.2500	3.8750	.3125	.015	60
-5	3.0625	3.8750	.3125	.015	60

TABLE IV
BORE AND O.D. CODE

TOL RANGE I.D. \ O.D.	-.00000 -.00010	-.00011 -.00020	-.00021 -.00030	-.00031 -.00040
.00000 -.00010	11	12	13	14
-.00011 -.00020	21	22	23	24
-.00021 -.00030	31	32	33	34

TABLE III
ECCENTRICITY CODE

TOL RANGE I.R. \ O.R.	.000000 .000050	.000051 .000100	.000101 .000150	.000151 .000200	.000201 .000250	.000251 .000300
.000000 .000050	AA	AB	AC	AD	AE	AF
.000051 .000100	BA	BB	BC	BD	BE	BF
.000101 .000150	CA	CB	CC	CD	CE	CF
.000151 .000200	DA	DB	DC	DD	DE	DF

TABLE II - TORQUE

NASA DASH NO	MAX STARTING TORQUE	
	TORQUE GM-CM	APPLIED THRUST POUNDS
-1	70	15
-2	85	15

NASA DASH NO	KIC DASH NO
-1	2240
-2	2720

MASTER

Ⓓ THIS SHEET ADDED

K.I.C. NO. 30205772240 THRU 2720

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 3A
HEAT TREATMENT ~
FINAL FINISH ~

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN M.MENZORIO DATE 3-6-64
CHECKED J.E.Kelly 3/4/64
APPROVAL
APPROVAL
NASA APPROVAL W. J. Rhine 9-22-64
MIT APPROVAL W Kupfer 9/22/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BEARING, BALL, ANNULAR (ANGULAR CONTACT NON SEPARABLE) SPECIFICATION CONTROL DWG

CODE IDENT NO. | SIZE C | NASA DRAWING NO. 1011606
SCALE ~ | WT | SHEET 2 OF 2

4 3 2 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

E	9091101

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
ⓓ D	REDRAWN AND REPLACES REV C WITH CHANGES PER TDRR 12809	9-22-64	WH.
E	REVISED PER TDRR 16567	2/24/65	WR

REQUIREMENTS

1. GENERAL

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND 1015404, CLASS 1.

   C. PACKAGING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III.

   MARKING OF EXTERIOR SHIPPING CONTAINER SHALL INCLUDE NASA DRAWING NUMBER, LATEST REVISION LETTER AND DASH NUMBER.

2. INSPECTION AND ACCEPTANCE

   A. MECHANICAL REQUIREMENTS

      1. PARTS SHALL BE MARKED PER ND 1002019 WITH THE NASA DRAWING NUMBER, LATEST REVISION LETTER, DASH NUMBER AND MANUFACTURER'S IDENTIFICATION.

         MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART OR PACKAGE.

      2. PARTS SHALL BE INDIVIDUALLY PACKAGED IN SEPARATE MOISTURE-PROOF BAGS OF POLYETHYLENE OR OTHER SUITABLE MATERIAL AND ENCLOSED IN INDIVIDUAL BOXES.

      3. MANUFACTURER SHALL MARK DATE OF LUBRICATION ON EACH UNIT PACKAGE.

      4. ANGULAR CONTACT, NON-SEPARABLE BEARING WITH PHENOLIC RETAINER.

      5. MECHANICAL DIMENSIONS: AS SHOWN (APPLY AT 68°F) TABLE I.

      6. TORQUE: MAX STARTING TORQUE AND THRUST LOAD AS SHOWN IN TABLE II.

      7. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.

         ECCENTRICITY TO BE CODED PER TABLE III AND PACKAGES MARKED ACCORDINGLY.

      8. BORES AND O.D.'S TO BE CODED PER TABLE IV AND PACKAGES MARKED ACCORDINGLY.

      9. BEARINGS MAY BE OUT OF ROUND BY .002 BEFORE MOUNTING.

3. DESIGN REQUIREMENTS

   A. MATERIALS

      1. BALLS AND RINGS: CORROSION RESISTING STEEL, FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A, RC 56 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243.

      2. RETAINER: LINEN BASE PHENOLIC IN ACCORDANCE WITH MIL-P-79, TYPE FBE, FORM R EXCEPT FOR SPECIFIC GRAVITY AND WATER ABSORPTION. POROSITY TO BE 1-1/2% MIN.

         MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION SPECIFYING POROSITY AND METHOD OF MEASUREMENT.

   B. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171, FINISH NO. 5.4.

   C. THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 5 RMS MAX FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.

   D. RADIAL AND AXIAL RUNOUT

      1. RADIAL RUNOUT OF INNER RING = .0002 TIR MAX
      2. RADIAL RUNOUT OF OUTER RING = .0003 TIR MAX
      3. AXIAL RUNOUT OF INNER RING = .0002 TIR MAX
      4. AXIAL RUNOUT OF OUTER RING = .0003 TIR MAX

   E. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.

   F. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORANCE WITH ABEC 7.

   G. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.

   H. LUBRICATE PER ND 1002077 (VACUUM IMPREGNATION METHOD).

   I. CONTACT ANGLE = 25° (REF).

Ⓓ REPLACES REV Ⓒ WITH CHANGES

MASTER

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

KIC NO 30205772240 THRU 2720

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 3A
HEAT TREATMENT ~
FINAL FINISH ~

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN M.MENZORIO DATE 3-6-64
CHECKED J.E.Kelly 3/10/64
APPROVAL
APPROVAL E. Thomp 9/22/64
NASA APPROVAL W J Rhine 9-22-64
MIT APPROVAL 9/22/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BEARING, BALL, ANNULAR
(ANGULAR CONTACT NON SEPARABLE)
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011606
SCALE ~
WT
SHEET 1 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

E 9091101

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
D	THIS SHEET ADDED PER TDRR 12809	9-22-64	WK
E	REVISED PER TDRR 16567	2/4/65	WR

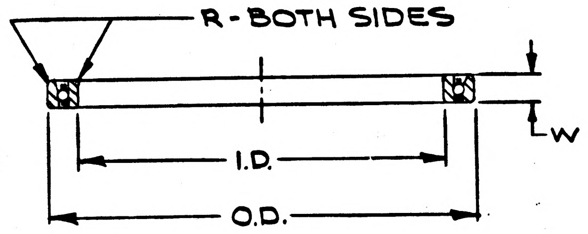


TABLE I DIMENSIONS

NASA DASH NO	I.D. +.0000 -.0003	O D +.0000 -.0004	W +.000 -.002	R +.020 -.000	MIN NO BALLS	BALL DIA	BALL TOLERANCE
-1	3.5000	4.0000	.250	.015	60	1/8	±.0000125
-2	4.2500	4.7500	.250	.015	75	1/8	±.0000125
-3	3.2500	3.7500	.250	.015	60	1/8	±.0000125
-4	3.2500	3.8750	.3125	.015	60	1/8	±.0000125
-5	3.0625	3.8750	.3125	.015	60	1/8	±.0000125
-6	3.0625	3.8750	.3125	.015	42	3/16	±.0000125

TABLE IV BORE AND O.D. CODE

TOL RANGE O.D. I.D.	-.00000 -.00010	-.00011 -.00020	-.00021 -.00030	-.00031 -.00040
.00000 -.00010	11	12	13	14
-.00011 -.00020	21	22	23	24
-.00021 -.00030	31	32	33	34

TABLE III ECCENTRICITY CODE

TOL RANGE O.R. I.R.	.000000 .000050	.000051 .000100	.000101 .000150	.000151 .000200	.000201 .000250	.000251 .000300
.000000 .000050	AA	AB	AC	AD	AE	AF
.000051 .000100	BA	BB	BC	BD	BE	BF
.000101 .000150	CA	CB	CC	CD	CE	CF
.000151 .000200	DA	DB	DC	DD	DE	DF

TABLE II - TORQUE

NASA DASH NO	MAX STARTING TORQUE	
	TORQUE GM-CM	APPLIED THRUST POUNDS
-1	70	15
-2	85	15
-3	70	15
-4	70	15
-5	70	15
-6	70	15

Ⓓ THIS SHEET ADDED

MASTE

K.I.C. NO.	30205772240 THRU 2720

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 3A

HEAT TREATMENT ~

FINAL FINISH ~

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
CONTRACT

DRAWN M.MENZORIO DATE 3-6-64
CHECKED J.E.Kelly 3/1964
APPROVAL
APPROVAL
NASA APPROVAL W. J. Rhine 9-22-64
MIT APPROVAL W Kupfer 9/22/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BEARING, BALL, ANNULAR
(ANGULAR CONTACT NON SEPARABLE)
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011606
SCALE ~
WT
SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

F 1011606

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
D	REDRAWN AND REPLACES REV C WITH CHANGES PER TDRR 12809	9-22-64	WH.
E	REVISED PER TDRR 16567	2/24/65	WR
F	REVISED PER TDRR 17498	23 May 65	WR

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND 1015404, CLASS 1.
   - C. PACKAGING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III.

     MARKING OF EXTERIOR SHIPPING CONTAINER SHALL INCLUDE NASA DRAWING NUMBER, LATEST REVISION LETTER AND DASH NUMBER.
2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS
     1. PARTS SHALL BE MARKED PER ND 1002019 WITH THE NASA DRAWING NUMBER, LATEST REVISION LETTER, DASH NUMBER AND MANUFACTURER'S IDENTIFICATION.

        MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART OR PACKAGE.
     2. PARTS SHALL BE INDIVIDUALLY PACKAGED IN SEPARATE MOISTURE-PROOF BAGS OF POLYETHYLENE OR OTHER SUITABLE MATERIAL AND ENCLOSED IN INDIVIDUAL BOXES.
     3. MANUFACTURER SHALL MARK DATE OF LUBRICATION ON EACH UNIT PACKAGE.
     4. ANGULAR CONTACT, NON-SEPARABLE BEARING WITH PHENOLIC RETAINER.
     5. MECHANICAL DIMENSIONS: AS SHOWN (APPLY AT 68°F) TABLE I.
     6. TORQUE: MAX STARTING TORQUE AND THRUST LOAD AS SHOWN IN TABLE II.
     7. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.

        ECCENTRICITY TO BE CODED PER TABLE III AND PACKAGES MARKED ACCORDINGLY.
     8. BORES AND O.D.'S TO BE CODED PER TABLE IV AND PACKAGES MARKED ACCORDINGLY.
     9. BEARINGS MAY BE OUT OF ROUND BY .002 BEFORE MOUNTING.
3. DESIGN REQUIREMENTS
   - A. MATERIALS
     1. BALLS AND RINGS: CORROSION RESISTING STEEL, FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A, RC 56 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243.
     2. RETAINER: LINEN BASE PHENOLIC IN ACCORDANCE WITH MIL-P-79, TYPE FBE, FORM R EXCEPT FOR SPECIFIC GRAVITY, WATER ABSORPTION AND ELECTRICAL CHARACTERISTICS POROSITY TO BE 1-1/2% MIN.

        MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION SPECIFYING POROSITY AND METHOD OF MEASUREMENT.
   - B. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171, FINISH NO. 5.4.
   - C. THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 5 RMS MAX FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.
   - D. RADIAL AND AXIAL RUNOUT
     1. RADIAL RUNOUT OF INNER RING = .0002 TIR MAX
     2. RADIAL RUNOUT OF OUTER RING = .0003 TIR MAX
     3. AXIAL RUNOUT OF INNER RING = .0002 TIR MAX
     4. AXIAL RUNOUT OF OUTER RING = .0003 TIR MAX
   - E. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.
   - F. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORANCE WITH ABEC 7.
   - G. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.
   - H. LUBRICATE PER ND 1002077 (VACUUM IMPREGNATION METHOD).
   - I. CONTACT ANGLE = 25° (REF).

Ⓓ REPLACES REV Ⓒ WITH CHANGES

MASTE

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

KIC NO 30205772240 THRU 2720

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 3A
HEAT TREATMENT ~
FINAL FINISH ~

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN M. MENZORIO DATE 3-6-64
CHECKED J.E. Kelly 3/10/64
APPROVAL
APPROVAL E. Thomp 9/22/64
NASA APPROVAL W. J. Rhine 9-22-64
MIT APPROVAL 22/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BEARING, BALL, ANNULAR
(ANGULAR CONTACT NON SEPARABLE)
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011606
SCALE ~
WT
SHEET 1 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

F 1011606

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
D	THIS SHEET ADDED PER TDRR 12809	9-22-64	WK
E	REVISED PER TDRR 16567	2/24/65	WK
F	REVISED PER TDRR 17498	[illegible] 65	WK

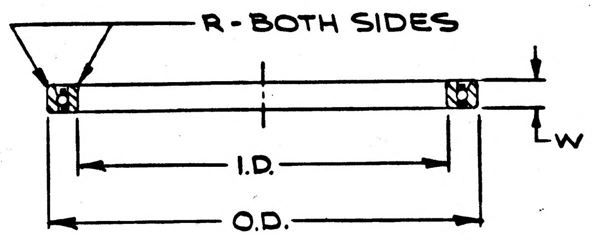


TABLE I DIMENSIONS

NASA DASH NO	I.D. +.0000 -.0003	O D +.0000 -.0004	W +.000 -.002	R +.020 -.000	MIN NO BALLS	BALL DIA	BALL TOLERANCE
-1	3.5000	4.0000	.250	.015	60	1/8	± .0000125
-2	4.2500	4.7500	.250	.015	75	1/8	± .0000125
-3	3.2500	3.7500	.250	.015	60	1/8	± .0000125
-4	3.2500	3.8750	.3125	.015	60	1/8	± .0000125
-5	3.0625	3.8750	.3125	.015	60	1/8	± .0000125
-6	3.0625	3.8750	.3125	.015	42	3/16	± .0000125

TABLE IV
BORE AND O.D. CODE

TOL RANGE O.D. / I.D.	-.00000 -.00010	-.00011 -.00020	-.00021 -.00030	-.00031 -.00040
-.00000 -.00010	11	12	13	14
-.00011 -.00020	21	22	23	24
-.00021 -.00030	31	32	33	34

TABLE III
ECCENTRICITY CODE

TOL RANGE O.R. / I.R.	.000000 .000050	.000051 .000100	.000101 .000150	.000151 .000200	.000201 .000250	.000251 .000300
.000000 .000050	AA	AB	AC	AD	AE	AF
.000051 .000100	BA	BB	BC	BD	BE	BF
.000101 .000150	CA	CB	CC	CD	CE	CF
.000151 .000200	DA	DB	DC	DD	DE	DF

TABLE II - TORQUE

NASA DASH NO	MAX STARTING TORQUE	
	TORQUE GM-CM	APPLIED THRUST POUNDS
-1	70	15
-2	85	15
-3	70	15
-4	70	15
-5	70	15
-6	70	15

Ⓓ THIS SHEET ADDED

MASTER

K.I.C. NO. 30205772240 THRU 2720

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 3A

HEAT TREATMENT
~

FINAL FINISH
~

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN M. MENZORIO DATE 3-6-64
CHECKED J.E. Kelly 3/1964
APPROVAL
APPROVAL
NASA APPROVAL W. J. Rhine 9-22-64
MIT APPROVAL W Kupfer 9/22/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BEARING, BALL, ANNULAR
(ANGULAR CONTACT NON SEPARABLE
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011606
SCALE ~
WT
SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1011606 G

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
D	REDRAWN AND REPLACES REV C WITH CHANGES PER TDRR 12809	9-22-64	WH.
E	REVISED PER TDRR 16567	2/24/65	WK
F	REVISED PER TDRR 17498	23Mar65	WK
G	REVISED PER TDRR 21257	10Aug65	WK

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND 1015404, CLASS 1.
   - C. PACKAGING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III.

     MARKING OF EXTERIOR SHIPPING CONTAINER SHALL INCLUDE NASA DRAWING NUMBER, LATEST REVISION LETTER AND DASH NUMBER.
2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS
     1. PARTS SHALL BE MARKED PER ND 1002019 WITH THE NASA DRAWING NUMBER, LATEST REVISION LETTER, DASH NUMBER AND MANUFACTURER'S IDENTIFICATION.

        MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART OR PACKAGE.
     2. PARTS SHALL BE INDIVIDUALLY PACKAGED IN SEPARATE MOISTURE-PROOF BAGS OF POLYETHYLENE OR OTHER SUITABLE MATERIAL AND ENCLOSED IN INDIVIDUAL BOXES.
     3. MANUFACTURER SHALL MARK DATE OF LUBRICATION ON EACH UNIT PACKAGE.
     4. ANGULAR CONTACT, NON-SEPARABLE BEARING WITH PHENOLIC RETAINER.
     5. MECHANICAL DIMENSIONS: AS SHOWN (APPLY AT 68°F) TABLE I.
     6. TORQUE: MAX STARTING TORQUE AND THRUST LOAD AS SHOWN IN TABLE II.
     7. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.

        ECCENTRICITY TO BE CODED PER TABLE III AND PACKAGES MARKED ACCORDINGLY.
     8. BORES AND O.D.'S TO BE CODED PER TABLE IV AND PACKAGES MARKED ACCORDINGLY.
     9. BEARINGS MAY BE OUT OF ROUND BY .002 BEFORE MOUNTING.
3. DESIGN REQUIREMENTS
   - A. MATERIALS
     1. BALLS AND RINGS: CORROSION RESISTING STEEL, FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A, RC 56 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243.
     2. RETAINER: LINEN BASE PHENOLIC IN ACCORDANCE WITH MIL-P-79, TYPE FBE, FORM TR EXCEPT FOR SPECIFIC GRAVITY, WATER ABSORPTION AND ELECTRICAL CHARACTERISTICS POROSITY TO BE 1-1/2% MIN.

        MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION SPECIFYING POROSITY AND METHOD OF MEASUREMENT.
   - B. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171, FINISH NO. 5.4.
   - C. THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 5 RMS MAX FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.
   - D. RADIAL AND AXIAL RUNOUT
     1. RADIAL RUNOUT OF INNER RING = .0002 TIR MAX
     2. RADIAL RUNOUT OF OUTER RING = .0003 TIR MAX
     3. AXIAL RUNOUT OF INNER RING = .0002 TIR MAX
     4. AXIAL RUNOUT OF OUTER RING = .0003 TIR MAX
   - E. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.
   - F. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORANCE WITH ABEC 7.
   - G. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.
   - H. LUBRICATE PER ND 1002077 (VACUUM IMPREGNATION METHOD).
   - I. CONTACT ANGLE = 25° (REF).

Ⓓ REPLACES REV Ⓒ WITH CHANGES

MASTE

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

KIC NO 30205772240 THRU 2720	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 3A

HEAT TREATMENT ~

FINAL FINISH ~

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN M.MENZORIO DATE 3-6-64
CHECKED J.E.Kelly 3/10/64
APPROVAL
APPROVAL E. Thorup 9/22/64
NASA APPROVAL W J Rhine 9-22-64
MIT APPROVAL 9/22/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BEARING, BALL, ANNULAR
(ANGULAR CONTACT NON SEPARABLE)
SPECIFICATION CONTROL DWG

CODE IDENT NO. SIZE C NASA DRAWING NO. 1011606

SCALE ~ WT SHEET 1 OF 2

1011606 G

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

G	9091101

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
D	THIS SHEET ADDED PER TDRR 12809	9-22-64	WK
E	REVISED PER TDRR 16567	2/24/65	WK
F	REVISED PER TDRR 17498	23 Mar 65	WK
G	REVISED PER TDRR 21257	10 Aug 65	WK

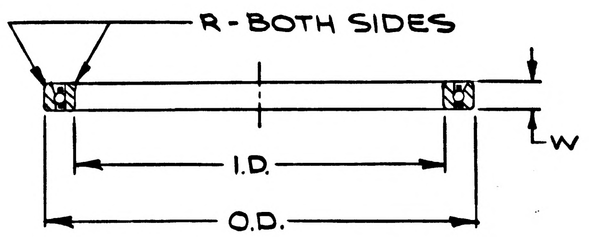


TABLE I DIMENSIONS

NASA DASH NO	I.D. +.0000 -.0003	O.D. +.0000 -.0004	W +.000 -.002	R +.020 -.000	MIN NO BALLS	BALL DIA	BALL TOLERANCE
-1	3.5000	4.0000	.250	.015	60	1/8	±.0000125
-2	4.2500	4.7500	.250	.015	75	1/8	±.0000125
-3	3.2500	3.7500	.250	.015	60	1/8	±.0000125
-4	3.2500	3.8750	.3125	.015	60	1/8	±.0000125
-5	3.0625	3.8750	.3125	.015	60	1/8	±.0000125
-6	3.0625	3.8750	.3125	.015	42	3/16	±.0000125

TABLE IV
BORE AND O.D. CODE

TOL RANGE I.D. \ O.D.	-.00000 -.00010	-.00011 -.00020	-.00021 -.00030	-.00031 -.00040
.00000 -.00010	11	12	13	14
-.00011 -.00020	21	22	23	24
-.00021 -.00030	31	32	33	34

TABLE III
ECCENTRICITY CODE

TOL RANGE I.R. \ O.R.	.000000 .000050	.000051 .000100	.000101 .000150	.000151 .000200	.000201 .000250	.000251 .000300
.000000 .000050	AA	AB	AC	AD	AE	AF
.000051 .000100	BA	BB	BC	BD	BE	BF
.000101 .000150	CA	CB	CC	CD	CE	CF
.000151 .000200	DA	DB	DC	DD	DE	DF

TABLE II - TORQUE

NASA DASH NO	MAX STARTING TORQUE	
	TORQUE GM-CM	APPLIED THRUST POUNDS
-1	70	15
-2	85	15
-3	70	15
-4	70	15
-5	70	15
-6	70	15

Ⓓ THIS SHEET ADDED

MASTE.

K.I.C. NO. 30205772240 THRU 2720	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 3A
HEAT TREATMENT ~
FINAL FINISH ~

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN M. MENZORIO DATE 3-6-64
CHECKED J.E. Kelly 3/1964
APPROVAL
APPROVAL
NASA APPROVAL W. J. Rhine 9-22-64
MIT APPROVAL W Kupfer 9/22/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BEARING, BALL, ANNULAR (ANGULAR CONTACT NON SEPARABLE) SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011606
SCALE ~
WT
SHEET 2 OF 2

REVISIONS TDRR 21140				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REQUIREMENTS.

1. GENERAL.

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND1015404, CLASS 1.

C. MATERIALS:
BALLS AND RINGS - CRES AISI 440C
FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A
Rc59 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243.
RETAINER - LINEN BASE PHENOLIC, POROSITY = 1-1/2% MIN.

D. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.

E. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171, (KPS-10051.200).
THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 5 RMS MAX. FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.

F. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.

G. LUBRICATE PER ND1002090.

H. MANUFACTURER SHALL MARK DATE WHEN BEARING WAS LUBRICATED ON EACH PACKAGE.

I. PARTS PREPARED FOR DELIVERY PER MIL-P-116 (KES-1003D.1, CLASS 1).

J. PARTS SHALL BE MARKED FOR IDENTIFICATION IN ACCORDANCE WITH ND1002019.

K. MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION IDENTIFYING TYPE OF PHENOLIC, CHEMICAL COMPOSITION, POROSITY AND METHOD OF MEASUREMENT, OF RETAINER MATERIAL.

2. DESIGN DETAIL.

A. ANGULAR CONTACT, NON-SEPARABLE.

B. BALLS SHALL BE 1/8 INCH DIAMETER AND SHALL BE WITHIN .000025 MAX. OF EACH OTHER.

C. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.

D. RADIAL RUNOUT OF INNER RING = .0002 TIR MAX.
RADIAL RUNOUT OF OUTER RING = .0003 TIR MAX.
AXIAL RUNOUT OF INNER RING = .0002 TIR MAX.
AXIAL RUNOUT OF OUTER RING = .0003 TIR MAX.

E. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.

ECCENTRICITY TO BE CODED TO NEAREST .000050 INCREMENT PER TABLE II AND PACKAGES MARKED ACCORDINGLY.

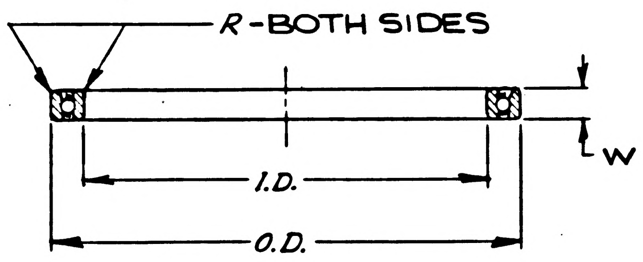
F. BORES AND O.D.'S TO BE CODED TO NEAREST .0001 PER TABLE I AND PACKAGES MARKED ACCORDINGLY.

G. DIMENSIONS SHOWN APPLY AT 68°F.

H. CONTACT ANGLE = 25° (REF).

I. BEARINGS MAY BE OUT OF ROUND BY .001 BEFORE MOUNTING.

J. BEARING SHALL MEET THE REQUIREMENTS OF PROCUREMENT SPECIFICATION ND1002124.



NASA DASH NO.	K.I.C. DASH NO.	I.D. +.0000 -.0003	O.D. +.0000 -.0004	W +.000 -.002	R +.020 -.000	MIN NO. BALLS	MAX STARTING TORQUE	
							TORQUE GM-CM	APPLIED THRUST POUNDS
-1	2240	3.5000	4.0000	.250	.015	60	70	15
-2	2720	4.2500	4.7500	.250	.015	75	85	15

ORIGINAL SOURCES OF SUPPLY

NASA DASH NO	KIC DASH NO	S.B.B. LEBANON, NH	KAYDON MUSKEGON, MICH	MESSINGER PHILA, PA	I.T.I. COMPTON, CALIF
-1	2240	3 TAR-56-64-9	KA35AB7-8002-1		ITI 6489-A
-2	2720	3 TAR-68-76-2	KA42AB7-8003-1		ITI 6490-A

TABLE I

TOL RANGE ID \ OD	.0000 -.0001	-.0001 -.0002	-.0002 -.0003	-.0003 -.0004
.0000 -.0001	11	12	13	14
-.0001 -.0002	21	22	23	24
-.0002 -.0003	31	32	33	34

TABLE II

TOL RANGE I.R. \ O.R.	.000000 .000050	.000050 .000100	.000100 .000150	.000150 .000200	.000200 .000250	.000250 .000300
.000000 .000050	A A	A B	A C	A D	A E	A F
.000050 .000100	B A	B B	B C	B D	B E	B F
.000100 .000150	C A	C B	C C	C D	C E	C F
.000150 .000200	D A	D B	D C	D D	D E	D F

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
	MULTIPLE

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ -	+ -	+ -

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 1C

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 30205772240 THRU 2720

DRAWN C. SCRICCO DATE 4-4-63
CHECKED Ⓢ V. Tomala 4-29-63
APPROVAL Thornton Klenn 5-3-63
APPROVAL E. Thomp 5-3-63
NASA APPROVAL Jack Barnard
MIT APPROVAL W Kupfer 8 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BEARING, BALL, ANNULAR
(ANGULAR CONTACT NONSEPARABLE)
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011606
SCALE ~
WEIGHT
CALC. ACTUAL
SHEET 1 OF 1

1011606

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

A 1011607

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		GENERAL CHANGES SEE TDRR NO. 02254		WK 8/6/63

REVISIONS TDRR01140

REQUIREMENTS

1. GENERAL

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND1015404, CLASS 1.

Ⓐ2 C. MATERIALS:
BALLS AND RINGS - CORROSION RESISTING STEEL
FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A
Rc56 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243
RETAINER - LINEN BASE PHENOLIC, POROSITY = 1-1/2% MIN.

D. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.

E. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171 (KPS-10051.200)
THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 5 RMS MAX. FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.

F. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.

G. LUBRICATE PER ND1002090.

H. MANUFACTURER SHALL MARK DATE WHEN BEARING WAS LUBRICATED ON EACH PACKAGE.

I. PARTS PREPARED FOR DELIVERY PER MIL-P-116 (KES-1003D.1, CLASS 1).

J. PARTS SHALL BE MARKED FOR IDENTIFICATION IN ACCORDANCE WITH ND1002019.

K. MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION IDENTIFYING TYPE OF PHENOLIC, CHEMICAL COMPOSITION, POROSITY AND METHOD OF MEASUREMENT, OF RETAINER MATERIAL.

2. DESIGN DETAIL

A. FLANGED, ANGULAR CONTACT, NON-SEPARABLE.

B. BALLS SHALL BE 1/8 INCH DIAMETER AND SHALL BE WITHIN .000025 OF EACH OTHER.

C. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.

D. RADIAL RUNOUT OF INNER RING = .0002 TIR MAX
RADIAL RUNOUT OF OUTER RING = .0003 TIR MAX
AXIAL RUNOUT OF INNER RING = .0002 TIR MAX
AXIAL RUNOUT OF OUTER RING = .0003 TIR MAX
AXIAL RUNOUT OF FLANGE = .0003 TIR MAX

E. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.

ECCENTRICITY TO BE CODED TO NEAREST .000050 INCREMENT PER TABLE II AND PACKAGES MARKED ACCORDINGLY.

F. BORES AND O.D.'S TO BE CODED TO NEAREST .0001 PER TABLE I AND PACKAGES MARKED ACCORDINGLY.

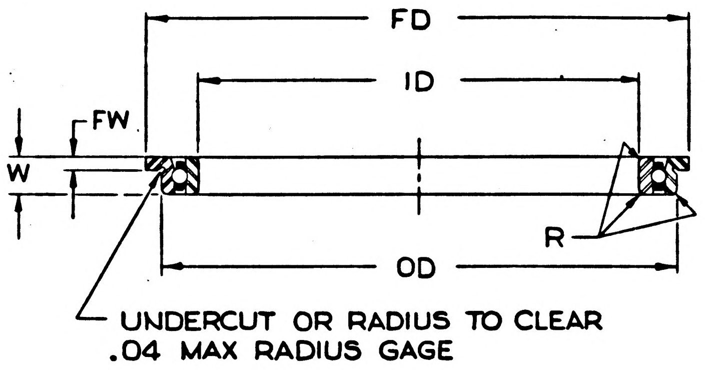
G. DIMENSIONS SHOWN APPLY AT 68°F.

H. CONTACT ANGLE = 25° (REF)

I. BEARINGS MAY BE OUT OF ROUND BY .001 BEFORE MOUNTING.

Ⓐ4

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



Ⓐ1

NASA DASH NO.	KIC DASH NO.	ID +.0000 -.0003	OD +.0000 -.0004	W +.000 -.002	FD ±.015	FW ±.005	R +.020 -.000	MIN NO. BALLS	MAX STARTING TORQUE TORQUE GM-CM	MAX STARTING TORQUE APPLIED THRUST POUNDS
-1	1760	2.7500	3.2500	.250	3.375	.062	.015	50	70	15
-2	2400	3.7500	4.3750	.312	4.6250	.125	.015	68	85	15

Ⓐ3

TABLE I

TOL. RANGE ID \ OD	.0000 -.0001	-.0001 -.0002	-.0002 -.0003	-.0003 -.0004
.0000 -.0001	11	12	13	14
-.0001 -.0002	21	22	23	24
-.0002 -.0003	31	32	33	34

TABLE II

TOL. RANGE IR \ OR	.000000 .000050	.000050 .000100	.000100 .000150	.000150 .000200	.000200 .000250	.000250 .000300
.000000 .000050	AA	AB	AC	AD	AE	AF
.000050 .000100	BA	BB	BC	BD	BE	BF
.000100 .000150	CA	CB	CC	CD	CE	CF
.000150 .000200	DA	DB	DC	DD	DE	DF

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
	MULTIPLE

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	±	±	±

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 1C

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 30205771760 THRU 2400

DRAWN V. Malinowsky DATE 4-4-63
CHECKED ③ V. Tomala 4-29-63
APPROVAL Thompson 5-3-63
APPROVAL E. Thorp 5-3-63
NASA APPROVAL Jack Barnes
MIT APPROVAL W Wypper 8 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE BEARING, BALL, ANNULAR
(ANGULAR CONTACT,
NON-SEPARABLE, FLANGED)
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011607
SCALE
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

E-184

1011607A

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

B 1011607

REVISIONS TDRR01140				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		GENERAL CHANGES SEE TDRR NO. 02254		WK 8/6/63
B		REVISED PER TDRR NO. 04365	10/31/63	WR.

REQUIREMENTS

1. GENERAL

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND1015404, CLASS 1.

Ⓐ2 C. MATERIALS:
BALLS AND RINGS - CORROSION RESISTING STEEL
FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A
Rc56 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243
RETAINER - LINEN BASE PHENOLIC, POROSITY = 1-1/2% MIN.

D. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.

E. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171 (KPS-10051.200)
THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 5 RMS MAX. FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.

F. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.

G. LUBRICATE PER ND1002090.

H. MANUFACTURER SHALL MARK DATE WHEN BEARING WAS LUBRICATED ON EACH PACKAGE.

I. PARTS PREPARED FOR DELIVERY PER MIL-P-116 (KES-1003D.1, CLASS 1).

J. PARTS SHALL BE MARKED FOR IDENTIFICATION IN ACCORDANCE WITH ND1002019.

K. MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION IDENTIFYING TYPE OF PHENOLIC, CHEMICAL COMPOSITION, POROSITY AND METHOD OF MEASUREMENT, OF RETAINER MATERIAL.

2. DESIGN DETAIL

A. FLANGED, ANGULAR CONTACT, NON-SEPARABLE.

B. BALLS SHALL BE 1/8 INCH DIAMETER AND SHALL BE WITHIN .000025 OF EACH OTHER.

C. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.

D. RADIAL RUNOUT OF INNER RING = .0002 TIR MAX
RADIAL RUNOUT OF OUTER RING = .0003 TIR MAX
AXIAL RUNOUT OF INNER RING = .0002 TIR MAX
AXIAL RUNOUT OF OUTER RING = .0003 TIR MAX
AXIAL RUNOUT OF FLANGE = .0003 TIR MAX

E. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.

ECCENTRICITY TO BE CODED TO NEAREST .000050 INCREMENT PER TABLE II AND PACKAGES MARKED ACCORDINGLY.

F. BORES AND O.D.'S TO BE CODED TO NEAREST .0001 PER TABLE I AND PACKAGES MARKED ACCORDINGLY.

G. DIMENSIONS SHOWN APPLY AT 68°F.

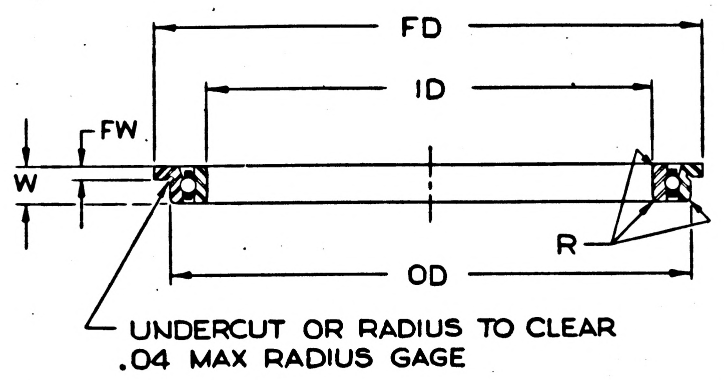
H. CONTACT ANGLE = 25° (REF)

I. BEARINGS MAY BE OUT OF ROUND BY .002 BEFORE MOUNTING. Ⓑ

Ⓐ4

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER



UNDERCUT OR RADIUS TO CLEAR .04 MAX RADIUS GAGE

Ⓐ1

NASA DASH NO.	KIC DASH NO.	ID +.0000 -.0003	OD +.0000 -.0004	W +.000 -.002	FD ±.015	FW ±.005	R +.020 -.000	MIN NO. BALLS	MAX STARTING TORQUE: TORQUE GM-CM	MAX STARTING TORQUE: APPLIED THRUST POUNDS
-1	1760	2.7500	3.2500	.250	3.375	.062	.015	50	70	15
-2	2400	3.7500	4.3750	.312	4.6250	.125	.015	68	85	15

Ⓐ3

TABLE I

TOL. RANGE ID \ OD	.0000 -.0001	-.0001 -.0002	-.0002 -.0003	-.0003 -.0004
.0000 -.0001	11	12	13	14
-.0001 -.0002	21	22	23	24
-.0002 -.0003	31	32	33	34

TABLE II

TOL. RANGE IR \ OR	.000000 .000050	.000050 .000100	.000100 .000150	.000150 .000200	.000200 .000250	.000250 .000300
.000000 .000050	AA	AB	AC	AD	AE	AF
.000050 .000100	BA	BB	BC	BD	BE	BF
.000100 .000150	CA	CB	CC	CD	CE	CF
.000150 .000200	DA	DB	DC	DD	DE	DF

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
	MULTIPLE

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ −	+ −	+ −

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 1C

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 30205771760 THRU 2400

DRAWN V. Malinowsky DATE 4-4-63
CHECKED ③ V. Tomala 4-29-63
APPROVAL Thornton Stearns 5-3-63
APPROVAL E. Thorp 5-3-63
NASA APPROVAL Jack Barnard
MIT APPROVAL W Kupfer 8 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE BEARING, BALL, ANNULAR (ANGULAR CONTACT, NON-SEPARABLE, FLANGED) SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011607
SCALE
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-184

REVISIONS TDRR 01143				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REQUIREMENTS

1. GENERAL

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND1015404, CLASS 1.

   C. MATERIALS:
      BALLS AND RINGS - CRES AISI 440C
      FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A
      Rc59 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE
      WITH FED-STD-151, METHOD 243
      RETAINER - LINEN BASE PHENOLIC, POROSITY = 1-1/2% MIN.

   D. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.

   E. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171 (KPS-10051.200)
      THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 5 RMS MAX. FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.

   F. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.

   G. LUBRICATE PER ND1002090.

   H. MANUFACTURER SHALL MARK DATE WHEN BEARING WAS LUBRICATED ON EACH PACKAGE.

   I. PARTS PREPARED FOR DELIVERY PER MIL-P-116 (KES-1003D.1, CLASS 1).

   J. PARTS SHALL BE MARKED FOR IDENTIFICATION IN ACCORDANCE WITH ND1002019.

   K. MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION IDENTIFYING TYPE OF PHENOLIC, CHEMICAL COMPOSITION, POROSITY AND METHOD OF MEASUREMENT, OF RETAINER MATERIAL.

2. DESIGN DETAIL

   A. FLANGED, ANGULAR CONTACT, NON-SEPARABLE.

   B. BALLS SHALL BE 1/8 INCH DIAMETER AND SHALL BE WITHIN .000025 OF EACH OTHER.

   C. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.

   D. RADIAL RUNOUT OF INNER RING = .0002 TIR MAX
      RADIAL RUNOUT OF OUTER RING = .0003 TIR MAX
      AXIAL RUNOUT OF INNER RING = .0002 TIR MAX
      AXIAL RUNOUT OF OUTER RING = .0003 TIR MAX
      AXIAL RUNOUT OF FLANGE = .0003 TIR MAX

   E. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.

      ECCENTRICITY TO BE CODED TO NEAREST .000050 INCREMENT PER TABLE II AND PACKAGES MARKED ACCORDINGLY.

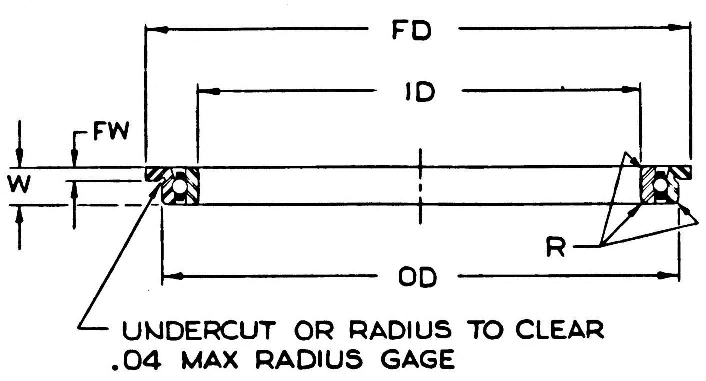
   F. BORES AND O.D.'S TO BE CODED TO NEAREST .0001 PER TABLE I AND PACKAGES MARKED ACCORDINGLY.

   G. DIMENSIONS SHOWN APPLY AT 68°F.

   H. CONTACT ANGLE = 25° (REF)

   I. BEARINGS MAY BE OUT OF ROUND BY .001 BEFORE MOUNTING.

   J. BEARING SHALL MEET THE REQUIREMENTS OF PROCUREMENT SPECIFICATION ND1002124.



NASA DASH NO.	KIC DASH NO.	ID +.0000 -.0003	OD +.0000 -.0004	W +.000 -.002	FD ±.015	FW ±.005	R +.020 -.000	MIN NO. BALLS	MAX STARTING TORQUE	
									TORQUE GM-CM	APPLIED THRUST POUNDS
-1	1760	2.7500	3.2500	.250	3. ·	.062	.015	50	70	15
-2	2400	3.7500	4.3750	.312	4.6250	.125	.015	68	85	15

ORIGINAL SOURCES OF SUPPLY

NASA DASH NO.	KIC DASH NO.	S.B.B. LEBANON, N.H.	KAYDON MUSKEGON, MICH	MESSINGER PHILA, PA.	I.T.I. COMPTON, CALIF.
-1	1760	3TAR 44-52-1			ITI 6593
-2	2400	3TAR 60-70-2	7768-1		ITI 6573

TABLE I

TOL. RANGE OD ID	.0000 -.0001	-.0001 -.0002	-.0002 -.0003	-.0003 -.0004
.0000 -.0001	11	12	13	14
-.0001 -.0002	21	22	23	24
-.0002 -.0003	31	32	33	34

TABLE II

TOL. RANGE OR IR	.000000 .000050	.000050 .000100	.000100 .000150	.000150 .000200	.000200 .000250	.000250 .000300
.000000 .000050	AA	AB	AC	AD	AE	AF
.000050 .000100	BA	BB	BC	BD	BE	BF
.000100 .000150	CA	CB	CC	CD	CE	CF
.000150 .000200	DA	DB	DC	DD	DE	DF

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
	MULTIPLE

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ -	+ -	+ -

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 1C

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC 30205771760
PN THRU 2400

DRAWN V. Malinowsky DATE 4-4-63
CHECKED ③ V. Tomala 4-29-63
APPROVAL Thornton Sloane 5-3-63
APPROVAL E. Thorp 5-3-63
NASA APPROVAL Jack Barnes
MIT APPROVAL W Wypler 8 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE BEARING, BALL, ANNULAR
(ANGULAR CONTACT,
NON-SEPARABLE, FLANGED)
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011607
SCALE
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011607

∀ 8091101

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO 02688	8/21/6[illegible]	[illegible]

REVISIONS TDRR 01190

REQUIREMENTS

1. GENERAL

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND1015404, CLASS 2.

C. MATERIALS:
BALLS AND RINGS - CORROSION RESISTING STEEL
FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A
Rc59 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE
WITH FED-STD-151, METHOD 243.
RETAINER - LINEN BASE PHENOLIC, POROSITY = 2% MIN.

D. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.

E. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171 (KPS-10051.200).
THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 2 RMS MAX. FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS; PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.

F. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.

G. LUBRICATE PER ND1002090.

H. MANUFACTURER SHALL MARK DATE WHEN BEARING WAS LUBRICATED ON EACH PACKAGE.

I. PARTS PREPARED FOR DELIVERY PER MIL-P-116, (KES-1003D.1, CLASS 1).

J. TORQUE SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-206A.

K. PARTS SHALL BE MARKED FOR IDENTIFICATION IN ACCORDANCE WITH ND1002019.

L. MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION IDENTIFYING TYPE OF PHENOLIC, CHEMICAL COMPOSITION, POROSITY AND METHOD OF MEASUREMENT, OF RETAINER MATERIAL.

2. DESIGN DETAIL

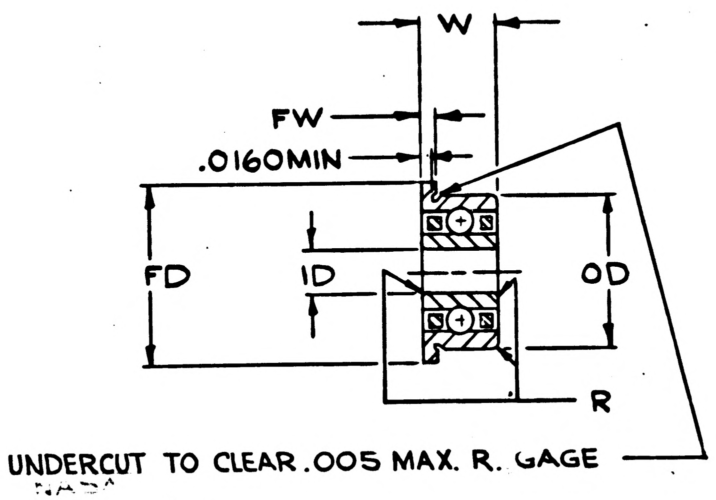
A. FLANGED, DEEP GROOVE, CONRAD TYPE.

B. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.

C. RADIAL RUNOUT OF INNER RING = .0001 TIR MAX
RADIAL RUNOUT OF OUTER RING = .0002 TIR MAX
AXIAL RUNOUT OF INNER RING = .0001 TIR MAX
AXIAL RUNOUT OF OUTER RING = .0002 TIR MAX

D. BORES AND O.D.'S TO BE CODED TO NEAREST .0001 PER TABLE I AND PACKAGES MARKED ACCORDINGLY.

E. RADIAL PLAY .0003 TO .0006.



NASA DASH NO.	KIC DASH NO.	ID +.0000 -.0002	OD +.0000 -.0002	W +.0000 -.0010	FD +.000 -.005	FW +.000 -.002	R +.005 -.000	MAX. AVG. RUN TOR. TORQUE MG MM	MAX. AVG. RUN TOR. APPLIED THRUST GRAMS
-1	0080	.1250	.2500	.0937	.296	.023	.005	2000	75
-2	0081	.1250	.3125	.1094	.359	.023	.006	2600	75
-3	0082	.1250	.3750	.1094	.422	.023	.006	2700	75
-4	0120	.1875	.3750	.1250	.422	.023	.006	3400	75

TABLE I

TOL. RANGE O.D. / I.D.	.0000 -.0001	-.0001 -.0002
.0000 -.0001	11	12
-.0001 -.0002	21	22

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DRAWING

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
	MULTIPLE

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS + − DECIMALS + − ANGLES + −
DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE 1C
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 30251700080 THRU 0120
DRAWN G.KRUK DATE 4-5-63
CHECKED ⑤ V. Tomala 4-29-63
APPROVAL [illegible] 5-3-63
APPROVAL E. Okamp 5-3-63
NASA APPROVAL Jack Barnard
MIT APPROVAL W Kupfer 8 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BEARING, BALL, ANNULAR
(FLANGED, PHENOLIC RETAINER)
SPEC. CONTROL DWG

CODE IDENT NO.
SIZE C
NASA NUMBER 1011608
SCALE ~
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011608 ∀

1011608 B

REVISIONS TDRR 01190				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO 02688	8/2/6	
B		REPLACED BY REV C WITH CHANGES PER TDRR 12329	8 Sep 64	

REQUIREMENTS

1. GENERAL

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND1015404, CLASS 2.

C. MATERIALS:
BALLS AND RINGS - CORROSION RESISTING STEEL
FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A
Rc59 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243.
RETAINER - LINEN BASE PHENOLIC, POROSITY = 2% MIN.

D. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.

E. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171 (KPS-10051.200).
THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 2 RMS MAX. FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS; PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.

F. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.

G. LUBRICATE PER ND1002090.

H. MANUFACTURER SHALL MARK DATE WHEN BEARING WAS LUBRICATED ON EACH PACKAGE.

I. PARTS PREPARED FOR DELIVERY PER MIL-P-116, (KES-1003D.1, CLASS 1).

J. TORQUE SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-206A.

K. PARTS SHALL BE MARKED FOR IDENTIFICATION IN ACCORDANCE WITH ND1002019.

L. MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION IDENTIFYING TYPE OF PHENOLIC, CHEMICAL COMPOSITION, POROSITY AND METHOD OF MEASUREMENT, OF RETAINER MATERIAL.

2. DESIGN DETAIL

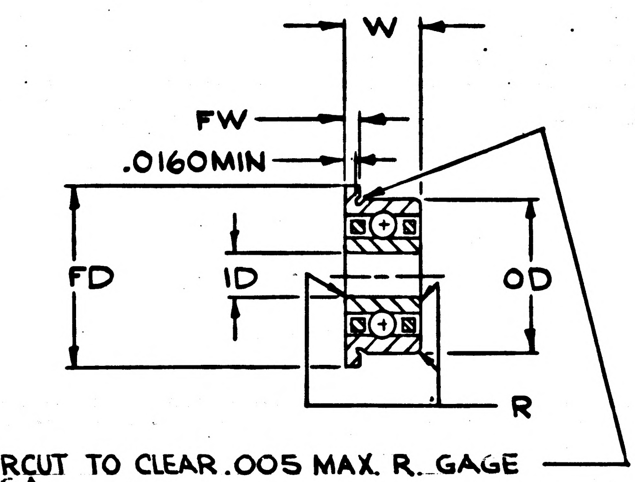
A. FLANGED, DEEP GROOVE, CONRAD TYPE.

B. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.

C. RADIAL RUNOUT OF INNER RING = .0001 TIR MAX
RADIAL RUNOUT OF OUTER RING = .0002 TIR MAX
AXIAL RUNOUT OF INNER RING = .0001 TIR MAX
AXIAL RUNOUT OF OUTER RING = .0002 TIR MAX

D. BORES AND O.D.'S TO BE CODED TO NEAREST .0001 PER TABLE I AND PACKAGES MARKED ACCORDINGLY.

E. RADIAL PLAY .0003 TO .0006.



UNDERCUT TO CLEAR .005 MAX. R. GAGE

Ⓑ REPLACED BY REV Ⓒ WITH CHANGES

NASA DASH NO.	KIC DASH NO.	ID +.0000 -.0002	OD +.0000 -.0002	W +.0000 -.0010	FD +.000 -.005	FW +.000 -.002	R +.005 -.000	MAX. AVG. RUN TOR. TORQUE MG MM	MAX. AVG. RUN TOR. APPLIED THRUST GRAMS
-1	0080	.1250	.2500	.0937	.296	.023	.005	2000	75
-2	0081	.1250	.3125	.1094	.359	.023	.006	2600	75
-3	0082	.1250	.3750	.1094	.422	.023	.006	2700	75
-4	0120	.1875	.3750	.1250	.422	.023	.006	3400	75

TABLE I

TOL. RANGE O.D. / I.D.	.0000 -.0001	-.0001 -.0002
.0000 -.0001	11	12
-.0001 -.0002	21	22

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DRAWING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
	MULTIPLE

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ -	+ -	+ -

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 1C

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC 30251700080
PN THRU 0120

DRAWN G.KRUK DATE 4-5-63
CHECKED Ⓢ V. Tomala 4-29-63
APPROVAL 5-3-63
APPROVAL E. Okamp 5-3-63
NASA APPROVAL Jack Barnard
MIT APPROVAL W Kupfer 8 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BEARING, BALL, ANNULAR
(FLANGED, PHENOLIC RETAINER)
SPEC. CONTROL DWG

CODE IDENT NO.
SIZE C
NASA NUMBER 1011608
SCALE ~
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

C	8091101

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
C	REPLACES REV B WITH CHANGES PER TDRR 12329	8 Sep 64	WK.

REQUIREMENTS

1. GENERAL

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

   C. PACKAGING AND SHIPPING IN ACCORDANCE WITH ND 1002215 CLASS 1
   MARKING OF EXTERIOR SHIPPING CONTAINER SHALL INCLUDE NASA DRAWING NUMBER, LATEST REVISION LETTER AND DASH NUMBER.

2. INSPECTION AND ACCEPTANCE

   A. MECHANICAL REQUIREMENTS

      1. PARTS SHALL BE MARKED PER ND 1002019 WITH THE NASA DRAWING NUMBER, LATEST REVISION LETTER, DASH NUMBER AND MANUFACTURER'S IDENTIFICATION.
      MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART OR PACKAGE.

      2. PARTS SHALL BE INDIVIDUALLY PACKAGED IN SEPARATE MOISTURE PROOF BAGS OF POLYETHYLENE OR OTHER SUITABLE MATERIAL AND ENCLOSED IN INDIVIDUAL BOXES.

      3. MANUFACTURER SHALL MARK DATE OF LUBRICATION ON EACH UNIT PACKAGE.

      4. FLANGED, DEEP GROOVE BEARING WITH PHENOLIC RETAINER.

      5. MECHANICAL DIMENSIONS: AS SHOWN (APPLY AT 68°F) TABLE I

      6. TORQUE: RUNNING TORQUE AND THRUST LOAD AS SHOWN IN TABLE II.

      7. BORES AND O.D.'S TO BE CODED TO NEAREST .0001 PER TABLE III AND PACKAGES MARKED ACCORDINGLY.

      8. RADIAL PLAY: .0003 TO .0006.

3. DESIGN REQUIREMENTS

   A. MATERIALS

      1. BALLS AND RINGS: CORROSION RESISTING STEEL, FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A, RC 56 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243.

      2. RETAINER: LINEN BASE PHENOLIC IN ACCORDANCE WITH MIL-P-79, TYPE FBE, FORM R EXCEPT FOR SPECIFIC GRAVITY AND WATER ABSORPTION. POROSITY TO BE 2% MIN.
      MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION SPECIFYING POROSITY AND METHOD OF MEASUREMENT.

   B. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171, FINISH NO. 5.4.

   C. THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 2 RMS MAX FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.

   D. RADIAL AND AXIAL RUNOUT

      1. RADIAL RUNOUT OF INNER RING = .0001 TIR MAX

      2. RADIAL RUNOUT OF OUTER RING = .0002 TIR MAX

      3. AXIAL RUNOUT OF INNER RING = .0001 TIR MAX

      4. AXIAL RUNOUT OF OUTER RING = .0002 TIR MAX

   E. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.

   F. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.

   G. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.

   H. LUBRICATE PER ND 1002077 (VACUUM IMPREGNATION METHOD).

   I. PARTS SHALL MEET REQUIREMENT OF PARAGRAPH 2.A.6 WHEN TESTED IN ACCORDANCE WITH MIL-STD-206.

Ⓒ REPLACES REV Ⓑ WITH CHANGES

MASTER

K.I.C. NO. 30025770080 THRU 0121	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

NEXT ASSY	USED ON	
APPLICATION		

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DWG. NO. CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
MATERIAL SEE NOTE 3A	DRAWN M. NENZORI DATE 3-9-64 CHECKED J.E. Kelly 3/9/64 APPROVAL APPROVAL E. Thomas 9/4/64	BEARING, BALL, ANNULAR (FLANGED, PHENOLIC RETAINER) SPEC CONTROL DWG
HEAT TREATMENT ~	NASA APPROVAL	CODE IDENT NO. SIZE C NASA DRAWING NO. 1011608
FINAL FINISH ~	MIT APPROVAL W Kupfer 8 Sep 64	SCALE ~ WT SHEET 1 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

C 8091101

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
C	THIS SHEET ADDED PER TDRR 12329	6 Aug 64	WK

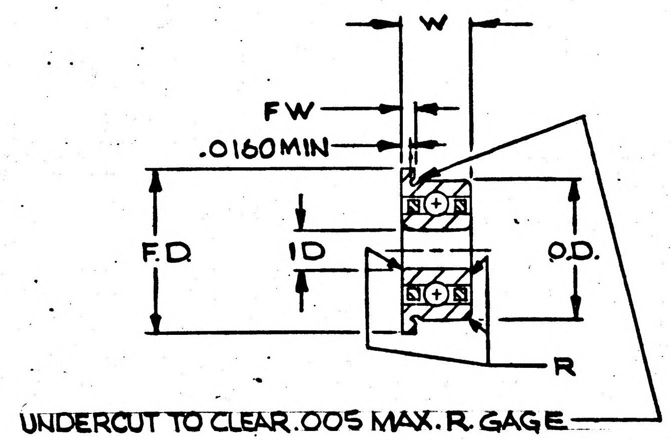


TABLE I DIMENSIONS

NASA DASH NO.	ID +.0000 -.0002	OD +.0000 -.0002	W +.0000 -.0010	FD +.000 -.005	FW +.000 -.002	R +.005 -.000
-1	.1250	.2500	.0937	.296	.023	.005
-2	.1250	.3125	.1094	.359	.023	.006
-3	.1250	3750	.1094	.422	.023	.006
-4	.1875	.3750	.1250	.422	.023	.006
-5	.1875	.3125	.1094	.359	.023	.005

TABLE II - TORQUE

NASA DASH NO	MAX. AVG. RUN TOR.	
	TORQUE MG MM	APPLIED THRUST GRAMS
-1	2000	75
-2	2600	75
-3	2700	75
-4	3400	75
-5	3000	75

TABLE III BORE & O.D. CODE

TOL. RANGE O.D. / I.D	.00000 -.00010	-.00011 -.00020
.00000 -.00010	11	12
-.00011 -.00020	21	22

MASTER

Ⓒ THIS SHEET ADDED

K.I.C. NO. 30025770080 THRU 0121	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 3A
HEAT TREATMENT ~
FINAL FINISH ~

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN H. HENDRICK DATE 3-9-64
CHECKED J.E. Kelly 3/10/64
APPROVAL
APPROVAL E. Olhoeug 9/4/64
NASA APPROVAL
MIT APPROVAL W. K. 8 Aug 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BEARING, BALL, ANNULAR
(FLANGED, PHENOLIC RETAINER)
SPEC CONTROL DWG

CODE IDENT NO. | SIZE C | NASA DRAWING NO. 1011608
SCALE | WT | SHEET 2 OF 2

INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHT, OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

D 8091101

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
C	REPLACES REV B WITH CHANGES PER TDRR 12329	8 Sep 64	WR
D	REVISED PER TDRR 17498	23 Jan 65	WR

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKAGING AND SHIPPING IN ACCORDANCE WITH ND 1002215 CLASS 1 MARKING OF EXTERIOR SHIPPING CONTAINER SHALL INCLUDE NASA DRAWING NUMBER, LATEST REVISION LETTER AND DASH NUMBER.
2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS
     1. PARTS SHALL BE MARKED PER ND 1002019 WITH THE NASA DRAWING NUMBER, LATEST REVISION LETTER, DASH NUMBER AND MANUFACTURER'S IDENTIFICATION. MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART OR PACKAGE.
     2. PARTS SHALL BE INDIVIDUALLY PACKAGED IN SEPARATE MOISTURE PROOF BAGS OF POLYETHYLENE OR OTHER SUITABLE MATERIAL AND ENCLOSED IN INDIVIDUAL BOXES.
     3. MANUFACTURER SHALL MARK DATE OF LUBRICATION ON EACH UNIT PACKAGE.
     4. FLANGED, DEEP GROOVE BEARING WITH PHENOLIC RETAINER.
     5. MECHANICAL DIMENSIONS: AS SHOWN (APPLY AT 68°F) TABLE I
     6. TORQUE: RUNNING TORQUE AND THRUST LOAD AS SHOWN IN TABLE II.
     7. BORES AND O.D.'S TO BE CODED TO NEAREST .0001 PER TABLE III AND PACKAGES MARKED ACCORDINGLY.
     8. RADIAL PLAY: .0003 TO .0006.
3. DESIGN REQUIREMENTS
   - A. MATERIALS
     1. BALLS AND RINGS: CORROSION RESISTING STEEL, FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A, RC 56 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243.
     2. RETAINER: LINEN BASE PHENOLIC IN ACCORDANCE WITH MIL-P-79, TYPE FBE, FORM R EXCEPT FOR SPECIFIC GRAVITY, WATER ABSORPTION AND ELECTRICAL CHARACTERISTICS POROSITY TO BE 2% MIN.

        MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION SPECIFYING POROSITY AND METHOD OF MEASUREMENT.
   - B. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171, FINISH NO. 5.4.
   - C. THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 2 RMS MAX FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.
   - D. RADIAL AND AXIAL RUNOUT
     1. RADIAL RUNOUT OF INNER RING = .0001 TIR MAX
     2. RADIAL RUNOUT OF OUTER RING = .0002 TIR MAX
     3. AXIAL RUNOUT OF INNER RING = .0001 TIR MAX
     4. AXIAL RUNOUT OF OUTER RING = .0002 TIR MAX
   - E. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.
   - F. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.
   - G. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.
   - H. LUBRICATE PER ND 1002077 (VACUUM IMPREGNATION METHOD).
   - I. PARTS SHALL MEET REQUIREMENT OF PARAGRAPH 2.A.6 WHEN TESTED IN ACCORDANCE WITH MIL-STD-206.

Ⓒ REPLACES REV Ⓑ WITH CHANGES

MASTER

K.I.C. NO. 30025770080 THRU 0121	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
		LIST OF MATERIALS		

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DWG. NO. CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
MATERIAL SEE NOTE 3A	DRAWN M. MENTZOR DATE 3-9-64 CHECKED J.E. Kelly 3/9/64 APPROVAL APPROVAL E. Thomp 9/4/64	BEARING, BALL, ANNULAR (FLANGED, PHENOLIC RETAINER) SPEC CONTROL DWG
HEAT TREATMENT ~	NASA APPROVAL	CODE IDENT NO. — SIZE C — NASA DRAWING NO. 1011608
FINAL FINISH ~	MIT APPROVAL W Kupfer 8 Sep 64	SCALE ~ — WT — SHEET 1 OF 2

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D 8091101

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
C	THIS SHEET ADDED PER TDRR 12329	8 Sep 64	wk.
D	REVISED PER TDRR 17498	23 Mar 65	wk

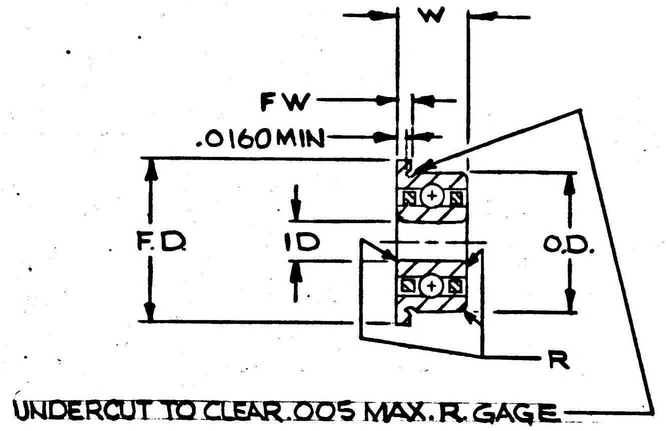


TABLE I DIMENSIONS

NASA DASH NO.	ID +.0000 -.0002	OD +.0000 -.0002	W +.0000 -.0010	FD +.000 -.005	FW +.000 -.002	R +.005 -.000
-1	.1250	.2500	.0937	.296	.023	.005
-2	.1250	.3125	.1094	.359	.023	.006
-3	.1250	.3750	.1094	.422	.023	.006
-4	.1875	.3750	.1250	.422	.023	.006
-5	.1875	.3125	.1094	.359	.023	.005

TABLE II - TORQUE

NASA DASH NO	MAX. AVG. RUN TOR.	
	TORQUE MG MM	APPLIED THRUST GRAMS
-1	2000	75
-2	2600	75
-3	2700	75
-4	3400	75
-5	3000	75

TABLE III BORE & O.D. CODE

TOL. RANGE O.D. I.D	.00000 -.00010	-.00011 -.00020
.00000 -.00010	11	12
-.00011 -.00020	21	22

1011608 D

© THIS SHEET ADDED

MASTER

K.I.C. NO. 30025770080 THRU 0121

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 3A

HEAT TREATMENT
~

FINAL FINISH
~

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN H Menzorid DATE 3-9-64
CHECKED J.E. Kelly 3/10/64
APPROVAL
APPROVAL E. Olsson 9/4/64
NASA APPROVAL
MIT APPROVAL W Cooper 8 Sep 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BEARING, BALL, ANNULAR
(FLANGED, PHENOLIC RETAINER)
SPEC CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011608
SCALE
WT
SHEET 2 OF 2

REVISIONS TDRR 21190

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REQUIREMENTS

1. GENERAL

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND1015404, CLASS 2.

   C. MATERIALS:
      BALLS AND RINGS - CRES AISI 440C
      FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A
      Rc59 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243.
      RETAINER - LINEN BASE PHENOLIC, POROSITY = 2% MIN.

   D. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.

   E. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171 (KPS-10051.200).
      THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 2 RMS MAX. FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.

   F. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.

   G. LUBRICATE PER ND1002090.

   H. MANUFACTURER SHALL MARK DATE WHEN BEARING WAS LUBRICATED ON EACH PACKAGE.

   I. PARTS PREPARED FOR DELIVERY PER MIL-P-116, (KES-1003D.1, CLASS 1).

   J. TORQUE SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-206A.

   K. PARTS SHALL BE MARKED FOR IDENTIFICATION IN ACCORDANCE WITH ND1002019.

   L. MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION IDENTIFYING TYPE OF PHENOLIC, CHEMICAL COMPOSITION, POROSITY AND METHOD OF MEASUREMENT, OF RETAINER MATERIAL.

2. DESIGN DETAIL

   A. FLANGED, DEEP GROOVE, CONRAD TYPE.

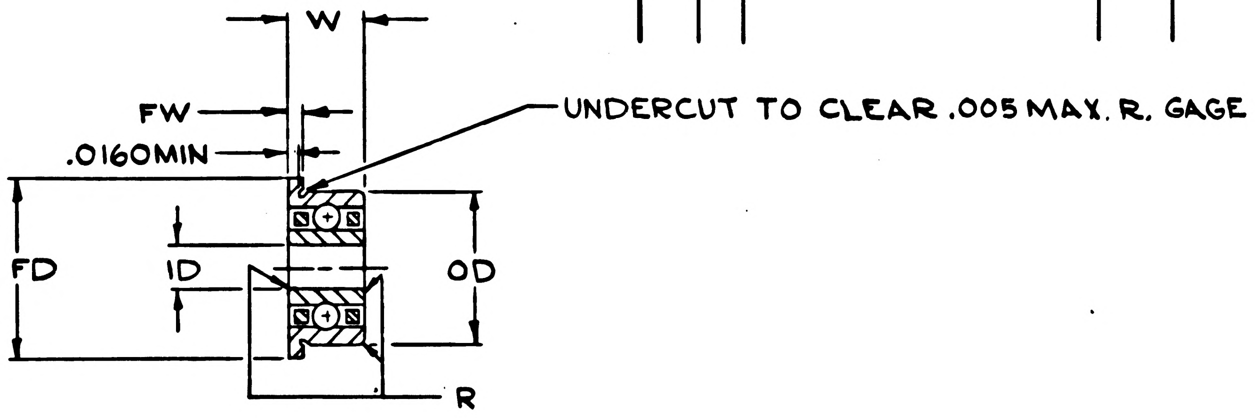
   B. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.

   C. RADIAL RUNOUT OF INNER RING = .0001 TIR MAX
      RADIAL RUNOUT OF OUTER RING = .0002 TIR MAX
      AXIAL RUNOUT OF INNER RING = .0001 TIR MAX
      AXIAL RUNOUT OF OUTER RING = .0002 TIR MAX

   D. BORES AND O.D.'S TO BE CODED TO NEAREST .0001 PER TABLE I AND PACKAGES MARKED ACCORDINGLY.

   E. RADIAL PLAY .0003 TO .0006.

   F. BEARING SHALL SATISFY THE REQUIREMENTS OF PROCUREMENT SPECIFICATION ND1002124.



NASA DASH NO.	KIC DASH NO.	ID +.0000 -.0002	OD +.0000 -.0002	W +.0000 -.0010	FD +.000 -.005	FW +.000 -.002	R +.005 -.000	MAX. AVG. RUN. TOR. TORQUE MG MM	MAX. AVG. RUN. TOR. APPLIED THRUST GRAMS
-1	0080	.1250	.2500	.0937	.296	.023	.005	2000	75
-2	0081	.1250	.3125	.1094	.359	.023	.006	2600	75
-3	0082	.1250	.3750	.1094	.422	.023	.006	2700	75
-4	0120	.1875	.3750	.1250	.422	.023	.006	3400	75

ORIGINAL SOURCES OF SUPPLY

NASA DASH NO.	KIC DASH NO.	BARDEN DANBURY, CONN.	M.P.B. KEENE, N.H.	N.H.B.B. PETERBOROUGH, N.H.
-1	0080	SFR144TA	S418FMC-P36-ZD-V20-LYV-5+LY-48	SFR144TK36
-2	0081	SFR2-5TA	S518FMC-P36-ZD-V20-LYV-5+LY-48	SFR2-5TK36
-3	0082	SFR2-6TA	S618FMC-P36-ZD-V22-LYV-5+LY-48	SFR2-6TK36
-4	0120	SFR166TA	S6632FMC-P36-ZD-V22-LYV-5+LY-48	SFR166TK36

TABLE I

TOL. RANGE I.D. \ O.D.	.0000 -.0001	-.0001 -.0002
.0000 -.0001	11	12
-.0001 -.0002	21	22

LIST OF PARTS AND MATERIALS

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

NEXT ASSY	USED ON
	MULTIPLE

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ -	+ -	+ -

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 1C

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 30025770080 THRU 0120

DRAWN G.KRUK DATE 4-5-63
CHECKED Ⓢ V. Tomala 4-29-63
APPROVAL Thornton Stearns 5-3-63
APPROVAL E. Dhomp 5-3-63
NASA APPROVAL Jack Barnard
MIT APPROVAL W. Kupfer 8 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BEARING, BALL, ANNULAR
(FLANGED, PHENOLIC RETAINER)
SPEC. CONTROL DWG

CODE IDENT NO.
SIZE C
NASA NUMBER 1011608
SCALE ~
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-184

1011608

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011609 A

			REVISIONS TDRR 01140		
ⓜ	SYM	ZONE	DESCRIPTION	DATE	APPROVAL
	A4		GENERAL CHANGES SEE TDRR NO. 02256	7-25-63	WK 8/6/63

REQUIREMENTS

1. GENERAL

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND1015404, CLASS 2.

C. MATERIALS: (A1)
BALLS AND RINGS - CORROSION RESISTING STEEL
FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A
Rc59 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE
WITH FED-STD-151, METHOD 243
RETAINER - LINEN BASE PHENOLIC, POROSITY = 2% MIN.

D. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.

E. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171 (KPS-10051.200).
THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 2 RMS MAX. FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.

F. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.

G. LUBRICATE PER ND1002090.

H. MANUFACTURER SHALL MARK DATE WHEN BEARING WAS LUBRICATED ON EACH PACKAGE.

I. PARTS PREPARED FOR DELIVERY PER MIL-P-116 (KES-1003D.1, CLASS 1).

J. TORQUE:
a) MAX AVERAGE RUNNING TORQUE OF PART 6 GM-CM UNDER 2 POUNDS THRUST LOAD.
b) SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-206A.

K. PARTS SHALL BE MARKED FOR IDENTIFICATION IN ACCORDANCE WITH ND1002019.

L. MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION IDENTIFYING TYPE OF PHENOLIC, CHEMICAL COMPOSITION, POROSITY AND METHOD OF MEASUREMENT, OF RETAINER MATERIAL.

2. DESIGN DETAIL

A. BEARING MAY BE DEEP GROOVE, CONRAD TYPE OR ANGULAR CONTACT-NON-SEPARABLE.

B. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.

C. RADIAL RUNOUT OF INNER RING = .0001 TIR MAX
RADIAL RUNOUT OF OUTER RING = .0002 TIR MAX
AXIAL RUNOUT OF INNER RING = .0001 TIR MAX
AXIAL RUNOUT OF OUTER RING = .0002 TIR MAX

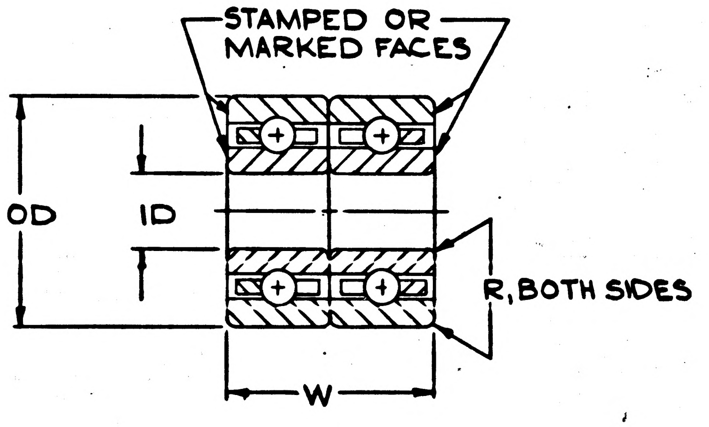
D. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.

E. BORES AND O.D.'S OF MATCHED PAIRS TO BE CODED TO NEAREST .0001 PER TABLE I AND PACKAGES MARKED ACCORDINGLY.

F. EACH MATCHED PAIR SHALL HAVE BORES AND O.D.'S MATCHED TO THE NEAREST .0001.

G. RADIAL PLAY .0003 TO .0006 (EACH BEARING)

(A2)



ID +.0000 -.0002	OD +.0000 -.0002	W, TOTAL +.0000 -.0020	R +.003 -.000
.1875	.3125	.2188	.005

(A3)

TABLE I

TOL. RANGE O.D. / I.D.	.0000 -.0001	-.0001 -.0002
.0000 -.0001	11	12
-.0001 -.0002	21	22

(A4) PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
	MULTIPLE

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ -	+ -	+ -

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 1C

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 30105770120

DRAWN G.KRUK DATE 4-5-63
CHECKED (S) V. Tomala 4-29-63
APPROVAL Thornton Stearns 5-3-63
APPROVAL E. Throop 5-3-63
NASA APPROVAL Jack Barnard
MIT APPROVAL W Kupfer 8 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BEARING, BALL, ANNULAR
(DUPLEX, DF)
SPEC. CONTROL DWG

CODE IDENT NO.
SIZE C
NASA NUMBER 1011609

SCALE ~
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

B	6091101

REVISIONS TDRR 01140

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		GENERAL CHANGES SEE TDRR NO. 02256	7-25-63	WK 8/6/63
B		REPLACED BY REV C WITH CHANGES PER TDRR 13818	[illegible]	

REQUIREMENTS

1. GENERAL

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND1015404, CLASS 2.

(A1)

C. MATERIALS:
BALLS AND RINGS - CORROSION RESISTING STEEL
FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A
Rc59 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243
RETAINER - LINEN BASE PHENOLIC, POROSITY = 2% MIN.

D. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.

E. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171 (KPS-10051.200).
THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 2 RMS MAX. FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.

F. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.

G. LUBRICATE PER ND1002090.

H. MANUFACTURER SHALL MARK DATE WHEN BEARING WAS LUBRICATED ON EACH PACKAGE.

I. PARTS PREPARED FOR DELIVERY PER MIL-P-116 (KES-1003D.1, CLASS 1).

J. TORQUE:
a) MAX AVERAGE RUNNING TORQUE OF PART 6 GM-CM UNDER 2 POUNDS THRUST LOAD.
b) SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-206A.

K. PARTS SHALL BE MARKED FOR IDENTIFICATION IN ACCORDANCE WITH ND1002019.

L. MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION IDENTIFYING TYPE OF PHENOLIC, CHEMICAL COMPOSITION, POROSITY AND METHOD OF MEASUREMENT, OF RETAINER MATERIAL.

2. DESIGN DETAIL

A. BEARING MAY BE DEEP GROOVE, CONRAD TYPE OR ANGULAR CONTACT-NON-SEPARABLE.

B. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.

C. RADIAL RUNOUT OF INNER RING = .0001 TIR MAX
RADIAL RUNOUT OF OUTER RING = .0002 TIR MAX
AXIAL RUNOUT OF INNER RING = .0001 TIR MAX
AXIAL RUNOUT OF OUTER RING = .0002 TIR MAX

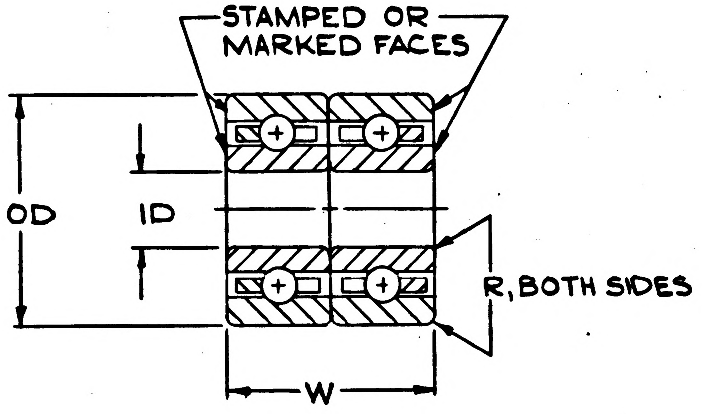
D. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.

E. BORES AND O.D.'S OF MATCHED PAIRS TO BE CODED TO NEAREST .0001 PER TABLE I AND PACKAGES MARKED ACCORDINGLY.

F. EACH MATCHED PAIR SHALL HAVE BORES AND O.D.'S MATCHED TO THE NEAREST .0001.

G. RADIAL PLAY .0003 TO .0006 (EACH BEARING)

(A2)



ID	OD	W, TOTAL	R
+.0000 -.0002	+.0000 -.0002	+.0000 -.0020	+.003 -.000
.1875	.3125	.2188	.005

(A3)

TABLE I

TOL. RANGE O.D. I.D.	.0000 -.0001	-.0001 -.0002
.0000 -.0001	11	12
-.0001 -.0002	21	22

(B) REPLACED BY REV (C) WITH CHANGES

(A4) PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
	MULTIPLE

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

	FRACTIONS	DECIMALS	ANGLES
TOL ON	+ -	+ -	+ -

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 1C

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 30105770120

DRAWN G.KRUK DATE 4-5-63
CHECKED (S) V. Tomasa 4-29-63
APPROVAL Thornton Stearns 5-3-63
APPROVAL E. Thomp 5-3-63
NASA APPROVAL Jack Barnard
MIT APPROVAL W Kupfer 8 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BEARING, BALL, ANNULAR
(DUPLEX, DF)
SPEC. CONTROL DWG

CODE IDENT NO.
SIZE C
NASA NUMBER 1011609
SCALE ~
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1011609 C

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
C	REDRAWN WITH CHANGES PER TDRR REPLACES REV B 13818	10/20/64	

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKAGING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III. MARKING OF EXTERIOR SHIPPING CONTAINER SHALL INCLUDE NASA DRAWING NUMBER AND LATEST REVISION LETTER.
2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS
     1. PARTS SHALL BE MARKED PER ND 1002019 WITH THE NASA DRAWING NUMBER, LATEST REVISION LETTER AND MANUFACTURER'S IDENTIFICATION. MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART OR PACKAGE.
     2. PARTS SHALL BE INDIVIDUALLY PACKAGED IN SEPARATE MOISTURE PROOF BAGS OF POLYETHYLENE OR OTHER SUITABLE MATERIAL AND ENCLOSED IN INDIVIDUAL BOXES.
     3. MANUFACTURER SHALL MARK DATE OF LUBRICATION ON EACH UNIT PACKAGE.
     4. INDIVIDUAL BEARINGS MAY BE DEEP GROOVE, CONRAD TYPE, OR ANGULAR CONTACT NON-SEPARABLE. PAIR SHALL BE FACE TO FACE DUPLEX HAVING PRELOAD OF 2 LB. ± 0.5 LB.
     5. MECHANICAL DIMENSIONS: AS SHOWN (APPLY AT 68°F). TABLE I
     6. TORQUE: MAX AVERAGE RUNNING TORQUE = 6 GM-CM UNDER SPECIFIED PRELOAD.
     7. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.
     8. EACH MATCHED PAIR SHALL HAVE BORES AND O.D.'S MATCHED AND CODED PER TABLE II AND PACKAGES MARKED ACCORDINGLY.
3. DESIGN REQUIREMENTS
   - A. MATERIALS
     1. BALLS AND RINGS: CORROSION RESISTING STEEL, FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A, RC 56 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243.
     2. RETAINER: LINEN BASE PHENOLIC IN ACCORDANCE WITH MIL-P-79, TYPE FBE, FORM R EXCEPT FOR SPECIFIC GRAVITY AND WATER ABSORPTION. POROSITY TO BE 2% MIN. MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION SPECIFYING POROSITY AND METHOD OF MEASUREMENT.
   - B. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171, FINISH NO. 5.4.
   - C. THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 2 RMS MAX FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.
   - D. RADIAL AND AXIAL RUNOUT
     1. RADIAL RUNOUT OF INNER RING = .0001 TIR MAX
     2. RADIAL RUNOUT OF OUTER RING = .0002 TIR MAX
     3. AXIAL RUNOUT OF INNER RING = .0001 TIR MAX
     4. AXIAL RUNOUT OF OUTER RING = .0002 TIR MAX
   - E. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.
   - F. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.
   - G. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.
   - H. LUBRICATE PER ND 1002077 (VACUUM IMPREGNATION METHOD).
   - I. PARTS SHALL MEET REQUIREMENT OF PARAGRAPH 2.A.6 WHEN TESTED IN ACCORDANCE WITH MIL-STD-206A.

Ⓒ REPLACES REV B WITH CHANGES

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

NEXT ASSY	USED ON
APPLICATION	

K.I.C. NO. 30105770120

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 3A

HEAT TREATMENT ~

FINAL FINISH ~

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN M. NENZORIO DATE 3-9-64
CHECKED J.E. Kelly 3/10/64
APPROVAL
APPROVAL E. Olsen 10/20/64
NASA APPROVAL W. J. Rhine 10-20-64
MIT APPROVAL 10/20/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BEARING, BALL, ANNULAR
(DUPLEX, DF)
SPEC CONTROL DWG

CODE IDENT NO. SIZE C NASA DRAWING NO. 1011609

SCALE ~ WT SHEET 1 OF 2

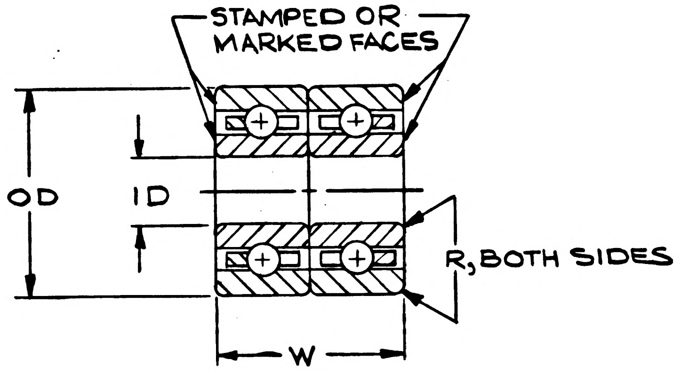
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

C 6091101

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
C	THIS SHEET ADDED PER TDRR 13818	10/20/64	[illegible]



W = TOTAL WIDTH OF INNER RACES
= TOTAL WIDTH OF OUTER RACES WITH APPLIED SPECIFIED PRELOAD.

TABLE I DIMENSIONS

ID +.0000 -.0002	OD +.0000 -.0002	W. TOTAL +.0000 -.0020	R +.003 -.000
.1875	.3125	.2188	.005

TABLE II
BORE AND O.D CODE

TOL. RANGE O.D. I.D.	.00000 -.00010	-.00011 -.00020
-.00000 -.00010	11	12
-.00011 -.00020	21	22

REV Ⓒ THIS SHEET ADDED

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

K.I.C. NO. 30105770120

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 3A
HEAT TREATMENT ~
FINAL FINISH ~

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN M. MENZORIO DATE 3-9-64
CHECKED J.E. Kelly 3/10/64 Ro
APPROVAL
APPROVAL E. Olsony 10/20/64
NASA APPROVAL W. J. Rhine 10-20-64
MIT APPROVAL 10/20/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BEARING, BALL, ANNULAR
(DUPLEX, DF)
SPEC CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011609
SCALE
WT
SHEET 2 OF 2

MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

D 6091101

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
C	REDRAWN WITH CHANGES PER TDRR REPLACES REV B 13818	10/20/64	
D	REVISED PER TDRR 17498	23/Feb/65	

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKAGING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III.

     MARKING OF EXTERIOR SHIPPING CONTAINER SHALL INCLUDE NASA DRAWING NUMBER AND LATEST REVISION LETTER.
2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS
     1. PARTS SHALL BE MARKED PER ND 1002019 WITH THE NASA DRAWING NUMBER, LATEST REVISION LETTER AND MANUFACTURER'S IDENTIFICATION.

        MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART OR PACKAGE.
     2. PARTS SHALL BE INDIVIDUALLY PACKAGED IN SEPARATE MOISTURE PROOF BAGS OF POLYETHYLENE OR OTHER SUITABLE MATERIAL AND ENCLOSED IN INDIVIDUAL BOXES.
     3. MANUFACTURER SHALL MARK DATE OF LUBRICATION ON EACH UNIT PACKAGE.
     4. INDIVIDUAL BEARINGS MAY BE DEEP GROOVE, CONRAD TYPE, OR ANGULAR CONTACT NON-SEPARABLE. PAIR SHALL BE FACE TO FACE DUPLEX HAVING PRELOAD OF 2 LB. ± 0.5 LB.
     5. MECHANICAL DIMENSIONS: AS SHOWN (APPLY AT 68°F). TABLE I
     6. TORQUE: MAX AVERAGE RUNNING TORQUE = 6 GM-CM UNDER SPECIFIED PRELOAD.
     7. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.
     8. EACH MATCHED PAIR SHALL HAVE BORES AND O.D.'S MATCHED AND CODED PER TABLE II AND PACKAGES MARKED ACCORDINGLY.
   - B. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171, FINISH NO. 5.4.
   - C. THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 2 RMS MAX FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.
   - D. RADIAL AND AXIAL RUNOUT
     1. RADIAL RUNOUT OF INNER RING = .0001 TIR MAX
     2. RADIAL RUNOUT OF OUTER RING = .0002 TIR MAX
     3. AXIAL RUNOUT OF INNER RING = .0001 TIR MAX
     4. AXIAL RUNOUT OF OUTER RING = .0002 TIR MAX
   - E. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.
   - F. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.
   - G. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.
   - H. LUBRICATE PER ND 1002077 (VACUUM IMPREGNATION METHOD).
   - I. PARTS SHALL MEET REQUIREMENT OF PARAGRAPH 2.A.6 WHEN TESTED IN ACCORDANCE WITH MIL-STD-206A.
3. DESIGN REQUIREMENTS
   - A. MATERIALS
     1. BALLS AND RINGS: CORROSION RESISTING STEEL, FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A, RC 56 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243.
     2. RETAINER: LINEN BASE PHENOLIC IN ACCORDANCE WITH MIL-P-79, TYPE FBE, FORM R EXCEPT FOR SPECIFIC GRAVITY, WATER ABSORPTION AND ELECTRICAL CHARACTERISTICS POROSITY TO BE 2% MIN.

        MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION SPECIFYING POROSITY AND METHOD OF MEASUREMENT.

Ⓒ REPLACES REV B WITH CHANGES

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

K.I.C. NO. 30105770120

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 3A

HEAT TREATMENT ~

FINAL FINISH ~

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN M. NENZORIO DATE 3-9-64
CHECKED J.E.Kelly 3/4/64
APPROVAL
APPROVAL E. Olsaup 10/20/64
NASA APPROVAL W. J. Rhine 10-20-64
MIT APPROVAL 10/20/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BEARING, BALL, ANNULAR
(DUPLEX, DF)
SPEC CONTROL DWG

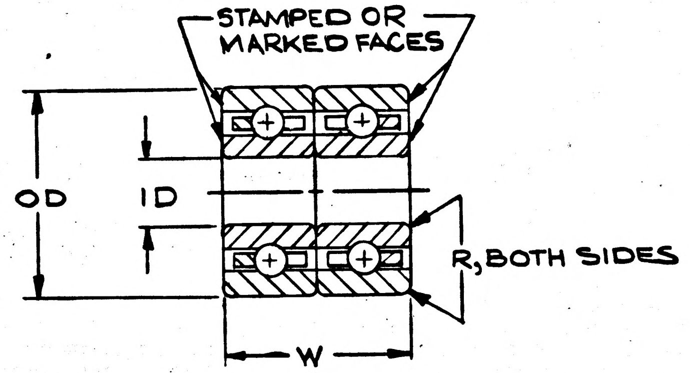
CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011609
SCALE ~
WT
SHEET 1 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

D 6091101

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
C	THIS SHEET ADDED PER TDRR 13818	10/20/64	ecm
D	REVISED PER TDRR 17498	23 May 65	WR



W = TOTAL WIDTH OF INNER RACES
= TOTAL WIDTH OF OUTER RACES WITH APPLIED SPECIFIED PRELOAD.

TABLE I DIMENSIONS

ID +.0000 -.0002	OD +.0000 -.0002	W. TOTAL +.0000 -.0020	R +.005 -.000
.1875	.3125	.2188	.005

TABLE II
BORE AND O.D CODE

TOL. RANGE O.D. / I.D.	.00000 -.00010	-.00011 -.00020
.00000 -.00010	11	12
-.00011 -.00020	21	22

REV Ⓒ THIS SHEET ADDED

MASTER

NEXT ASSY	USED ON
APPLICATION	

K.I.C. NO. 30105770120

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 3A

HEAT TREATMENT ~

FINAL FINISH ~

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT

DRAWN M. MENZORIO DATE 3-9-64
CHECKED J.E. Kelly 3/10/64 RO
APPROVAL
APPROVAL E. Thomas 10/20/64
NASA APPROVAL W. J. Rhine 10-20-64
MIT APPROVAL 10/20/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BEARING, BALL, ANNULAR (DUPLEX, DF) SPEC CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011609
SCALE
WT
SHEET 2 OF 2

1011609

REVISIONS TDDR 21140

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REQUIREMENTS

1. GENERAL

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND1015404, CLASS 2.

C. MATERIALS:
BALLS AND RINGS - CRES AISI 440C
FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A
Rc59 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243
RETAINER - LINEN BASE PHENOLIC, POROSITY = 2% MIN.

D. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.

E. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171 (KPS-1005I.200).
THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 2 RMS MAX. FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.

F. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.

G. LUBRICATE PER ND1002090.

H. MANUFACTURER SHALL MARK DATE WHEN BEARING WAS LUBRICATED ON EACH PACKAGE.

I. PARTS PREPARED FOR DELIVERY PER MIL-P-116 (KES-1003D.1, CLASS 1).

J. TORQUE:
- a) MAX AVERAGE RUNNING TORQUE OF PART 6 GM-CM UNDER 2 POUNDS THRUST LOAD.
- b) SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-206A.

K. PARTS SHALL BE MARKED FOR IDENTIFICATION IN ACCORDANCE WITH ND1002019.

L. MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION IDENTIFYING TYPE OF PHENOLIC, CHEMICAL COMPOSITION, POROSITY AND METHOD OF MEASUREMENT, OF RETAINER MATERIAL.

2. DESIGN DETAIL

A. BEARING MAY BE DEEP GROOVE, CONRAD TYPE OR ANGULAR CONTACT-NON-SEPARABLE.

B. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.

C. RADIAL RUNOUT OF INNER RING = .0001 TIR MAX
RADIAL RUNOUT OF OUTER RING = .0002 TIR MAX
AXIAL RUNOUT OF INNER RING = .0001 TIR MAX
AXIAL RUNOUT OF OUTER RING = .0002 TIR MAX

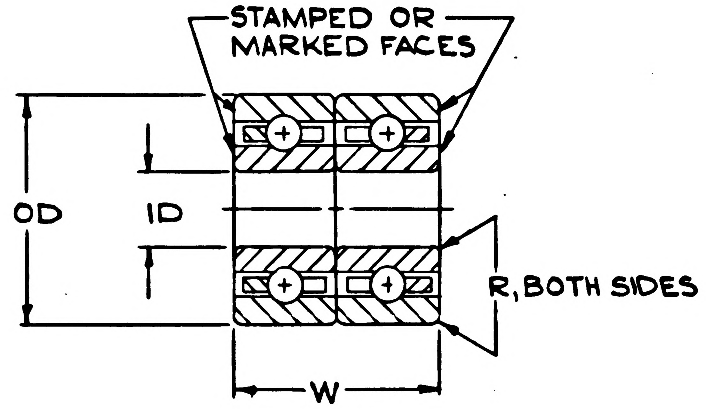
D. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.

E. BORES AND O.D.'S OF MATCHED PAIRS TO BE CODED TO NEAREST .0001 PER TABLE I AND PACKAGES MARKED ACCORDINGLY.

F. EACH MATCHED PAIR SHALL HAVE BORES AND O.D.'S MATCHED TO THE NEAREST .0001.

G. RADIAL PLAY .0003 TO .0006 (EACH BEARING)

H. BEARING SHALL MEET THE REQUIREMENTS OF PROCUREMENT SPECIFICATION ND1002124.



ORIGINAL SOURCES OF SUPPLY

ID +.0000 -.0002	OD +.0000 -.0002	W, TOTAL +.0000 -.0020	R +.003 -.000	BARDEN DANBURY, CONN.	MHBB PETERBOROUGH N.H.	MPB KEENE, N.H.
.1875	.3125	.2188	.005	SR156TADF	SR156B11WK 36-2	S5632MC-DF2-P36-ZDM -V LYV-5+LY-48

TABLE I

TOL. RANGE O.D. / I.D.	.0000 -.0001	-.0001 -.0002
.0000 -.0001	11	12
-.0001 -.0002	21	22

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
	MULTIPLE

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ -	+ -	+ -

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 1C

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 30105770120

DRAWN G.KRUK DATE 4-5-63
CHECKED (S) V. Tomala 4-29-63
APPROVAL Thornton Stearns 5-3-63
APPROVAL E. Thomp 5-3-63
NASA APPROVAL Jack Barnard
MIT APPROVAL W Kupfer 8 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BEARING, BALL, ANNULAR
(DUPLEX, DF)
SPEC. CONTROL DWG

CODE IDENT NO.
SIZE C
NASA NUMBER 1011609
SCALE ~
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011610 A

REVISIONS TDRR01140				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO. 02689 .	8/21/63	[illegible]

REQUIREMENTS

1. GENERAL

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND1015404, CLASS 2.

C. MATERIALS: CORROSION RESISTING STEEL
BALLS AND RINGS -
FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A
Rc59 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243
RETAINER - LINEN BASE PHENOLIC, POROSITY = 2% MIN.

D. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.

E. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171 (KPS-10051.200)
THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 2 RMS MAX. FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.

F. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.

G. LUBRICATE PER ND1002090.

H. MANUFACTURER SHALL MARK DATE WHEN BEARING WAS LUBRICATED ON EACH PACKAGE.

I. PARTS PREPARED FOR DELIVERY PER MIL-P-116 (KES-1003D.1, CLASS 1).

J. TORQUE SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-206A.

K. PARTS SHALL BE MARKED FOR IDENTIFICATION IN ACCORDANCE WITH ND1002019.

L. MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION IDENTIFYING TYPE OF PHENOLIC, CHEMICAL COMPOSITION, POROSITY AND METHOD OF MEASUREMENT, OF RETAINER MATERIAL.

2. DESIGN DETAIL

A. DEEP GROOVE, CONRAD TYPE.

B. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.

C. RADIAL RUNOUT OF INNER RING = .000050 TIR MAX
RADIAL RUNOUT OF OUTER RING = .000100 TIR MAX
AXIAL RUNOUT OF INNER RING = .000100 TIR MAX
AXIAL RUNOUT OF OUTER RING = .000200 TIR MAX

D. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.

ECCENTRICITY TO BE CODED TO NEAREST .000020 INCREMENT PER TABLE II AND PACKAGES MARKED ACCORDINGLY.

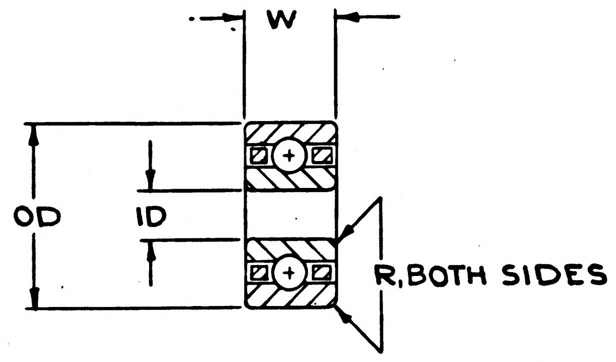
E. BORES AND O.D.'S TO BE CODED TO NEAREST .000025 PER TABLE I AND PACKAGES MARKED ACCORDINGLY.

F. DIMENSIONS SHOWN APPLY AT 68°F.

G. RADIAL PLAY .0003 to .0006.

[illegible] NT
SPL

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DRAWING



ID +.0000 -.0001	OD +.0000 -.0002	W +.000 -.001	R +.003 -.000	MAX. AVG. RUN TOR.	
				TORQUE MG-MM	APPLIED THRUST GRAMS
.2500	.5000	.1250	.010	14,000	400

TABLE I

TOL. RANGE OD / ID	.000000 -.000025	-.000025 -.000050	-.000050 -.000075	-.000075 -.000100	-.000100 -.000125	-.000125 -.000150	-.000150 -.000175	-.000175 -.000200
.000000 -.000025	11	12	13	14	15	16	17	18
-.000025 -.000050	21	22	23	24	25	26	27	28
-.000050 -.000075	31	32	33	34	35	36	37	38
-.000075 -.000100	41	42	43	44	45	46	47	48

TABLE II

RUNOUT TOL RANGE OR / IR	.000000 .000020	.000020 .000040	.000040 .000060	.000060 .000080	.000080 .000100
.000000 .000020	AA	AB	AC	AD	AE
.000020 .000040	BA	BB	BC	BD	BE
.000040 .000050	CA	CB	CC	CD	CE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
	MULTIPLE

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

	FRACTIONS	DECIMALS	ANGLES
TOL ON	+ -	+ -	+ -

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 1C

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 30005770161

DRAWN G. KRUK DATE 4-4-63
CHECKED Ⓢ V. Tomala 4-29-63
APPROVAL Thornton Stearns 5-3-63
APPROVAL E. Thomp 5-3-63
NASA APPROVAL J. Barnard
MIT APPROVAL W. Kapfer 8 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BEARING, BALL, ANNULAR
(PHENOLIC RETAINER)
SPEC. CONTROL DWG

CODE IDENT NO.
SIZE C
NASA NUMBER 1011610
SCALE ~
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

REVISIONS TDRR 01140				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO. 02689	8/21/63	
B		REPLACED BY REV C WITH CHANGES PER TDRR 12811	9-22-64	WK

REQUIREMENTS

1. GENERAL

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND1015404, CLASS 2.

C. MATERIALS: ~~CORROSION RESISTING STEEL~~
BALLS AND RINGS -
FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A
Rc59 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243
RETAINER - LINEN BASE PHENOLIC, POROSITY = 2% MIN.

D. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.

E. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171 (KPS-10051.200)
THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 2 RMS MAX. FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.

F. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.

G. LUBRICATE PER ND1002090.

H. MANUFACTURER SHALL MARK DATE WHEN BEARING WAS LUBRICATED ON EACH PACKAGE.

I. PARTS PREPARED FOR DELIVERY PER MIL-P-116 (KES-1003D.1, CLASS 1).

J. TORQUE SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-206A.

K. PARTS SHALL BE MARKED FOR IDENTIFICATION IN ACCORDANCE WITH ND1002019.

L. MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION IDENTIFYING TYPE OF PHENOLIC, CHEMICAL COMPOSITION, POROSITY AND METHOD OF MEASUREMENT, OF RETAINER MATERIAL.

2. DESIGN DETAIL

A. DEEP GROOVE, CONRAD TYPE.

B. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.

C. RADIAL RUNOUT OF INNER RING = .000050 TIR MAX
RADIAL RUNOUT OF OUTER RING = .000100 TIR MAX
AXIAL RUNOUT OF INNER RING = .000100 TIR MAX
AXIAL RUNOUT OF OUTER RING = .000200 TIR MAX

D. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.

ECCENTRICITY TO BE CODED TO NEAREST .000020 INCREMENT PER TABLE II AND PACKAGES MARKED ACCORDINGLY.

E. BORES AND O.D.'S TO BE CODED TO NEAREST .000025 PER TABLE I AND PACKAGES MARKED ACCORDINGLY.

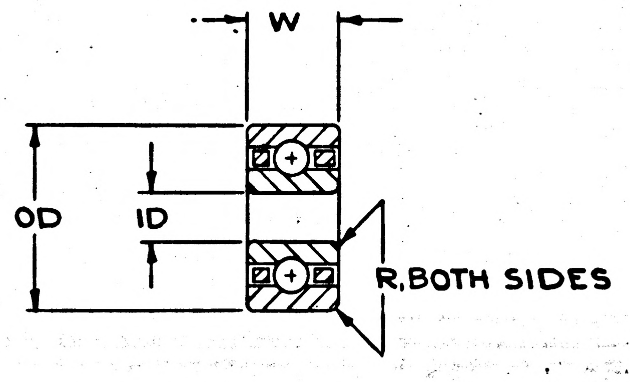
F. DIMENSIONS SHOWN APPLY AT 68°F.

G. RADIAL PLAY .0003 to .0006.

[illegible] NT

SPL [illegible]

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DRAWING



ID	OD	W	R	MAX. AVG. RUN TOR.	
+.0000 -.0001	+.0000 -.0002	+.000 -.001	+.003 -.000	TORQUE MG-MM	APPLIED THRUST GRAMS
.2500	.5000	.1250	.010	14,000	400

TABLE I

TOL. RANGE OD / ID	.000000 -.000025	-.000025 -.000050	-.000050 -.000075	-.000075 -.000100	-.000100 -.000125	-.000125 -.000150	-.000150 -.000175	-.000175 -.000200
.000000 -.000025	11	12	13	14	15	16	17	18
-.000025 -.000050	21	22	23	24	25	26	27	28
-.000050 -.000075	31	32	33	34	35	36	37	38
-.000075 -.000100	41	42	43	44	45	46	47	48

TABLE II

RUNOUT TOL RANGE OR / IR	.000000 .000020	.000020 .000040	.000040 .000060	.000060 .000080	.000080 .000100
.000000 .000020	AA	AB	AC	AD	AE
.000020 .000040	BA	BB	BC	BD	BE
.000040 .000050	CA	CB	CC	CD	CE

Ⓑ REPLACED BY REV Ⓒ WITH CHANGES

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

	MULTIPLE
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ -	+ -	+ -

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 1C

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 30005770161

DRAWN G. KRUK DATE 4-4-63
CHECKED Ⓢ V. Tomala 4-29-63
APPROVAL Thornton Stearns 5-3-63
APPROVAL E. Thomp 5-3-63
NASA APPROVAL J. B. Barnard
MIT APPROVAL W Kupfer 8 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BEARING, BALL, ANNULAR
(PHENOLIC RETAINER)
SPEC. CONTROL DWG

CODE IDENT NO.	SIZE	NASA NUMBER	
	C	1011610	
SCALE ~	WEIGHT	CALC ACTUAL	SHEET 1 OF 1

MASTER

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

Ↄ 0191101

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
C	REPLACES REV B WITH CHANGES PER TDRR 12811	9-22-64	WK

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKAGING AND SHIPPING IN ACCORDANCE WITH ND 1002215, CLASS I. MARKING OF EXTERIOR SHIPPING CONTAINER SHALL INCLUDE NASA DRAWING NUMBER AND LATEST REVISION LETTER.
2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS
     1. PARTS SHALL BE MARKED PER ND 1002019 WITH THE NASA DRAWING NUMBER, LATEST REVISION LETTER AND MANUFACTURER'S IDENTIFICATION. MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART OR PACKAGE.
     2. PARTS SHALL BE INDIVIDUALLY PACKAGED IN SEPARATE MOISTURE-PROOF BAGS OF POLYETHYLENE OR OTHER SUITABLE MATERIAL AND ENCLOSED IN INDIVIDUAL BOXES.
     3. MANUFACTURER SHALL MARK DATE OF LUBRICATION ON EACH UNIT PACKAGE.
     4. DEEP GROOVE, CONRAD TYPE BEARING WITH PHENOLIC RETAINER.
     5. MECHANICAL DIMENSIONS AS SHOWN (APPLY AT 68°F). TABLE I
     6. TORQUE: MAX AVERAGE RUNNING TORQUE = 14,000 MG-MM WITH 400 GRAMS APPLIED THRUST.
     7. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE. ECCENTRICITY TO BE CODED PER TABLE II AND PACKAGES MARKED ACCORDINGLY.
     8. BORES AND O.D.'S TO BE CODED PER TABLE III AND PACKAGES MARKED ACCORDINGLY.
     9. RADIAL PLAY = .0003 TO .0006
   - B. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171, FINISH NO. 5.4.
   - C. THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 2 RMS MAX FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.
   - D. RADIAL AND AXIAL RUNOUT
     1. RADIAL RUNOUT OF INNER RING = .000050 TIR MAX
     2. RADIAL RUNOUT OF OUTER RING = .000100 TIR MAX
     3. AXIAL RUNOUT OF INNER RING = .000100 TIR MAX
     4. AXIAL RUNOUT OF OUTER RING = .000200 TIR MAX
   - E. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.
   - F. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.
   - G. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.
   - H. LUBRICATE PER ND 1002077 (VACUUM IMPREGNATION METHOD).
   - I. PARTS SHALL MEET REQUIREMENT OF PARAGRAPH 2.A.6 WHEN TESTED IN ACCORDANCE WITH MIL-STD-206.
3. DESIGN REQUIREMENTS
   - A. MATERIALS
     1. BALLS AND RINGS: CORROSION RESISTING STEEL, FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A, RC 56 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243.
     2. RETAINER: LINEN BASE PHENOLIC IN ACCORDANCE WITH MIL-P-79, TYPE FBE, FORM R EXCEPT FOR SPECIFIC GRAVITY AND WATER ABSORPTION. POROSITY TO BE 2% MIN. MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION SPECIFYING POROSITY AND METHOD OF MEASUREMENT.

REV Ⓒ REPLACES REV Ⓑ WITH CHANGES

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

MASTER

K.I.C. NO. 30005770161	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DWG. NO. CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
MATERIAL SEE NOTE 3A	DRAWN M. MENZORIO DATE 3-6-64 CHECKED J.E. Kelly APPROVAL APPROVAL 9/19/64	BEARING, BALL, ANNULAR (PHENOLIC RETAINER) SPEC CONTROL DWG	
HEAT TREATMENT	NASA APPROVAL W. J. Rhine 9-22-64	CODE IDENT NO.	SIZE C
FINAL FINISH	MIT APPROVAL WKupfer 12/14/64	SCALE	WT

NASA DRAWING NO. 1011610

SHEET 1 OF 2

NEXT ASSY	USED ON
APPLICATION	

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

4 3 2 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

C 0191101

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
C	REDRAWN WITH CHANGES PER TDRR THIS SHEET ADDED 12811	9-22-64	WK

TABLE I DIMENSIONS

I.D. +.0000 -.0001	O.D. +.0000 -.0002	W +.000 -.001	R +.003 -.000
.2500	.5000	.1250	.010

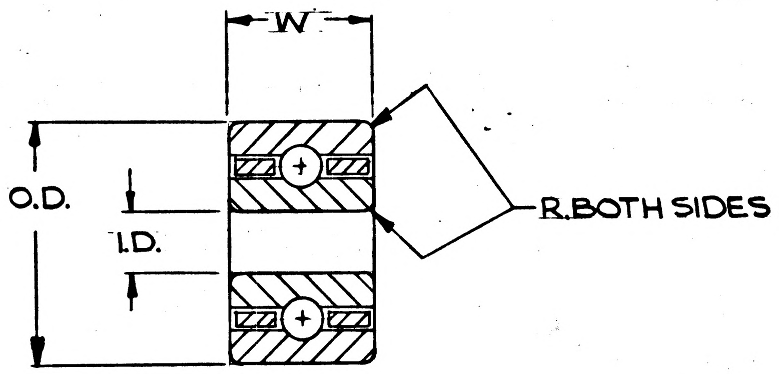


TABLE III BORE AND O.D. CODE

TOL. RANGE / O.D. / I.D.	.000000 -.000025	-.000026 -.000050	-.000051 -.000075	-.000076 -.000100	-.000101 -.000125	-.000126 -.000150	-.000151 -.000175	-.000176 -.000200
.000000 -.000025	11	12	13	14	15	16	17	18
-.000026 -.000050	21	22	23	24	25	26	27	28
-.000051 -.000075	31	32	33	34	35	36	37	38
-.000076 -.000100	41	42	43	44	45	46	47	48

TABLE II ECCENTRICITY CODE

RUNOUT TOL RANGE / OR / IR	.000000 .000020	.000021 .000040	.000041 .000060	.000061 .000080	.000081 .000100
.000000 .000020	AA	AB	AC	AD	AE
.000021 .000040	BA	BB	BC	BD	BE
.000041 .000050	CA	CB	CC	CD	CE

REV Ⓒ THIS SHEET ADDED

MASTER

K.I.C. NO. 30005770161

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 3A
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN M. MENZORIO DATE 3-6-64
CHECKED J.E. Kelly 3/10/64
APPROVAL
APPROVAL E. Pbonup 9/14/64
NASA APPROVAL W. J. Rhine 9-22-64
MIT APPROVAL W Kupfer 9/22/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BEARING, BALL, ANNULAR
(PHENOLIC RETAINER)
SPEC. CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011610
SCALE ~
WT
SHEET 2 OF 2

4 3 2 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

D	0191101

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
C	REPLACES REV B WITH CHANGES PER TDRR 12811	9-22-64	WK.
D	REVISED PER TDRR 17498	23 Mar 65	WK

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKAGING AND SHIPPING IN ACCORDANCE WITH ND 1002215, CLASS I
     MARKING OF EXTERIOR SHIPPING CONTAINER SHALL INCLUDE NASA DRAWING NUMBER AND LATEST REVISION LETTER.
2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS
     1. PARTS SHALL BE MARKED PER ND 1002019 WITH THE NASA DRAWING NUMBER, LATEST REVISION LETTER AND MANUFACTURER'S IDENTIFICATION.
        MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART OR PACKAGE.
     2. PARTS SHALL BE INDIVIDUALLY PACKAGED IN SEPARATE MOISTURE-PROOF BAGS OF POLYETHYLENE OR OTHER SUITABLE MATERIAL AND ENCLOSED IN INDIVIDUAL BOXES.
     3. MANUFACTURER SHALL MARK DATE OF LUBRICATION ON EACH UNIT PACKAGE.
     4. DEEP GROOVE, CONRAD TYPE BEARING WITH PHENOLIC RETAINER.
     5. MECHANICAL DIMENSIONS AS SHOWN (APPLY AT 68°F). TABLE I
     6. TORQUE: MAX AVERAGE RUNNING TORQUE = 14,000 MG-MM WITH 400 GRAMS APPLIED THRUST.
     7. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.
        ECCENTRICITY TO BE CODED PER TABLE II AND PACKAGES MARKED ACCORDINGLY.
     8. BORES AND O.D.'S TO BE CODED PER TABLE III AND PACKAGES MARKED ACCORDINGLY.
     9. RADIAL PLAY = .0003 TO .0006
3. DESIGN REQUIREMENTS
   - A. MATERIALS
     1. BALLS AND RINGS: CORROSION RESISTING STEEL, FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A, RC 56 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243.
     2. RETAINER: LINEN BASE PHENOLIC IN ACCORDANCE WITH MIL-P-79, TYPE FBE, FORM R EXCEPT FOR SPECIFIC GRAVITY, AND WATER ABSORPTION AND ELECTRICAL CHARACTERISTICS POROSITY TO BE 2% MIN.
        MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION SPECIFYING POROSITY AND METHOD OF MEASUREMENT.
   - B. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171, FINISH NO. 5.4.
   - C. THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 2 RMS MAX FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.
   - D. RADIAL AND AXIAL RUNOUT
     1. RADIAL RUNOUT OF INNER RING = .000050 TIR MAX
     2. RADIAL RUNOUT OF OUTER RING = .000100 TIR MAX
     3. AXIAL RUNOUT OF INNER RING = .000100 TIR MAX
     4. AXIAL RUNOUT OF OUTER RING = .000200 TIR MAX
   - E. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.
   - F. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.
   - G. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.
   - H. LUBRICATE PER ND 1002077 (VACUUM IMPREGNATION METHOD).
   - I. PARTS SHALL MEET REQUIREMENT OF PARAGRAPH 2.A.6 WHEN TESTED IN ACCORDANCE WITH MIL-STD-206.

REV Ⓒ REPLACES REV Ⓑ WITH CHANGES

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

MASTER

K.I.C. NO. 30005770161

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 3A

HEAT TREATMENT

FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN M MENZORIO DATE 3-6-64
CHECKED J.E. Kelly 3/6/64
APPROVAL
APPROVAL E. [illegible] 9/19/64
NASA APPROVAL W. J. Rhine 9-22-64
MIT APPROVAL W Kupfer 9/22/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BEARING, BALL, ANNULAR
(PHENOLIC RETAINER)
SPEC CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011610
SCALE
WT
SHEET 1 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

D 0191101

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
C	REDRAWN WITH CHANGES PER TDRR THIS SHEET ADDED 12811	9-22-64	WK
D	REVISED PER TDRR 17498	23/Mar/65	WK.

TABLE I DIMENSIONS

I.D. +.0000 -.0001	O.D. +.0000 -.0002	W +.000 -.001	R +.003 -.000
.2500	.5000	.1250	.010

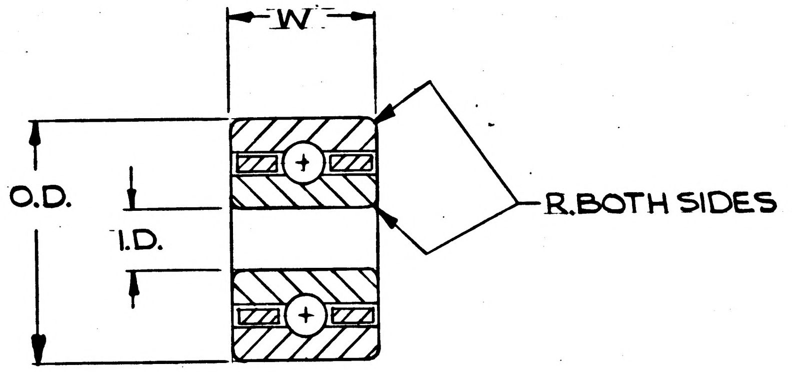


TABLE III BORE AND O.D. CODE

TOL. RANGE O.D / I.D.	.000000 .000025	-.000026 -.000050	-.000051 -.000075	-.000076 -.000100	-.000101 -.000125	-.000126 -.000150	-.000151 -.000175	-.000176 -.000200
.000000 -.000025	11	12	13	14	15	16	17	18
-.000026 -.000050	21	22	23	24	25	26	27	28
-.000051 -.000075	31	32	33	34	35	36	37	38
-.000076 -.000100	41	42	43	44	45	46	47	48

TABLE II ECCENTRICITY CODE

RUNOUT TOL RANGE OR / IR	.000000 .000020	.000021 .000040	.000041 .000060	.000061 .000080	.000081 .000100
.000000 .000020	AA	AB	AC	AD	AE
.000021 .000040	BA	BB	BC	BD	BE
.000041 .000050	CA	CB	CC	CD	CE

REV Ⓒ THIS SHEET ADDED

MASTER

NEXT ASSY	USED ON
APPLICATION	

K.I.C. NO. 30005770161

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 3A
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN M.MENZORIO DATE 3-6-64
CHECKED J.E.Kelly 3/10/64
APPROVAL
APPROVAL E. Rhoeup 9/19/64
NASA APPROVAL W J Rhine 9-22-64
MIT APPROVAL W Kupfer 22 Sep 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BEARING, BALL, ANNULAR
(PHENOLIC RETAINER)
SPEC. CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011610
SCALE ~
WT
SHEET 2 OF 2

REVISIONS TDRR01140				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REQUIREMENTS

1. GENERAL

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND1015404, CLASS 2.

C. MATERIALS:
BALLS AND RINGS - CRES AISI 440C
FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A
Rc59 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243
RETAINER - LINEN BASE PHENOLIC, POROSITY = 2% MIN.

D. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.

E. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171 (KPS-10051.200)
THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 2 RMS MAX. FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.

F. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.

G. LUBRICATE PER ND1002090.

H. MANUFACTURER SHALL MARK DATE WHEN BEARING WAS LUBRICATED ON EACH PACKAGE.

I. PARTS PREPARED FOR DELIVERY PER MIL-P-116 (KES-1003D.1, CLASS 1).

J. TORQUE SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-206A.

K. PARTS SHALL BE MARKED FOR IDENTIFICATION IN ACCORDANCE WITH ND1002019.

L. MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION IDENTIFYING TYPE OF PHENOLIC, CHEMICAL COMPOSITION, POROSITY AND METHOD OF MEASUREMENT, OF RETAINER MATERIAL.

2. DESIGN DETAIL

A. DEEP GROOVE, CONRAD TYPE.

B. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.

C. RADIAL RUNOUT OF INNER RING = .000050 TIR MAX
RADIAL RUNOUT OF OUTER RING = .000100 TIR MAX
AXIAL RUNOUT OF INNER RING = .000100 TIR MAX
AXIAL RUNOUT OF OUTER RING = .000200 TIR MAX

D. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.

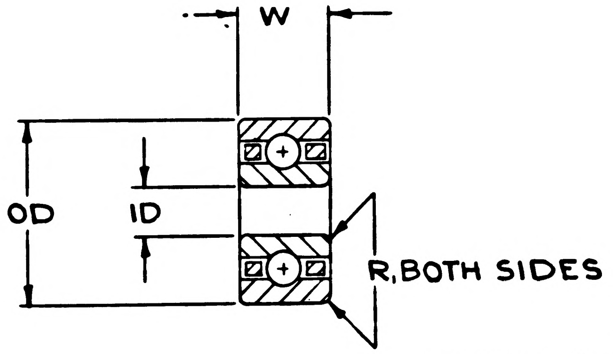
ECCENTRICITY TO BE CODED TO NEAREST .000020 INCREMENT PER TABLE II AND PACKAGES MARKED ACCORDINGLY.

E. BORES AND O.D.'S TO BE CODED TO NEAREST .000025 PER TABLE I AND PACKAGES MARKED ACCORDINGLY.

F. DIMENSIONS SHOWN APPLY AT 68°F.

G. RADIAL PLAY .0003 to .0006.

H. BEARING SHALL MEET THE REQUIREMENTS OF PROCUREMENT SPECIFICATION ND1002124.



ORIGINAL SOURCES OF SUPPLY

ID +.0000 -.0001	OD +.0000 -.0002	W +.000 -.001	R +.003 -.000	BARDEN DANBURY, CONN.	M. P. B. KEENE, N. H.	N. H. B. B. PETERBOROUGH, N. H.	MAX. AVG. RUN. TOR.: TORQUE MG-MM	MAX. AVG. RUN. TOR.: APPLIED THRUST GRAMS
.2500	.5000	.1250	.010	SR188TA	S814MC-B370	SR188TK36	14,000	400

TABLE I

TOL. RANGE OD / ID	.000000 -.000025	-.000025 -.000050	-.000050 -.000075	-.000075 -.000100	-.000100 -.000125	-.000125 -.000150	-.000150 -.000175	-.000175 -.000200
.000000 -.000025	11	12	13	14	15	16	17	18
-.000025 -.000050	21	22	23	24	25	26	27	28
-.000050 -.000075	31	32	33	34	35	36	37	38
-.000075 -.000100	41	42	43	44	45	46	47	48

TABLE II

RUNOUT TOL RANGE OR / IR	.000000 .000020	.000020 .000040	.000040 .000060	.000060 .000080	.000080 .000100
.000000 .000020	AA	AB	AC	AD	AE
.000020 .000040	BA	BB	BC	BD	BE
.000040 .000050	CA	CB	CC	CD	CE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

	MULTIPLE
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ -	+ -	+ -

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 1C

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK

KIC PN 30005770161

DRAWN G. KRUK DATE 4-4-63
CHECKED ⑤ V. Tomala 4-29-63
APPROVAL Thornton Stearns 5-3-63
APPROVAL E. Thomp 5-3-63
NASA APPROVAL
MIT APPROVAL 8 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BEARING, BALL, ANNULAR
(PHENOLIC RETAINER)
SPEC. CONTROL DWG

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011610

SCALE ~	WEIGHT CALC ACTUAL	SHEET 1 OF 1

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

REVISIONS TDRR 01140				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO. 02690	8/21/63	

(M)

REQUIREMENTS

1. GENERAL

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND1015404, CLASS 2.

(A1) C. MATERIALS:
BALLS AND RINGS - CORROSION RESISTING STEEL
FEDERAL SPECIFICATION QQ-S-763, CLASS 404C, CONDITION A
Rc59 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243.
RETAINER - LINEN BASE PHENOLIC, POROSITY = 2% MIN.

D. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.

E. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171 (KPS-10051.200)
THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 2 RMS MAX. FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.

F. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.

G. LUBRICATE PER ND1002090.

H. MANUFACTURER SHALL MARK DATE WHEN BEARING WAS LUBRICATED ON EACH PACKAGE.

I. PARTS PREPARED FOR DELIVERY PER MIL-P-116 (KES-1003D.1, CLASS 1).

J. TORQUE SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-206A.

K. PARTS SHALL BE MARKED FOR IDENTIFICATION IN ACCORDANCE WITH ND1002019.

L. MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION IDENTIFYING TYPE OF PHENOLIC, CHEMICAL COMPOSITION, POROSITY AND METHOD OF MEASUREMENT, OF RETAINER MATERIAL.

2. DESIGN DETAIL

A. DEEP GROOVE, CONRAD TYPE.

B. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.

C. RADIAL RUNOUT OF INNER RING = .000050 TIR MAX
RADIAL RUNOUT OF OUTER RING = .000100 TIR MAX
AXIAL RUNOUT OF INNER RING = .000100 TIR MAX
AXIAL RUNOUT OF OUTER RING = .000200 TIR MAX

D. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.

ECCENTRICITY TO BE CODED TO NEAREST .000020 INCREMENT PER TABLE II AND PACKAGES MARKED ACCORDINGLY.

E. BORES AND O.D.'S TO BE CODED TO NEAREST .000025 PER TABLE I AND PACKAGES MARKED ACCORDINGLY.

F. DIMENSIONS SHOWN APPLY AT 68°F.

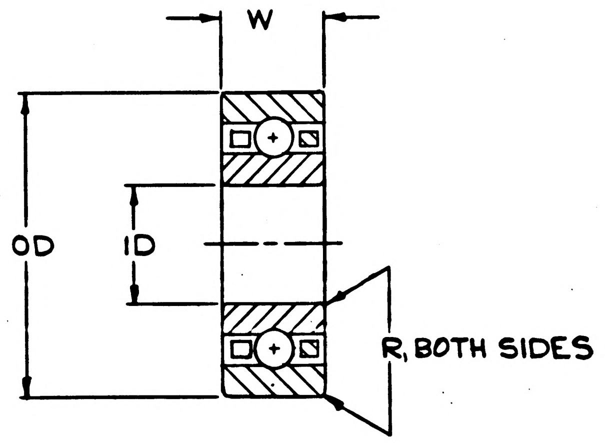
G. RADIAL PLAY .0003 TO .0006.

(A2)

I. TORQUE: MAX AVERAGE RUNNING TORQUE 14,000 MG-MM
35,500 MG-MM MAX PEAK UNDER 400 GMS THRUST LOAD.

(A3) PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DRAWING

MASTER



ID	OD	W	R
+.000000 -.000040	+.000000 -.000040	+.0000 -.0005	+.003 -.000
.2500	.62484	.1960	.012

TABLE I

TOL. RANGE — I.D. \ O.D.	.000000 -.000025	-.000025 -.000040
.000000 -.000025	11	12
-.000025 -.000040	21	22

TABLE II

RUNOUT TOL. RANGE — I.R. \ O.R.	.000000 .000020	.000020 .000040	.000040 .000060	.000060 .000080	.000080 .000100
.000000 .000020	AA	AB	AC	AD	AE
.000020 .000040	BA	BB	BC	BD	BE
.000040 .000050	CA	CB	CC	CD	CE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
	MULTIPLE

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ −	+ −	+ −

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 1C

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 30005770160

DRAWN G. KRUK DATE 4-4-63
CHECKED (S) V. Toucala 4-29-63
APPROVAL Thornton Stamm 5-3-63
APPROVAL E. Mhrup 5-3-63
NASA APPROVAL Jack Barnard
MIT APPROVAL W. Eyffer 8 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BEARING, BALL, ANNULAR
(PHENOLIC RETAINER)
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011611
SCALE ~
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

REVISIONS ~~TDRR~~ 01190				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO. 02690	9/2/63	
B		REPLACED BY REV C WITH CHANGES PER TDRR 12810	9-22-64	WK.

M

REQUIREMENTS

1. GENERAL

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND1015404, CLASS 2.

Ⓐ1 C. MATERIALS:
BALLS AND RINGS - CORROSION RESISTING STEEL
FEDERAL SPECIFICATION QQ-S-763, CLASS 404C, CONDITION A
Rc59 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243.
RETAINER - LINEN BASE PHENOLIC, POROSITY = 2% MIN.

D. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.

E. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171 (KPS-10051.200)
~~THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND~~ AND POLISHED OR LAPPED TO A 2 RMS MAX. FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS. PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.

F. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.

G. LUBRICATE PER ND1002090.

H. MANUFACTURER SHALL MARK DATE WHEN BEARING WAS LUBRICATED ON EACH PACKAGE.

I. PARTS PREPARED FOR DELIVERY PER MIL-P-116 (KES-1003D.1, CLASS 1).

J. TORQUE SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-206A.

K. PARTS SHALL BE MARKED FOR IDENTIFICATION IN ACCORDANCE WITH ND1002019.

L. MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION IDENTIFYING TYPE OF PHENOLIC, CHEMICAL COMPOSITION, POROSITY AND METHOD OF MEASUREMENT, OF RETAINER MATERIAL.

2. DESIGN DETAIL

A. DEEP GROOVE, CONRAD TYPE.

B. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.

C. RADIAL RUNOUT OF INNER RING = .000050 TIR MAX
RADIAL RUNOUT OF OUTER RING = .000100 TIR MAX
AXIAL RUNOUT OF INNER RING = .000100 TIR MAX
AXIAL RUNOUT OF OUTER RING = .000200 TIR MAX

D. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.

ECCENTRICITY TO BE CODED TO NEAREST .000020 INCREMENT PER TABLE II AND PACKAGES MARKED ACCORDINGLY.

E. BORES AND O.D.'S TO BE CODED TO NEAREST .000025 PER TABLE I AND PACKAGES MARKED ACCORDINGLY.

F. DIMENSIONS SHOWN APPLY AT 68°F.

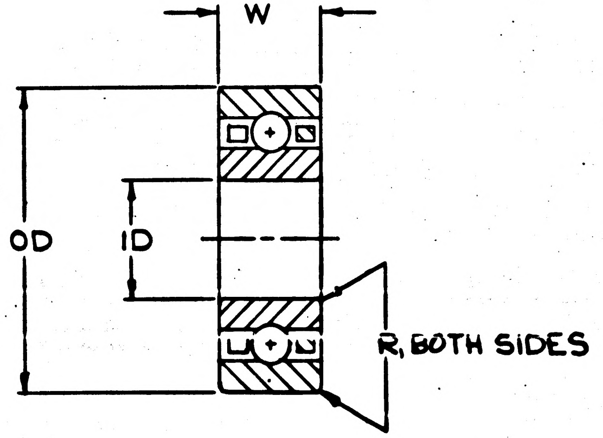
G. RADIAL PLAY .0003 TO .0006.

Ⓐ2

I. TORQUE: MAX AVERAGE RUNNING TORQUE 14,000 MG-MM
35,500 MG-MM MAX PEAK UNDER 400 GMS THRUST LOAD.

Ⓐ3 ~~PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DRAWING~~

MASTER



ID	OD	W	R
+.000000 -.000040	+.000000 -.000040	+.0000 -.0005	+.003 -.000
.2500	.62484	.1960	.012

TABLE I

TOL. RANGE O.D. / I.D.	.000000 -.000025	-.000025 -.000040
.000000 -.000025	11	12
-.000025 -.000040	21	22

TABLE II

RUN OUT TOL. RANGE O.R. / I.R.	.000000 .000020	.000020 .000040	.000040 .000060	.000060 .000080	.000080 .000100
.000000 .000020	AA	AB	AC	AD	AE
.000020 .000040	BA	BB	BC	BD	BE
.000040 .000050	CA	CB	CC	CD	CE

Ⓑ REPLACED BY REV Ⓒ WITH CHANGES

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
	MULTIPLE

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ -	+ -	+ -

DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE 1C
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 30005770160
DRAWN G. KRUK DATE 4-4-63
CHECKED Ⓢ V. Tomala 4-29-63
APPROVAL Thornton 5-3-63
APPROVAL E. 5-3-63
NASA APPROVAL
MIT APPROVAL W. Kupfer 8 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BEARING, BALL, ANNULAR
(PHENOLIC RETAINER)
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011611
SCALE ~
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OCLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1011611 C

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
C	REPLACES REV B WITH CHANGES PER TDRR 12810	9-22-64	WR

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKAGING AND SHIPPING IN ACCORDANCE WITH ND1002215, CLASS A

     MARKING OF EXTERIOR SHIPPING CONTAINER SHALL INCLUDE NASA DRAWING NUMBER AND LATEST REVISION LETTER.
2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS
     1. PARTS SHALL BE MARKED PER ND 1002019 WITH THE NASA DRAWING NUMBER, LATEST REVISION LETTER AND MANUFACTURER'S IDENTIFICATION.

        MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART OR PACKAGE.
     2. PARTS SHALL BE INDIVIDUALLY PACKAGED IN SEPARATE MOISTURE PROOF BAGS OF POLYETHYLENE OR OTHER SUITABLE MATERIAL AND ENCLOSED IN INDIVIDUAL BOXES.
     3. MANUFACTURER SHALL MARK DATE OF LUBRICATION ON EACH UNIT PACKAGE.
     4. DEEP GROOVE, CONRAD TYPE BEARING WITH PHENOLIC RETAINER.
     5. MECHANICAL DIMENSIONS: AS SHOWN (APPLY AT 68°F) TABLE I.
     6. TORQUE: MAX AVERAGE RUNNING TORQUE = 14,000 MG-MM (35,500 MG-MM MAX PEAK) UNDER 400 GMS THRUST LOAD.
     7. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.

        ECCENTRICITY TO BE CODED PER TABLE II AND PACKAGES MARKED ACCORDINGLY.
     8. BORES AND O.D.'S TO BE CODED PER TABLE III AND PACKAGES MARKED ACCORDINGLY.
     9. RADIAL PLAY = .0003 TO .0006.
3. DESIGN REQUIREMENTS
   - A. MATERIALS
     1. BALLS AND RINGS: CORROSION RESISTING STEEL, FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A, RC 56 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243.
     2. RETAINER: LINEN BASE PHENOLIC IN ACCORDANCE WITH MIL-P-79, TYPE FBE, FORM R EXCEPT FOR SPECIFIC GRAVITY AND WATER ABSORPTION. POROSITY TO BE 2% MIN.

        MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION SPECIFYING POROSITY AND METHOD OF MEASUREMENT.
   - B. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171, FINISH NO. 5.4.
   - C. THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 2 RMS MAX FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.
   - D. RADIAL AND AXIAL RUNOUT
     1. RADIAL RUNOUT OF INNER RING = .000050 TIR MAX
     2. RADIAL RUNOUT OF OUTER RING = .000100 TIR MAX
     3. AXIAL RUNOUT OF INNER RING = .000100 TIR MAX
     4. AXIAL RUNOUT OF OUTER RING = .000200 TIR MAX
   - E. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.
   - F. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.
   - G. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.
   - H. LUBRICATE PER ND 1002077 (VACUUM IMPREGNATION METHOD).
   - I. PARTS SHALL MEET REQUIREMENT OF PARAGRAPH 2.A.6 WHEN TESTED IN ACCORDANCE WITH MIL-STD-206

Ⓒ REPLACES REV Ⓑ WITH CHANGES

MASTE

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

K.I.C. NO. 30005770160

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 3A

HEAT TREATMENT ~

FINAL FINISH ~

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN H.Henzobie DATE 3-9-64
CHECKED J.E.Kelly 3/4/64 Ro
APPROVAL
APPROVAL E. [illegible] 9/18/64
NASA APPROVAL W J Rhine 9-22-64
MIT APPROVAL W [illegible] 9/22/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BEARING, BALL, ANNULAR
(PHENOLIC RETAINER)
SPEC CONTROL DWG.

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011611
SCALE ~ WT SHEET 1 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1011611 C

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
C	THIS SHEET ADDED PER TDRR 12810	9-22-64	WK

TABLE I
DIMENSIONS

ID +.000000 -.000040	OD +.000000 -.000040	W +.0000 -.0005	R +.003 -.000
.2500	.62484	.1960	.012

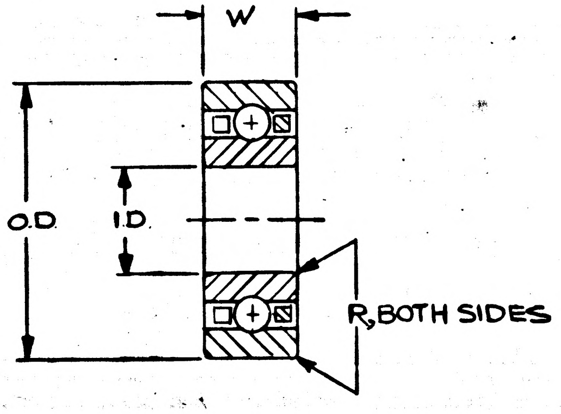


TABLE III
BORE AND O.D. CODE

TOL. RANGE OD / ID	.000000 -.000025	-.000026 -.000040
.000000 -.000025	11	12
-.000026 -.000040	21	22

TABLE II
ECCENTRICITY CODE

RUNOUT TOL RANGE O.R. / I.R.	.000000 .000020	.000021 .000040	.000041 .000060	.000061 .000080	.000081 .000100
.000000 .000020	AA	AB	AC	AD	AE
.000021 .000040	BA	BB	BC	BD	BE
.000041 .000050	CA	CB	CC	CD	CE

Ⓒ THIS SHEET ADDED

K.I.C. NO. 30005770160

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

MASTER

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING

MATERIAL: SEE NOTE 3A
HEAT TREATMENT: ~
FINAL FINISH: ~

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN U. MENZORIO DATE 3-9-64
CHECKED J.E. Kelly 3/10/64 Ro
APPROVAL
APPROVAL E. Olsson 9/14/64
NASA APPROVAL W. J. Rhine 9-22-64
MIT APPROVAL W Kupfer 9/22/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BEARING, BALL, ANNULAR
(PHENOLIC RETAINER)
SPEC CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011611
SCALE ~
WT
SHEET 2 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

REVISIONS TDRR 01150				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REQUIREMENTS

1. GENERAL

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND1015404, CLASS 2.

C. MATERIALS:
BALLS AND RINGS - CRES AISI 440C
FEDERAL SPECIFICATION QQ-S-763, CLASS 404C, CONDITION A
Rc59 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243.
RETAINER - LINEN BASE PHENOLIC, POROSITY = 2% MIN.

D. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.

E. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171 (KPS-1005I.200)
THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 2 RMS MAX. FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.

F. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.

G. LUBRICATE PER ND1002090.

H. MANUFACTURER SHALL MARK DATE WHEN BEARING WAS LUBRICATED ON EACH PACKAGE.

I. PARTS PREPARED FOR DELIVERY PER MIL-P-116 (KES-1003D.1, CLASS 1).

J. TORQUE SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-206A.

K. PARTS SHALL BE MARKED FOR IDENTIFICATION IN ACCORDANCE WITH ND1002019.

L. MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION IDENTIFYING TYPE OF PHENOLIC, CHEMICAL COMPOSITION, POROSITY AND METHOD OF MEASUREMENT, OF RETAINER MATERIAL.

2. DESIGN DETAIL

A. DEEP GROOVE, CONRAD TYPE.

B. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.

C. RADIAL RUNOUT OF INNER RING = .000050 TIR MAX
RADIAL RUNOUT OF OUTER RING = .000100 TIR MAX
AXIAL RUNOUT OF INNER RING = .000100 TIR MAX
AXIAL RUNOUT OF OUTER RING = .000200 TIR MAX

D. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.

ECCENTRICITY TO BE CODED TO NEAREST .000020 INCREMENT PER TABLE II AND PACKAGES MARKED ACCORDINGLY.

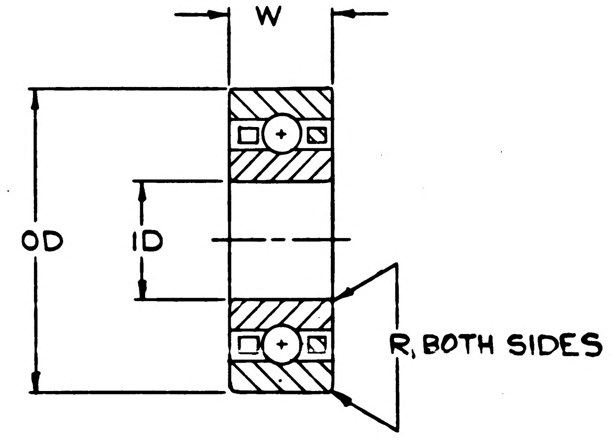
E. BORES AND O.D.'S TO BE CODED TO NEAREST .000025 PER TABLE I AND PACKAGES MARKED ACCORDINGLY.

F. DIMENSIONS SHOWN APPLY AT 68°F.

G. RADIAL PLAY .0003 TO .0006.

H. BEARING SHALL MEET THE REQUIREMENTS OF PROCUREMENT SPECIFICATION ND1002124.

I. TORQUE: MAX AVERAGE RUNNING TORQUE 14,000 MG-MM
35,500 MG-MM MAX PEAK UNDER 400 GMS THRUST LOAD.



ID +.000000 -.000040	OD +.000000 -.000040	W +.0000 -.0005	R +.003 -.000	BARDEN DANBURY, CONN.	M.P.B. KEENE, N.H.	N.H.B.B. PETERBOROUGH, N.H.
.2500	.62484	.1960	.012	SR4X33	SR4MC-B371	SR4TC11K35

TABLE I

TOL. RANGE I.D. \ OD.	.000000 -.000025	-.000025 -.000040
.000000 -.000025	11	12
-.000025 -.000040	21	22

TABLE II

RUNOUT TOL. RANGE I.R. \ O.R.	.000000 .000020	.000020 .000040	.000040 .000060	.000060 .000080	.000080 .000100
.000000 .000020	AA	AB	AC	AD	AE
.000020 .000040	BA	BB	BC	BD	BE
.000040 .000050	CA	CB	CC	CD	CE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
	MULTIPLE

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ −	+ −	+ −

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 1C

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 30005770160

DRAWN G.KRUK DATE 4-4-63
CHECKED (S) V Tomala 4-29-63
APPROVAL Thornton 5-3-63
APPROVAL E. 5-3-63
NASA APPROVAL Barnard
MIT APPROVAL 8 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BEARING, BALL, ANNULAR
(PHENOLIC RETAINER)
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. | SIZE C | NASA NUMBER 1011611

SCALE ~ | WEIGHT CALC ACTUAL | SHEET 1 OF 1

E-154

1011611

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

A	1011612

REVISIONS TDRR 01190

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		GENERAL CHANGES SEE TDRR NO. 02255	7-25-63	WK 8/6/63

REQUIREMENTS

1. GENERAL

A. INTERPRET DRAWING IN ACCORDANCE WITH STAND'RDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND1015404, CLASS 1.

(A1) C. MATERIALS:
BALLS AND RINGS - CORROSION RESISTING STEEL
FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A
Rc59 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243.
RETAINER - LINEN BASE PHENOLIC, POROSITY = 1-1/2% MIN.

D. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.

E. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171 (KPS-10051.200).
THE BALLS AND RUNNING SURFACES OF RINGS SHALLBE GROUND AND POLISHED OR LAPPED TO A 5 RMS MAX. FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.

F. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.

G. LUBRICATE PER ND1002090.

H. MANUFACTURER SHALL MARK DATE WHEN BEARING WAS LUBRICATED ON EACH PACKAGE.

I. PARTS PREPARED FOR DELIVERY PER MIL-P-116 (KES-1003D.1, CLASS 1).

J. TORQUE SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-206A.

K. PARTS SHALL BE MARKED FOR IDENTIFICATION IN ACCORDANCE WITH ND1002019.

L. MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION IDENTIFYING TYPE OF PHENOLIC, CHEMICAL COMPOSITION, POROSITY AND METHOD OF MEASUREMENT, OF RETAINER MATERIAL.

2. DESIGN DETAIL

A. ANGULAR CONTACT, NON-SEPARABLE, EXTENDED INNER RING.

B. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.

C. RADIAL RUNOUT OF INNER RING = .000050 TIR MAX.
RADIAL RUNOUT OF OUTER RING = .000100 TIR MAX.
AXIAL RUNOUT OF INNER RING = .000100 TIR MAX.
AXIAL RUNOUT OF OUTER RING = .000100 TIR MAX.

D. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.

ECCENTRICITY TO BE CODED TO NEAREST .000020 INCREMENT PER TABLE II AND PACKAGES MARKED ACCORDINGLY.

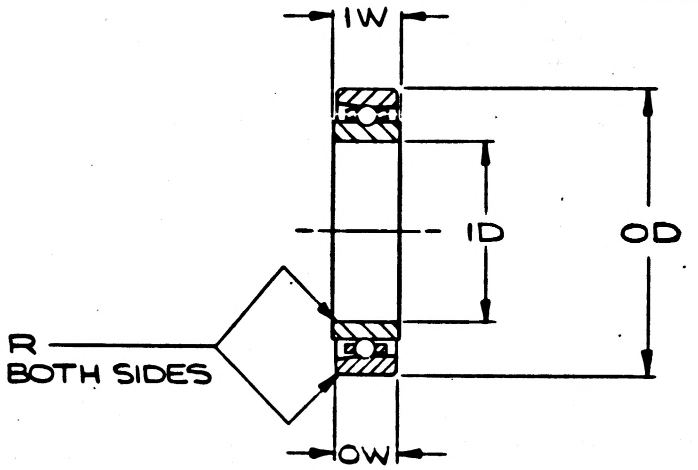
E. BORES AND O.D.'S TO BE CODED TO NEAREST .000050 PER TABLE I AND PACKAGES MARKED ACCORDINGLY.

F. DIMENSIONS SHOWN APPLY AT 68°F.

G. CONTACT ANGLE = 25° (REF).

H. RADIAL PLAY .0005 TO .0008.

(A2)



ID +.0000 -.0001	OD +.0000 -.0001	IW +.000 -.001	OW +.000 -.001	R +.015 -.000	MAX, RUNNING TORQUE TORQUE G M-CM		MAX, RUNNING TORQUE APPLIED THRUST LBS
.7500	1.1875	.281	.250	.015	AVG 19.5	PEAK48.5	5

(A3)

TABLE I

TOL RANGE OD / ID	.000000 -.000050	-.000050 -.000100
.000000 -.000050	11	12
-.000050 -.000100	21	22

TABLE II

RUNOUT TOL. RANGE O.R. / I.R.	.000000 .000020	.000020 .000040	.000040 .000060	.000060 .000080	.000080 .000100
.000000 .000020	A A	A B	A C	A D	A E
.000020 .000040	B A	B B	B C	B D	B E
.000040 .000050	C A	C B	C C	C D	C E

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

(A4) PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

MASTER

	MULTIPLE
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ -	+ -	+ -

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 1C

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 30295770480

DRAWN PIZZO DATE 4.4.63
CHECKED ⑤ V. Tomala 4-29-63
APPROVAL Thornton Ikams 5-3-63
APPROVAL E. Dthorp 5-3-63
NASA APPROVAL J. E. Barnard
MIT APPROVAL W. Kupfer 8 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE BEARING, BALL, ANNULAR
(ANGULAR CONTACT,
EXTENDED INNER RING)
SPEC CONTROL DWG

CODE IDENT NO.
SIZE C
NASA NUMBER 1011612
SCALE 2:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011612A

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

B | 1011612 Ⓜ

SYM	ZONE	REVISIONS TDRR 01190 DESCRIPTION	DATE	APPROVAL
A (A4)		GENERAL CHANGES SEE TDRR NO. 02255	9-25-62	WK 8/6/63
B		REPLACED BY REV C WITH CHANGES PER TDRR 12813	9-22-69	WK.

REQUIREMENTS

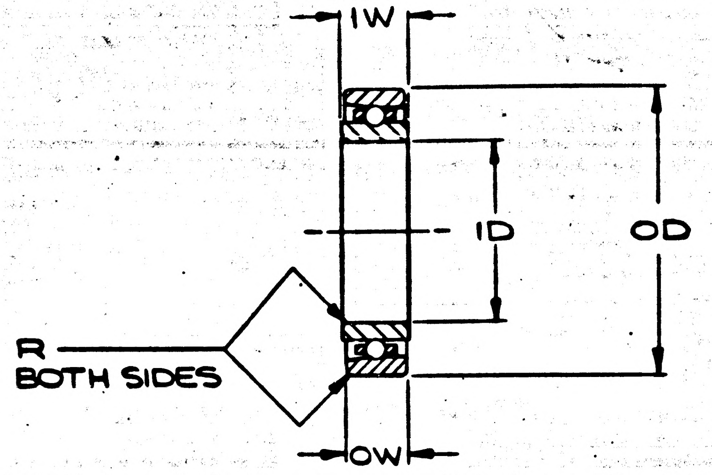
1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND1015404, CLASS 1.
   - (A1) C. MATERIALS:

     BALLS AND RINGS - CORROSION RESISTING STEEL
     FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A
     Rc59 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243.
     RETAINER - LINEN BASE PHENOLIC, POROSITY = 1-1/2% MIN.
   - D. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.
   - E. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171 (KPS-10051.200).

     THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 5 RMS MAX. FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.
   - F. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.
   - G. LUBRICATE PER ND1002090.
   - H. MANUFACTURER SHALL MARK DATE WHEN BEARING WAS LUBRICATED ON EACH PACKAGE.
   - I. PARTS PREPARED FOR DELIVERY PER MIL-P-116 (KES-1003D.1, CLASS 1).
   - J. TORQUE SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-206A.
   - K. PARTS SHALL BE MARKED FOR IDENTIFICATION IN ACCORDANCE WITH ND1002019.
   - L. MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION IDENTIFYING TYPE OF PHENOLIC, CHEMICAL COMPOSITION; POROSITY AND METHOD OF MEASUREMENT, OF RETAINER MATERIAL.
2. DESIGN DETAIL
   - A. ANGULAR CONTACT, NON-SEPARABLE, EXTENDED INNER RING.
   - B. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.
   - C. RADIAL RUNOUT OF INNER RING = .000050 TIR MAX.
     RADIAL RUNOUT OF OUTER RING = .000100 TIR MAX.
     AXIAL RUNOUT OF INNER RING = .000100 TIR MAX.
     AXIAL RUNOUT OF OUTER RING = .000100 TIR MAX.
   - D. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.

     ECCENTRICITY TO BE CODED TO NEAREST .000020 INCREMENT PER TABLE II AND PACKAGES MARKED ACCORDINGLY.
   - E. BORES AND O.D.'S TO BE CODED TO NEAREST .000050 PER TABLE I AND PACKAGES MARKED ACCORDINGLY.
   - F. DIMENSIONS SHOWN APPLY AT 68°F.
   - G. CONTACT ANGLE = 25° (REF).
   - H. RADIAL PLAY .0005 TO .0008.

(A2)



ID +.0000 -.0001	OD +.0000 -.0001	IW +.000 -.001	OW +.000 -.001	R +.015 -.000	MAX. RUNNING TORQUE TORQUE GM-CM		MAX. RUNNING TORQUE APPLIED THRUST LBS
.7500	1.1875	.281	.250	.015	AVG 19.5	PEAK 48.5	5

Ⓑ REPLACED BY REV Ⓒ WITH CHANGES

(A3)

TABLE I

TOL RANGE OD ID	.000000 -.000050	-.000050 -.000100
.000000 -.000050	11	12
-.000050 -.000100	21	22

TABLE II

RUNOUT TOL. RANGE O.R. I.R.	.000000 .000020	.000020 .000040	.000040 .000060	.000060 .000080	.000080 .000100
.000000 .000020	A A	A B	A C	A D	A E
.000020 .000040	B A	B B	B C	B D	B E
.000040 .000050	C A	C B	C C	C D	C E

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

(A4) PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

MASTER

	MULTIPLE
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL: SEE NOTE 1C
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 30295770480
DRAWN PIZZO DATE 4-4-63
CHECKED Ⓢ V. Tomala 4-29-63
APPROVAL Thornton Henry 5-3-63
APPROVAL E. Dhony 5-3-63
NASA APPROVAL Jack Barnard
MIT APPROVAL W. Hyffer 8 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE BEARING, BALL, ANNULAR (ANGULAR CONTACT, EXTENDED INNER RING) SPEC CONTROL DWG

CODE IDENT NO.
SIZE C
NASA NUMBER 1011612
SCALE 2:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-164

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
C	REPLACES REV B WITH CHANGES PER TDRR 12813	9-22-64	WK.

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND 1015404, CLASS 1.
   - C. PACKAGING AND SHIPPING IN ACCORDANCE WITH ND 1002215, CLASS I
     MARKING OF EXTERIOR SHIPPING CONTAINER SHALL INCLUDE NASA DRAWING NUMBER AND LATEST REVISION LETTER.
2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS
     1. PARTS SHALL BE MARKED PER ND 1002019 WITH THE NASA DRAWING NUMBER, LATEST REVISION LETTER AND MANUFACTURER'S IDENTIFICATION.
        MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART OR PACKAGE..
     2. PARTS SHALL BE INDIVIDUALLY PACKAGED IN SEPARATE MOISTURE PROOF BAGS OF POLYETHYLENE OR OTHER SUITABLE MATERIAL AND ENCLOSED IN INDIVIDUAL BOXES.
     3. MANUFACTURER SHALL MARK DATE OF LUBRICATION ON EACH UNIT PACKAGE.
     4. ANGULAR CONTACT, NON-SEPARABLE, EXTENDED INNER RING BEARING WITH PHENOLIC RETAINER.
     5. MECHANICAL DIMENSIONS: AS SHOWN (APPLY AT 68°F). TABLE I
     6. TORQUE: MAX AVERAGE RUNNING TORQUE = 19.5 GM-CM (48.5 GM-CM MAX PEAK) UNDER 5 LBS THRUST LOAD.
     7. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.
        ECCENTRICITY TO BE CODED PER TABLE II AND PACKAGES MARKED ACCORDINGLY.
     8. BORES AND O.D.'S TO BE CODED PER TABLE III AND PACKAGES MARKED ACCORDINGLY.
     9. RADIAL PLAY = .0005 TO .0008
3. DESIGN REQUIREMENTS
   - A. MATERIALS
     1. BALLS AND RINGS: CORROSION RESISTING STEEL, FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A, RC 56 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243.
     2. RETAINER: LINEN BASE PHENOLIC IN ACCORDANCE WITH MIL-P-79, TYPE FBE, FORM R EXCEPT FOR SPECIFIC GRAVITY AND WATER ABSORPTION. POROSITY TO BE 1-1/2% MIN.
        MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION SPECIFYING POROSITY AND METHOD OF MEASUREMENT.
   - B. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171, FINISH NO. 5.4.
   - C. THE BALLS AND RUNNING SURFACES OF RINGS SHALL BE GROUND AND POLISHED OR LAPPED TO A 5 RMS MAX FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.
   - D. RADIAL AND AXIAL RUNOUT
     1. RADIAL RUNOUT OF INNER RING = .000050 TIR MAX
     2. RADIAL RUNOUT OF OUTER RING = .000100 TIR MAX
     3. AXIAL RUNOUT OF INNER RING = .000100 TIR MAX
     4. AXIAL RUNOUT OF OUTER RING = .000100 TIR MAX
   - E. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.
   - F. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.
   - G. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.
   - H. LUBRICATE PER ND 1002077 (VACUUM IMPREGNATION METHOD).
   - I. CONTACT ANGLE = 25° (REF).
   - J. PARTS SHALL MEET REQUIREMENT OF PARAGRAPH 2.A.6 WHEN TESTED IN ACCORDANCE WITH MIL-STD-206

Ⓒ REPLACES REV Ⓑ WITH CHANGES

MASTER

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

K.I.C. NO. 30295770480	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ±	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DWG. NO. CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN M MENZORIO DATE 3-9-64 CHECKED J.E.Kelly APPROVAL APPROVAL 9/19/64	BEARING, BALL, ANNULAR (ANGULAR CONTACT, EXTENDED INNER RING) SPEC CONTROL DWG
MATERIAL SEE NOTE 3A		
HEAT TREATMENT	NASA APPROVAL 09-22-64	CODE IDENT NO. — SIZE C — NASA DRAWING NO. 1011612
FINAL FINISH	MIT APPROVAL W K 9/22/64	SCALE ~ — WT — SHEET 1 OF 2

INCHES
0 1 2
PHOTOGRAPHING SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1011612 C

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
C	THIS SHEET ADDED PER TDRR 12813	9-22-64	WK

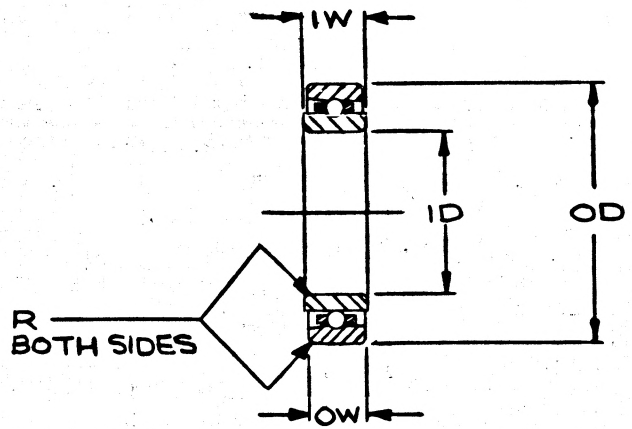


TABLE I DIMENSIONS

ID +.0000 -.0001	OD +.0000 -.0001	IW +.000 -.001	OW +.000 -.001	R +.015 -.000
.7500	1.1875	.281	.250	.015

TABLE III
BORE AND OD CODE

TOL RANGE ID \ OD	.000000 -.000050	-.000051 -.000100
.000000 -.000050	11	12
-.000051 -.000100	21	22

TABLE II
ECCENTRICITY CODE

RUNOUT TOL. RANGE I.R. \ O.R.	.000000 .000020	.000021 .000040	.000041 .000060	.000061 .000080	.000081 .000100
.000000 .000020	AA	AB	AC	AD	AE
.000021 .000040	BA	BB	BC	BD	BE
.000041 .000050	CA	CB	CC	CD	CE

Ⓒ THIS SHEET ADDED

MASTER

NEXT ASSY	USED ON
APPLICATION	

K.I.C. NO. 30295770480

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 3A

HEAT TREATMENT ~

FINAL FINISH ~

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN J. Mezzo Rio DATE 3-9-64
CHECKED J.E. Kelly 3/12/64
APPROVAL
APPROVAL E. Thomas 9/14/64

NASA APPROVAL W. J. Rhine 9-22-64

MIT APPROVAL 22 Sep 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BEARING, BALL, ANNULAR
(ANGULAR CONTACT,
EXTENDED INNER RING)
SPEC CONTROL DWG.

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	C	1011612
SCALE ~	WT	SHEET 2 OF 2

INCHES
0 1 2

PHOTOGRAPHIC SCALE

REVISIONS TDRR 01192

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REQUIREMENTS

1. GENERAL

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE AND RELIABILITY PROVISIONS SPECIFIED IN ND1015404, CLASS 1.

C. MATERIALS:
BALLS AND RINGS - CRES AISI 440C
FEDERAL SPECIFICATION QQ-S-763, CLASS 440C, CONDITION A
Rc59 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243.
RETAINER - LINEN BASE PHENOLIC, POROSITY = 1-1/2% MIN.

D. UNLESS SPECIFIED OTHERWISE, TOLERANCES SHALL BE IN ACCORDANCE WITH ABEC 7.

E. ALL CRES PARTS SHALL BE PASSIVATED PER MIL-STD-171 (KPS-10051.200).
THE BALLS AND RUNNING SURFACES OF RINGS SHALLBE GROUND AND POLISHED OR LAPPED TO A 5 RMS MAX. FINISH AND SHALL BE ENTIRELY FREE OF TOOL, CHATTER OR GRINDING MARKS, PITS (OVER .0015 DIA.) OR RUST, SOFT SPOTS OR ANY OTHER IMPERFECTIONS VIEWED UNDER 10X MAGNIFICATION.

F. ALL BEARINGS SHALL BE DEMAGNETIZED PRIOR TO LUBRICATION.

G. LUBRICATE PER ND1002090.

H. MANUFACTURER SHALL MARK DATE WHEN BEARING WAS LUBRICATED ON EACH PACKAGE.

I. PARTS PREPARED FOR DELIVERY PER MIL-P-116 (KES-1003D.1, CLASS 1).

J. TORQUE SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-206A.

K. PARTS SHALL BE MARKED FOR IDENTIFICATION IN ACCORDANCE WITH ND1002019.

L. MANUFACTURER SHALL PROVIDE WRITTEN INFORMATION IDENTIFYING TYPE OF PHENOLIC, CHEMICAL COMPOSITION; POROSITY AND METHOD OF MEASUREMENT, OF RETAINER MATERIAL.

2. DESIGN DETAIL

A. ANGULAR CONTACT, NON-SEPARABLE, EXTENDED INNER RING.

B. PARTS SHALL BE GAGED IN ACCORDANCE WITH AFBMA STANDARDS, SECTION 4.

C. RADIAL RUNOUT OF INNER RING = .000050 TIR MAX.
RADIAL RUNOUT OF OUTER RING = .000100 TIR MAX.
AXIAL RUNOUT OF INNER RING = .000100 TIR MAX.
AXIAL RUNOUT OF OUTER RING = .000100 TIR MAX.

D. MARK HIGH POINT OF ECCENTRICITY ON BOTH INNER AND OUTER RINGS. THE MARK SHALL BE PERMANENTLY ENGRAVED OR ETCHED AND BURR FREE.

ECCENTRICITY TO BE CODED TO NEAREST .000020 INCREMENT PER TABLE II AND PACKAGES MARKED ACCORDINGLY.

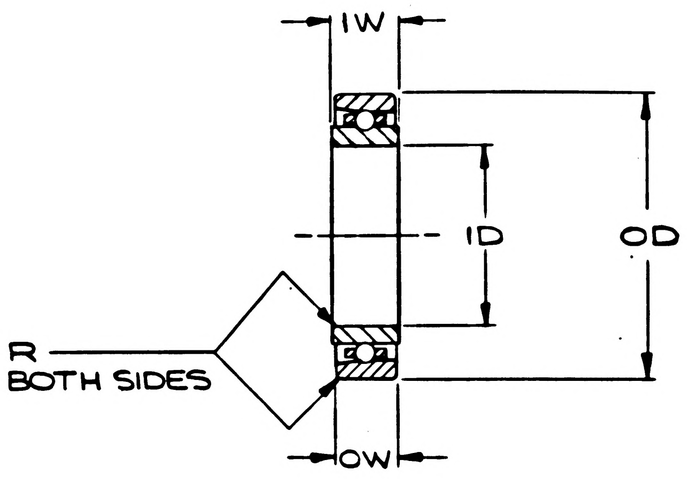
E. BORES AND O.D.'S TO BE CODED TO NEAREST .000050 PER TABLE I AND PACKAGES MARKED ACCORDINGLY.

F. DIMENSIONS SHOWN APPLY AT 68°F.

G. CONTACT ANGLE = 25° (REF).

H. RADIAL PLAY .0005 TO .0008.

I. BEARING SHALL MEET THE REQUIREMENTS OF PROCUREMENT SPECIFICATION ND1002124.



ID +.0000 -.0001	OD +.0000 -.0001	IW +.000 -.001	OW +.000 -.001	R +.015 -.000	MAX. RUNNING TORQUE TORQUE GM-CM		MAX. RUNNING TORQUE APPLIED THRUST LBS
.7500	1.1875	.281	.250	.015	AVG 19.5	PEAK48.5	5

ORIGINAL SOURCES OF SUPPLY

BARDEN DANBURY, CONN	N.H.B.B. PETERBOROUGH, N.H	S.B.B. LEBANON, N.H	ITI COMPTON, CALIF.
A539	SR539T3K58	3TACR-12-19-38	ITI 6592-A

TABLE I

TOL RANGE OD ID	.000000 -.000050	-.000050 -.000100
.000000 -.000050	11	12
-.000050 -.000100	21	22

TABLE II

RUNOUT TOL. RANGE O.R. I.R.	.000000 .000020	.000020 .000040	.000040 .000060	.000060 .000080	.000080 .000100
.000000 .000020	A A	A B	A C	A D	A E
.000020 .000040	B A	B B	B C	B D	B E
.000040 .000050	C A	C B	C C	C D	C E

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

	MULTIPLE
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ -	+ -	+ -

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 1C

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 30295770480

DRAWN PIZZO DATE 4.4.63
CHECKED ⑤ V. Tomala 4-29-63
APPROVAL Thornton Stearns 5-3-63
APPROVAL E. Olthorp 5-3-63
NASA APPROVAL
MIT APPROVAL W. Wyler 8 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE BEARING, BALL, ANNULAR
(ANGULAR CONTACT, EXTENDED INNER RING)
SPEC CONTROL DWG

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011612

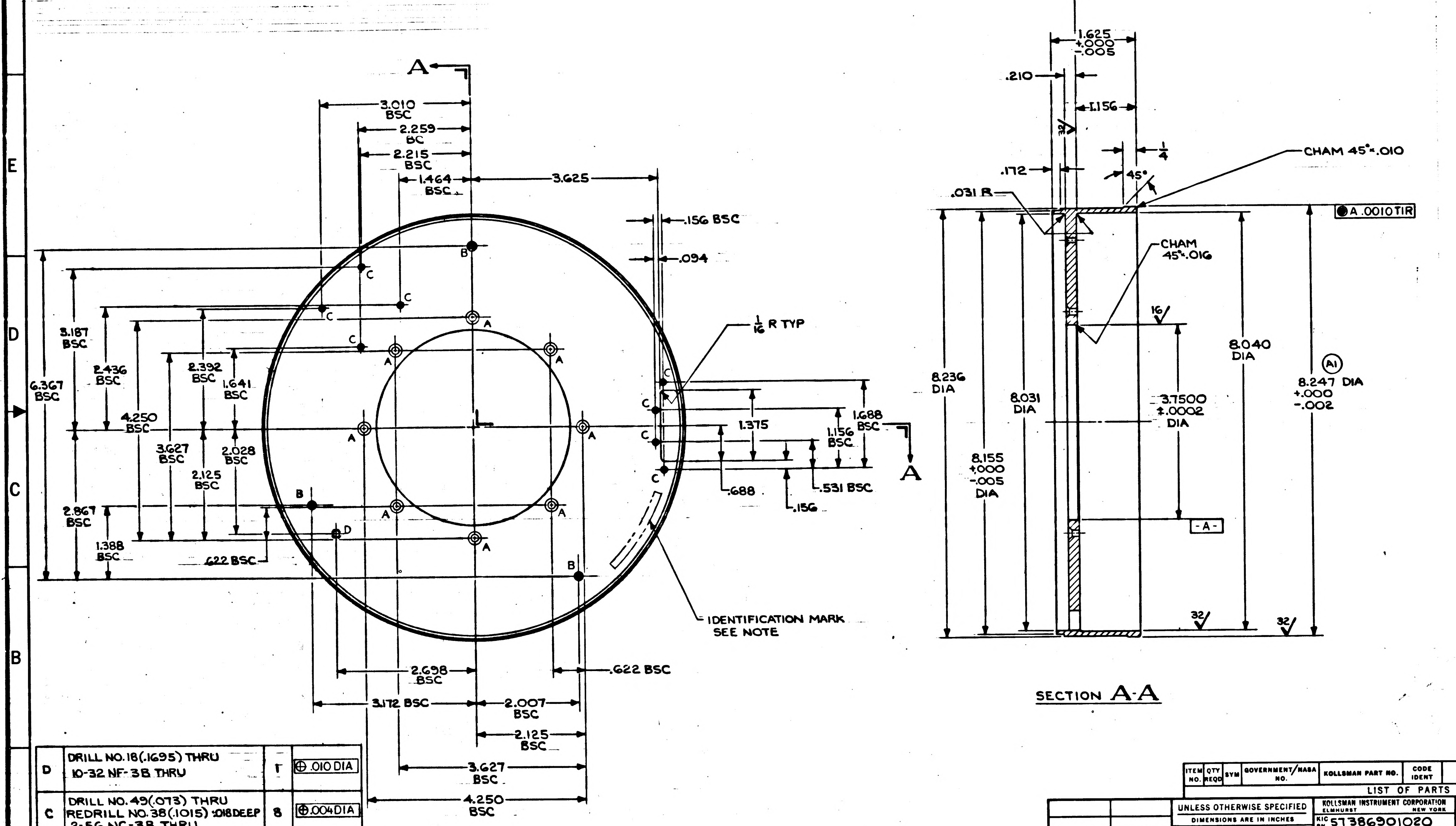
SCALE 2:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

A 1011616

TDRR 01015	REVISIONS			
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	D-2	(1) WAS:- 8.249 $^{+.000}_{-.002}$ DIA TDRR # 01128	6-26-63	WL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. HEAT TREAT (STABILIZE AND STRESS RELIEF) PER ND1002092.
6. IDENTIFY USING NASA DWG NO. REVISION LETTER, AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND1002019.


A
3.010 BSC
2.259 BC
2.215 BSC
1.464 BSC
3.625
.156 BSC
.094
1/16 R TYP
3.187 BSC
2.436 BSC
6.367 BSC
4.250 BSC
2.392 BSC
1.641 BSC
3.627 BSC
2.028 BSC
2.125 BSC
2.867 BSC
1.388 BSC
.622 BSC
1.375
1.688 BSC
1.156 BSC
.688
.531 BSC
.156
A
B
C
D
IDENTIFICATION MARK SEE NOTE
2.698 BSC
.622 BSC
3.172 BSC
2.007 BSC
2.125 BSC
3.627 BSC
4.250 BSC
⊥ A .001
1.625 +.000 -.005
.210
1.156
32√
1/4
CHAM 45° × .010
.172
45°
.031 R
● A .0010 TIR
CHAM 45° × .016
16√
8.236 DIA
8.031 DIA
8.155 +.000 -.005 DIA
3.7500 ±.0002 DIA
8.040 DIA
(A1) 8.247 DIA +.000 -.002
-A-
32√
32√
SECTION A-A

HOLE	DESCRIPTION	QTY	TRUE POSITION
D	DRILL NO. 18 (.1695) THRU 10-32 NF-3B THRU	1	⊕ .010 DIA
C	DRILL NO. 49 (.073) THRU REDRILL NO. 38 (.1015) × .018 DEEP 2-56 NC-3B THRU	8	⊕ .004 DIA
B	DRILL NO. 41 (.096) THRU REDRILL NO. 30 (.1285) × .025 DEEP 4-40 NC-3B THRU	3	⊕ .010 DIA
A	DR NO. 29 (.136) THRU 82° CSK TO .228 $^{+.005}_{-.000}$ DIA	8	⊕ A .010 DIA
HOLE DATA			

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ± .005; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL
BERYLLIUM
MIL-B-21531
SEE NOTE 5
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901020
DRAWN D. Sch... DATE 3-15-63
CHECKED ... 4-19-63
APPROVAL ... 4-22-63
APPROVAL E. Thomps... 4-22-63
NASA APPROVAL
MIT APPROVAL W. ... 24 Apr 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RING, MOUNTING, COVER

CODE IDENT NO.
SIZE D
NASA NUMBER 1011616
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011616 A

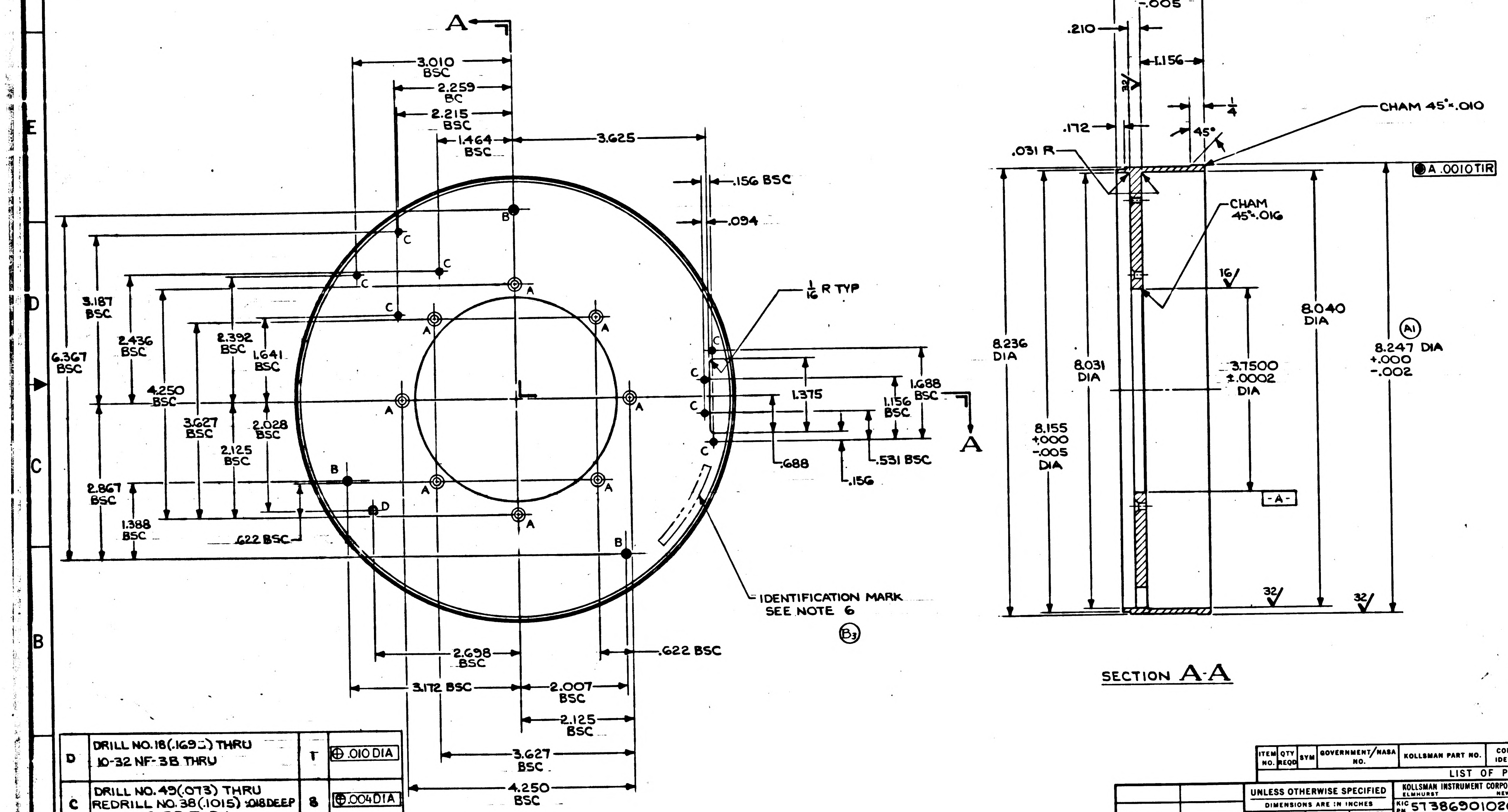
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

B 1011616

TDRR 01015

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	C2	(1) WAS:- 8.249 +.000 -.002 DIA TDRR # 01728	6-26-63	WR
B3		REVISED PER TDRR NO. 02676	8/21/63	

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63/ FINISH ALL OVER
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. HEAT TREAT (STABILIZE AND STRESS RELIEF) PER ND1002092.
6. IDENTIFY USING NASA DWG NO. REVISION LETTER, AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND1002019.


A
3.010 BSC
2.259 BC
2.215 BSC
1.464 BSC
3.625
.156 BSC
.094
1/16 R TYP
3.187 BSC
2.436 BSC
2.392 BSC
1.641 BSC
6.367 BSC
4.250 BSC
3.627 BSC
2.028 BSC
2.125 BSC
2.867 BSC
1.388 BSC
.622 BSC
1.375
1.156 BSC
1.688 BSC
.688
.531 BSC
.156
A
B
C
D
IDENTIFICATION MARK SEE NOTE 6
B3
2.698 BSC
.622 BSC
3.172 BSC
2.007 BSC
2.125 BSC
3.627 BSC
4.250 BSC
⊥ A .001
1.625 +.000 -.005
.210
1.156
32/
.172
1/4
45°
CHAM 45° x .010
.031 R
◉ A .0010 TIR
CHAM 45° x .016
16/
8.040 DIA
A1
8.247 DIA +.000 -.002
8.236 DIA
8.031 DIA
3.7500 ±.0002 DIA
8.155 +.000 -.005 DIA
-A-
32/
32/

SECTION A-A

HOLE	DESCRIPTION	QTY	TRUE POSITION
D	DRILL NO.18 (.169) THRU 10-32 NF-3B THRU	T	⊕ .010 DIA
C	DRILL NO. 49 (.073) THRU REDRILL NO. 38 (.1015) x .018 DEEP 2-56 NC-3B THRU	8	⊕ .004 DIA
B	DRILL NO. 41 (.096) THRU REDRILL NO. 30 (.1285) x .025 DEEP 4-40 NC-3B THRU	3	⊕ .010 DIA
A	DR NO. 29 (.136) THRU 100° CSK TO .258 +.005 -.000 DIA	8	⊕ A .010 DIA (B1)

HOLE DATA

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011890	1011000

(B2) APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
BERYLLIUM
MIL-B-21531
SEE NOTE 5

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901020

DRAWN DATE 3-15-63
CHECKED 4-19-63
APPROVAL 4-22-63
APPROVAL 4-22-63
NASA APPROVAL
MIT APPROVAL W Hopper 29 Apr 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RING, MOUNTING, COVER

CODE IDENT NO.
SIZE D
NASA NUMBER 1011616
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

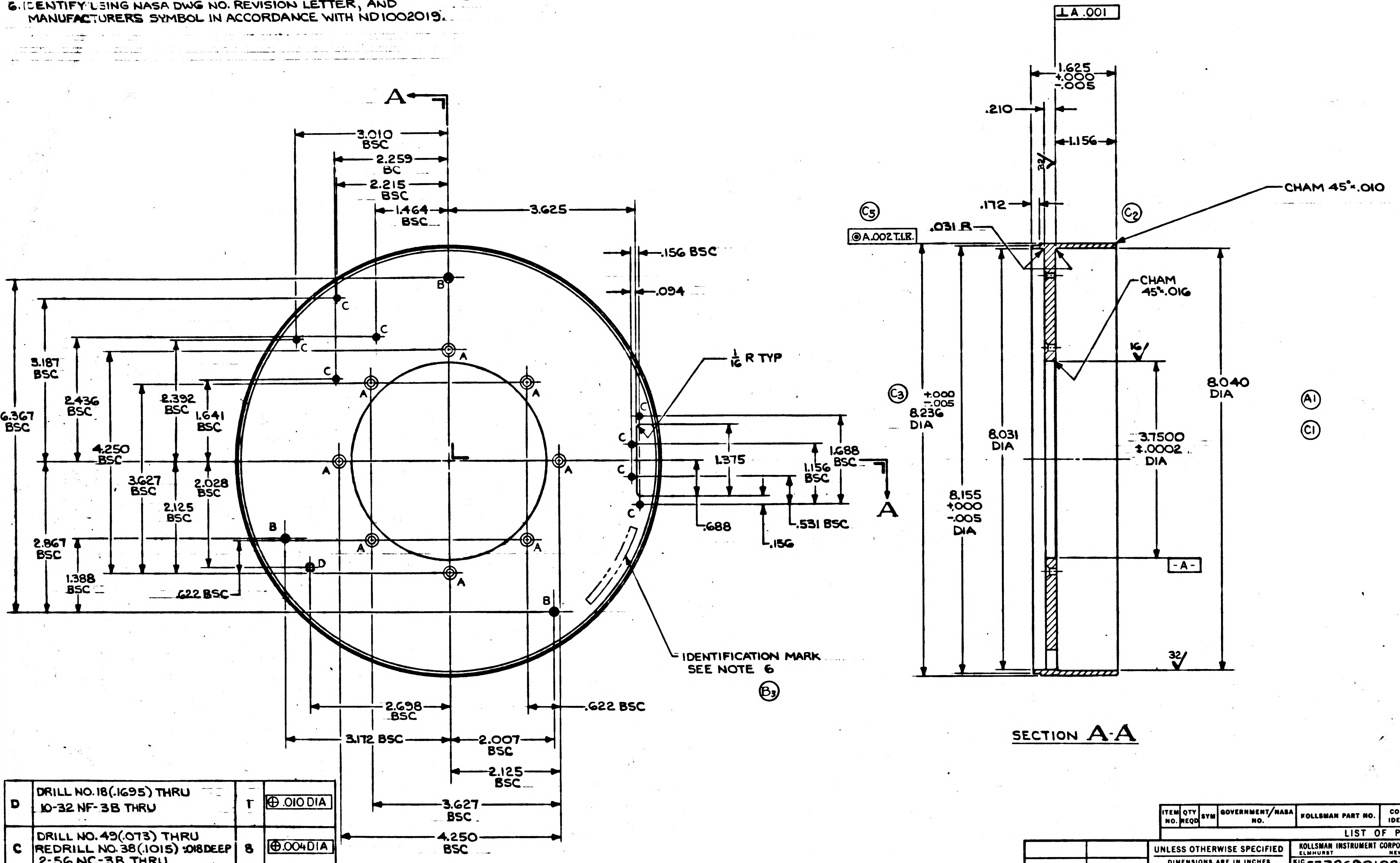
1011616 B

1011616 C

TDRR 01015

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	D-2	(1) WAS:- 8.249 $^{+.000}_{-.002}$ DIA TDRR* 01728	6-26-63	WK.
B3		REVISED PER TDRR NO. 02676	8/21/63	
C5		REVISED PER TDRR NO. 05926	1/22/64	WK

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. HEAT TREAT (STABILIZE AND STRESS RELIEF) PER ND1002114. (C4)
6. IDENTIFY USING NASA DWG NO. REVISION LETTER, AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND1002019.



⊥ A .001
1.625 +.000 -.005
.210
1.156
32√
.172
.031 R
(C5)
⊕ A .002 T.I.R.
(C2)
CHAM 45° ±.010
CHAM 45° ±.016
16√
(C3)
+.000 -.005 8.236 DIA
8.031 DIA
8.155 +.000 -.005 DIA
8.040 DIA
3.7500 ±.0002 DIA
-A-
32√
(A1)
(C1)
SECTION A-A
A
3.010 BSC
2.259 BC
2.215 BSC
1.464 BSC
3.625
.156 BSC
.094
1/16 R TYP
3.187 BSC
6.367 BSC
2.436 BSC
2.392 BSC
1.641 BSC
4.250 BSC
3.627 BSC
2.028 BSC
2.125 BSC
2.867 BSC
1.388 BSC
.622 BSC
1.375
1.688 BSC
1.156 BSC
.688
.531 BSC
.156
A
B
C
D
IDENTIFICATION MARK SEE NOTE 6
(B3)
2.698 BSC
.622 BSC
3.172 BSC
2.007 BSC
2.125 BSC
3.627 BSC
4.250 BSC

HOLE	DESCRIPTION	QTY	TRUE POSITION
D	DRILL NO. 18 (.1695) THRU 10-32 NF-3B THRU	T	⊕ .010 DIA
C	DRILL NO. 49 (.073) THRU REDRILL NO. 38 (.1015) ±.018 DEEP 2-56 NC-3B THRU	8	⊕ .004 DIA
B	DRILL NO. 41 (.096) THRU REDRILL NO. 30 (.1285) ±.025 DEEP 4-40 NC-3B THRU	3	⊕ .010 DIA
A	DR NO. 29 (.136) THRU 100° CSK TO .258 $^{+.005}_{-.000}$ DIA	8	⊕ A .010 DIA (B1)
HOLE DATA			

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
(B2) 1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
BERYLLIUM
MIL-B-21531
SEE NOTE 5

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901020

DRAWN J. Schiller DATE 3-15-63
CHECKED W. Gelhan 4-19-63
APPROVAL 4-22-63
APPROVAL E. Thomp 4-22-63
NASA APPROVAL
MIT APPROVAL 24 Apr 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RING, MOUNTING, COVER

CODE IDENT NO.
SIZE D
NASA NUMBER 1011616

SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

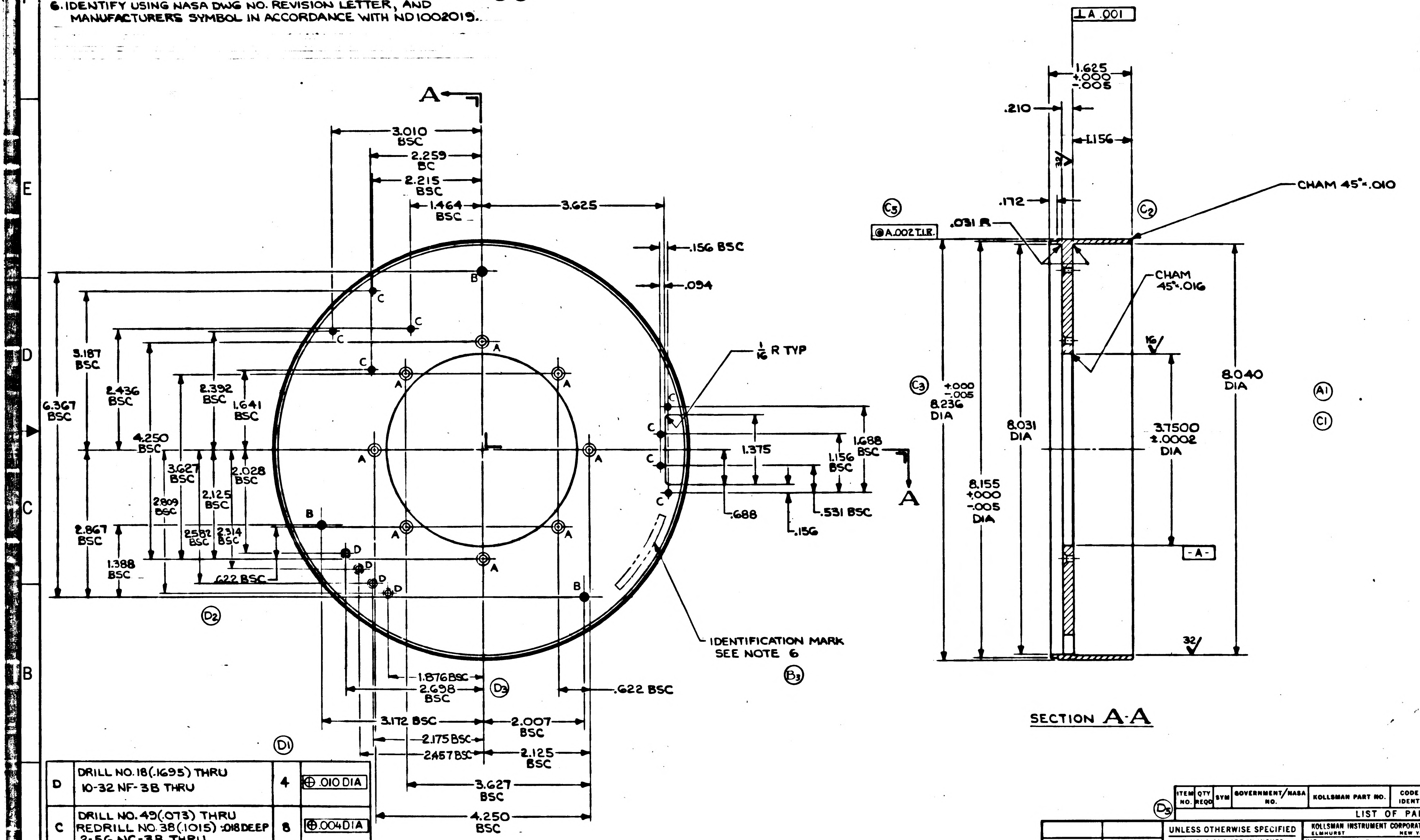
1011616 C

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
 a. 63√ FINISH ALL OVER
 b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. HEAT TREAT (STABILIZE AND STRESS RELIEVE) PER ND1002114. Ⓒ4 Ⓓ4
6. IDENTIFY USING NASA DWG NO. REVISION LETTER, AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND1002019.

D	9191101

TDRR 01015

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	D-2	(1) WAS:- 8.249 $^{+.000}_{-.002}$ DIA TDRR # 01728	6-26-63	WH.
B3		REVISED PER TDRR NO. 02676	8/21/63	
C5		REVISED PER TDRR NO. 05926	1/22/64	WH
D5		REVISED PER TDRR NO. 07557	4-7-64	



⊥ A .001
A
3.010 BSC
2.259 BC
2.215 BSC
1.464 BSC
3.625
.156 BSC
.094
1/16 R TYP
6.367 BSC
3.187 BSC
2.436 BSC
2.392 BSC
1.641 BSC
4.250 BSC
3.627 BSC
2.028 BSC
2.809 BSC
2.125 BSC
2.867 BSC
2.582 BSC
2.314 BSC
1.388 BSC
.622 BSC
1.375
1.688 BSC
1.156 BSC
.688
.531 BSC
.156
IDENTIFICATION MARK SEE NOTE 6
1.876 BSC
2.698 BSC
.622 BSC
3.172 BSC
2.007 BSC
2.175 BSC
2.457 BSC
2.125 BSC
3.627 BSC
4.250 BSC
A
B
C
D
Ⓓ1
Ⓓ2
Ⓓ3
Ⓑ3
Ⓒ3
Ⓒ5
Ⓒ2
Ⓐ1
Ⓒ1
1.625 +.000 -.005
.210
1.156
.172
32
.031 R
CHAM 45° × .010
Ⓐ .002 T.I.R.
CHAM 45° × .016
16
+.000 -.005 8.236 DIA
8.031 DIA
8.155 +.000 -.005 DIA
3.7500 ±.0002 DIA
8.040 DIA
-A-
32
SECTION A-A

HOLE	DESCRIPTION	QTY	TRUE POSITION
D	DRILL NO. 18 (.1695) THRU 10-32 NF-3B THRU	4	⊕ .010 DIA
C	DRILL NO. 49 (.073) THRU REDRILL NO. 38 (.1015) × .018 DEEP 2-56 NC-3B THRU	8	⊕ .004 DIA
B	DRILL NO. 41 (.096) THRU REDRILL NO. 30 (.1285) × .025 DEEP 4-40 NC-3B THRU	3	⊕ .010 DIA
A	DR NO. 29 (.136) THRU 100° CSK TO .258 $^{+.005}_{-.000}$ DIA	8	⊕ A .010 DIA Ⓑ1
HOLE DATA			

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

Ⓓ5 LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011890	1011000

Ⓑ2 APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ± .005; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL: BERYLLIUM ND1002125 SEE NOTE 5
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901020
DRAWN DATE 3-15-63
CHECKED 4-19-63
APPROVAL 4-22-63
APPROVAL 4-22-63
NASA APPROVAL
MIT APPROVAL 29 Apr 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RING, MOUNTING, COVER

CODE IDENT NO.
SIZE D
NASA NUMBER 1011616
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

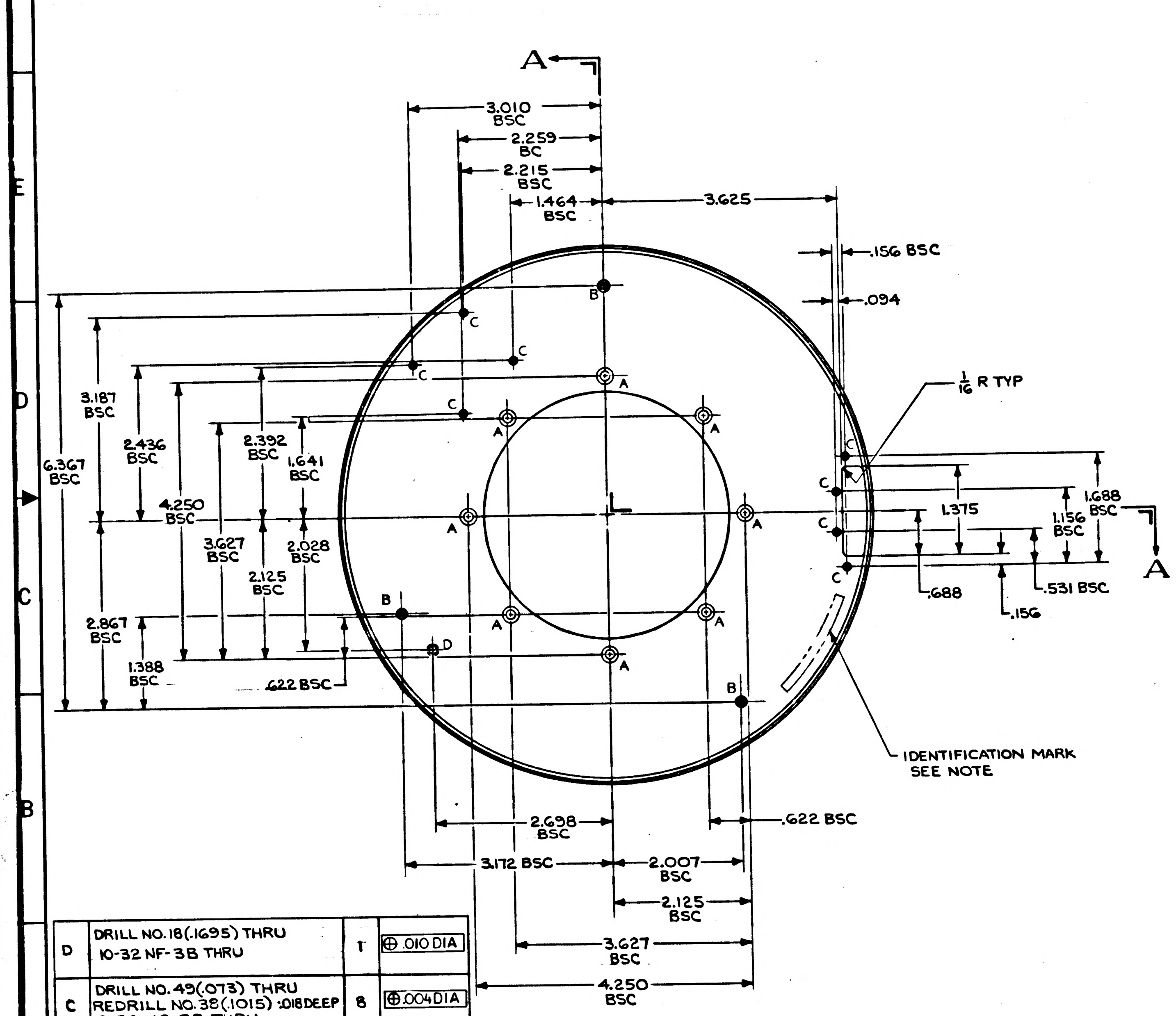
1011616 D

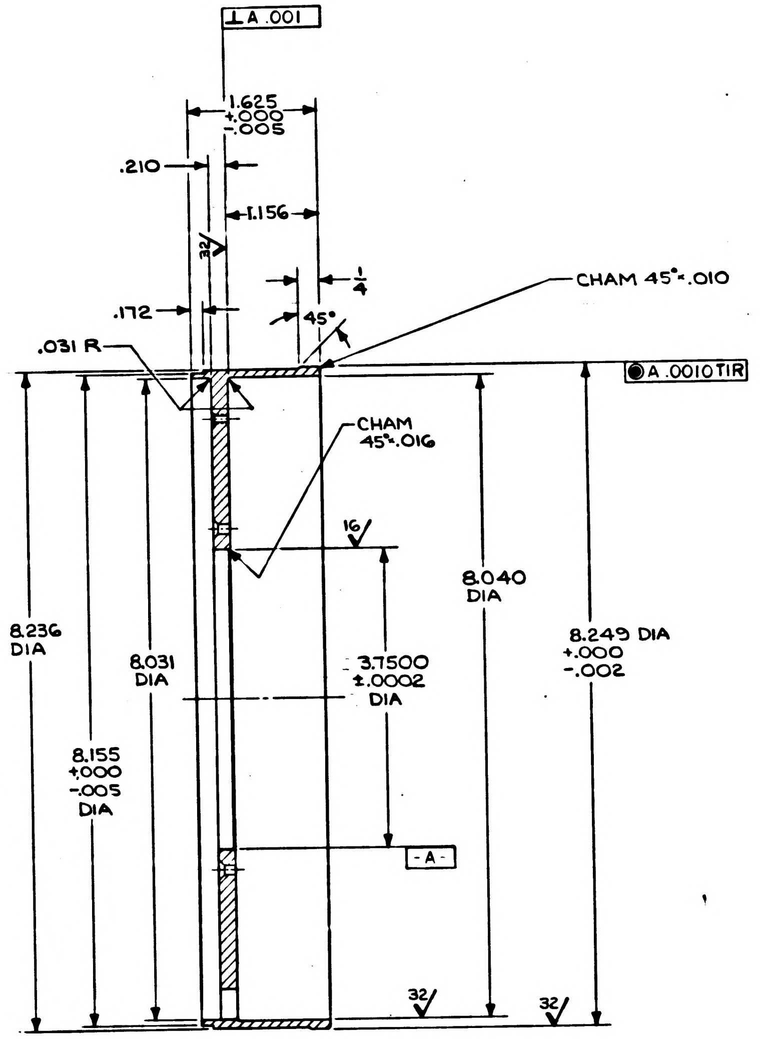
E-198

1011616 (M)

TDRR 01015	REVISIONS			
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63/ FINISH ALL OVER
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. HEAT TREAT (STABILIZE AND STRESS RELIEF) PER ND1002092.
6. IDENTIFY USING NASA DWG NO. REVISION LETTER, AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND1002019.


A
3.010 BSC
2.259 BC
2.215 BSC
1.464 BSC
3.625
.156 BSC
.094
1/16 R TYP
B
C
A
D
3.187 BSC
6.367 BSC
2.436 BSC
4.250 BSC
2.392 BSC
1.641 BSC
3.627 BSC
2.028 BSC
2.125 BSC
2.867 BSC
1.388 BSC
.622 BSC
1.375
1.688 BSC
1.156 BSC
.688
.531 BSC
.156
IDENTIFICATION MARK SEE NOTE
2.698 BSC
.622 BSC
3.172 BSC
2.007 BSC
2.125 BSC
3.627 BSC
4.250 BSC


⊥ A .001
1.625 +.000 -.005
.210
1.156
32/
1/4
CHAM 45°×.010
.172
45°
.031 R
◉ A .0010 TIR
CHAM 45°×.016
16/
8.040 DIA
8.236 DIA
8.031 DIA
3.7500 ±.0002 DIA
8.249 DIA +.000 -.002
8.155 +.000 -.005 DIA
-A-
32/
32/

SECTION A-A

HOLE	DESCRIPTION	QTY	TRUE POSITION
D	DRILL NO. 18 (.1695) THRU 10-32 NF-3B THRU	1	⊕ .010 DIA
C	DRILL NO. 49 (.073) THRU REDRILL NO. 38 (.1015) × .018 DEEP 2-56 NC-3B THRU	8	⊕ .004 DIA
B	DRILL NO. 41 (.096) THRU REDRILL NO. 30 (.1285) × .025 DEEP 4-40 NC-3B THRU	3	⊕ .010 DIA
A	DR NO. 29 (.136) THRU 82° CSK TO .228 $^{+.005}_{-.000}$ DIA	8	⊕ A .010 DIA

HOLE DATA

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
BERYLLIUM
MIL-B-21531
SEE NOTE 5

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901020

DRAWN D. Schiller DATE 3-15-63
CHECKED 4-19-63
APPROVAL 4-22-63
APPROVAL E. Thomas 4-22-63
NASA APPROVAL
MIT APPROVAL 24 Apr 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RING, MOUNTING, COVER

CODE IDENT NO.
SIZE D
NASA NUMBER 1011616
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

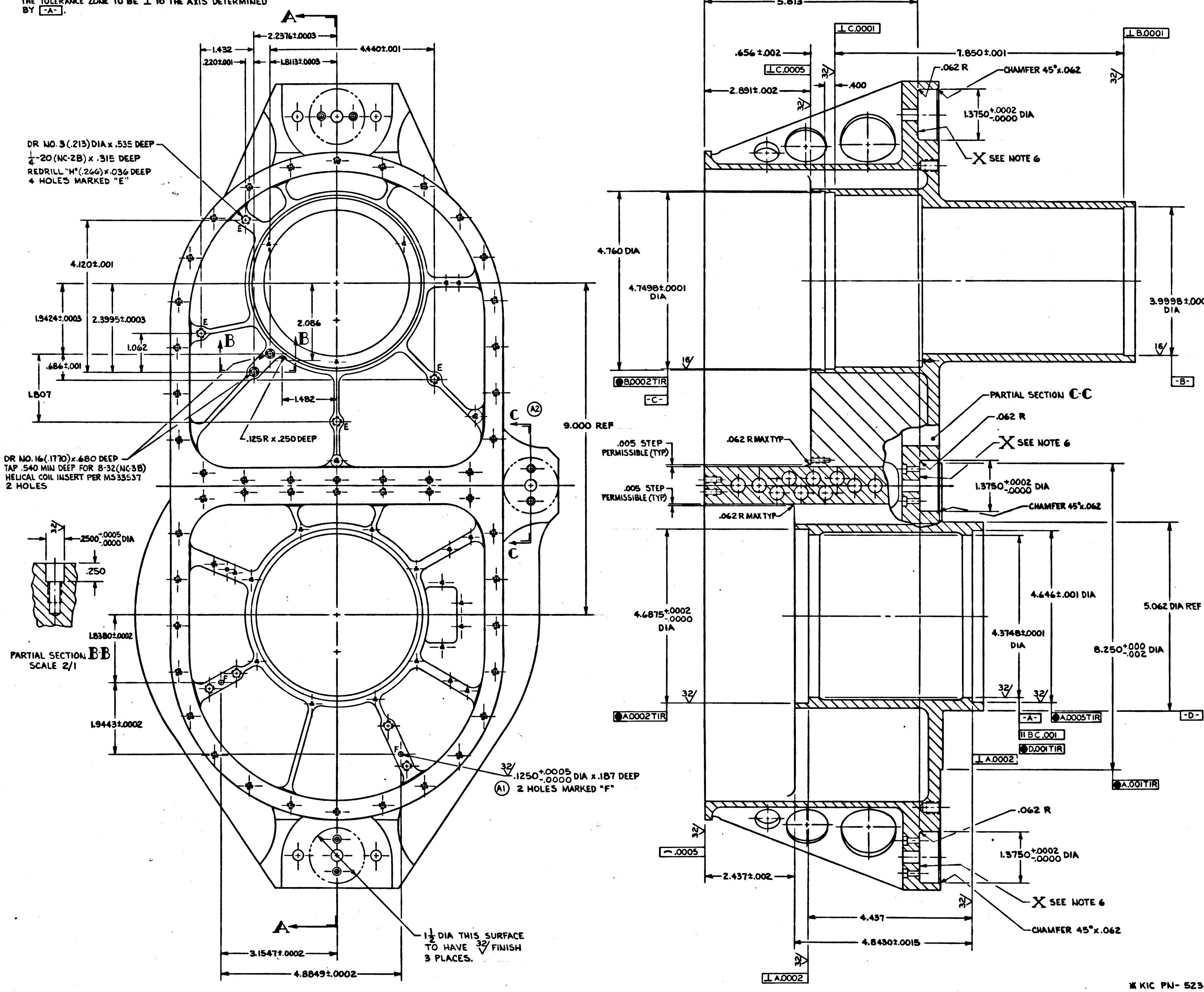
E-188

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011616

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED & UPGRADED TO CLASS A. TDRR 01921	6-26-63	

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. HEAT TREAT (STRESS RELIEVE & STABILIZE) PER ND1002092.
6. 3 SURFACES MARKED "X" TO LIE IN A TOLERANCE ZONE OF .0004. THE TOLERANCE ZONE TO BE ⊥ TO THE AXIS DETERMINED BY -A-.


A
2.2376±.0003
1.432
4.440±.001
.220±.001
1.8113±.0003
DR NO. 3 (.213) DIA x .535 DEEP
$\frac{1}{4}$-20 (NC-2B) x .315 DEEP
REDRILL "H" (.266) x .036 DEEP
4 HOLES MARKED "E"
E
4.120±.001
1.9424±.0003
2.3995±.0003
1.062
2.086
B
B
.686±.001
1.807
1.482
.125R x .250 DEEP
DR NO. 16 (.1770) x .680 DEEP
TAP .540 MIN DEEP FOR 8-32 (NC-3B)
HELICAL COIL INSERT PER MS33537
2 HOLES
C
A2
C
9.000 REF
32
.2500 +.0005 -.0000 DIA
.250
1.8380±.0002
PARTIAL SECTION B-B
SCALE 2/1
1.9443±.0002
F
32
.1250 +.0005 -.0000 DIA x .187 DEEP
A1
2 HOLES MARKED "F"
1½ DIA THIS SURFACE
TO HAVE 32√ FINISH
3 PLACES.
3.1547±.0002
4.8849±.0002
5.813
⊥C.0001
⊥B.0001
.656±.002
7.850±.001
⊥C.0005
.062 R
CHAMFER 45°x.062
2.891±.002
.400
32
1.3750 +.0002 -.0000 DIA
X SEE NOTE 6
4.760 DIA
4.7498±.0001 DIA
3.9998±.0001 DIA
16
-B-
B.0002 TIR
-C-
PARTIAL SECTION C-C
.062 R
X SEE NOTE 6
.005 STEP PERMISSIBLE (TYP)
.062 R MAX TYP
.005 STEP PERMISSIBLE (TYP)
.062 R MAX TYP
1.3750 +.0002 -.0000 DIA
CHAMFER 45°x.062
4.646±.001 DIA
5.062 DIA REF
4.6875 +.0002 -.0000 DIA
4.3748±.0001 DIA
8.250 +.000 -.002 DIA
A.0002 TIR
-A-
A.0005 TIR
-D-
∥BC.001
D.001 TIR
⊥A.0002
A.001 TIR
.062 R
⌒.0005
1.3750 +.0002 -.0000 DIA
2.437±.002
X SEE NOTE 6
4.437
CHAMFER 45°x.062
4.8430±.0015
⊥A.0002
SECTION A-A

✱ KIC PN- 52386900640

01582

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011631	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
1011317 ✱

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900770

DRAWN V. AMATO DATE 6-4-63
CHECKED E. Strickland 6-4-63
APPROVAL E. MacDonald 6-4-63
APPROVAL E. Mau 6-4-1963
NASA APPROVAL Jack Barnard
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL BASE, FINAL MACHINING

CODE IDENT NO.
SIZE E
NASA NUMBER 1011618

SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

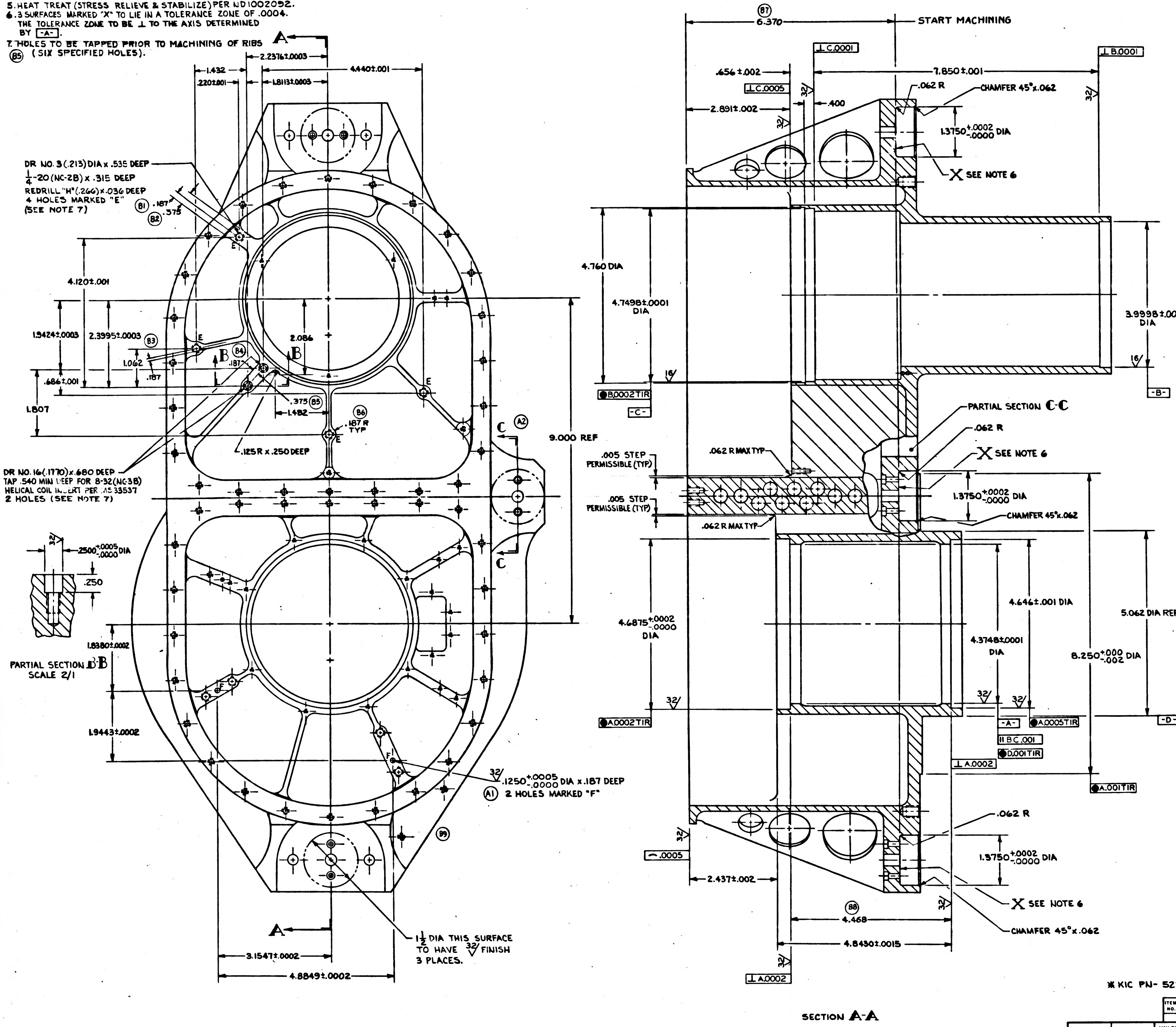
A 1011618

1011618

B 1011618

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED & UPGRADED TO CLASS A. TDRR 01421	6-26-63	WK
B		REVISED PER TDRR NO. 03376	9/25/63	

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63 FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. HEAT TREAT (STRESS RELIEVE & STABILIZE) PER ND1002092.
6. 3 SURFACES MARKED "X" TO LIE IN A TOLERANCE ZONE OF .0004. THE TOLERANCE ZONE TO BE ⊥ TO THE AXIS DETERMINED BY -A-.
7. HOLES TO BE TAPPED PRIOR TO MACHINING OF RIBS (B5) (SIX SPECIFIED HOLES).


A
2.2376±.0003
1.432
4.440±.001
.220±.001
1.8113±.0003
DR NO. 3 (.213) DIA x .535 DEEP
1/4-20 (NC-2B) x .315 DEEP
REDRILL "H" (.266) x .036 DEEP
4 HOLES MARKED "E"
(SEE NOTE 7)
(B1) .187
(B2) .375
E
4.120±.001
1.9424±.0003
2.3995±.0003
(B3)
1.062
.187
.686±.001
1.807
B
(B4)
.187
2.086
.375 (B5)
1.482
(B6)
.187 R TYP
.125 R x .250 DEEP
C
(A2)
9.000 REF
DR NO. 16 (.1770) x .680 DEEP
TAP .540 MIN DEEP FOR 8-32 (NC-3B)
HELICAL COIL INSERT PER MS33537
2 HOLES (SEE NOTE 7)
32
.2500 +.0005 -.0000 DIA
.250
PARTIAL SECTION B-B
SCALE 2/1
1.8380±.0002
1.9443±.0002
F
32
.1250 +.0005 -.0000 DIA x .187 DEEP
(A1) 2 HOLES MARKED "F"
(B9)
1 1/2 DIA THIS SURFACE
TO HAVE 32 FINISH
3 PLACES.
3.1547±.0002
4.8849±.0002
(B7)
6.370
START MACHINING
⊥ C .0001
⊥ B .0001
.656±.002
⊥ C .0005
7.850±.001
.062 R
CHAMFER 45° x .062
2.891±.002
.400
1.3750 +.0002 -.0000 DIA
X SEE NOTE 6
4.760 DIA
4.7498±.0001 DIA
3.9998±.0001 DIA
16
● B .0002 TIR
-C-
-B-
PARTIAL SECTION C-C
.062 R
X SEE NOTE 6
.005 STEP PERMISSIBLE (TYP)
.062 R MAX TYP
.005 STEP PERMISSIBLE (TYP)
.062 R MAX TYP
1.3750 +.0002 -.0000 DIA
CHAMFER 45° x .062
4.646±.001 DIA
5.062 DIA REF
4.6875 +.0002 -.0000 DIA
4.3748±.0001 DIA
8.250 +.000 -.002 DIA
32
● A .0002 TIR
-A-
● A .0005 TIR
-D-
∥ B C .001
● D .001 TIR
⊥ A .0002
● A .001 TIR
⌒ .0005
.062 R
1.3750 +.0002 -.0000 DIA
2.437±.002
X SEE NOTE 6
(B8)
4.468
CHAMFER 45° x .062
4.8430±.0015
⊥ A .0002

SECTION A-A

✱ KIC PN- 52386900640

01582

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011631	1011000
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
1011317 ✱

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900770

DRAWN V. AMATO DATE 6-4-63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL BASE, FINAL MACHINING

CODE IDENT NO.
SIZE E
NASA NUMBER 1011618

SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF

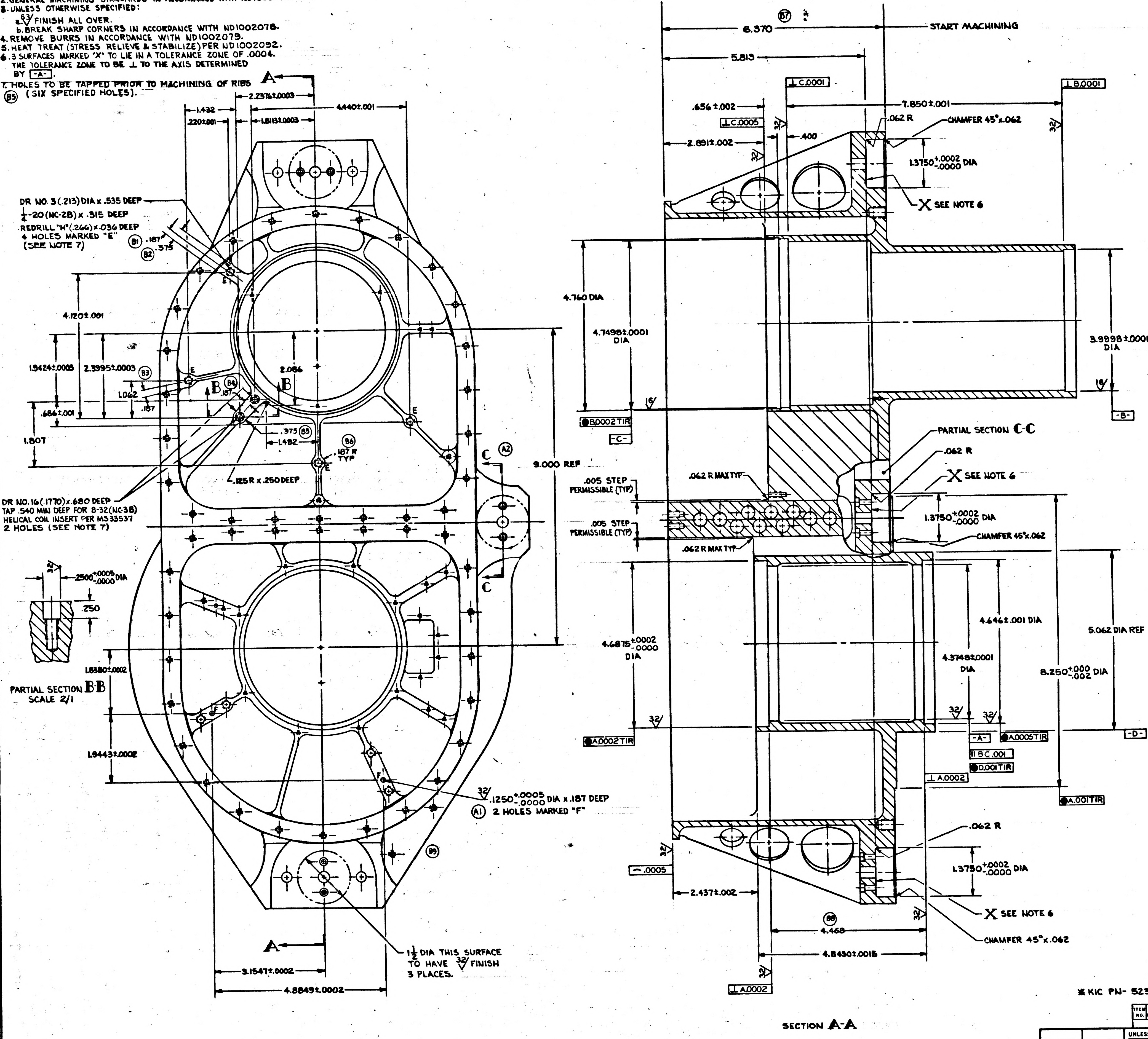
1011618

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. HEAT TREAT (STRESS RELIEVE & STABILIZE) PER ND1002092.
6. 3 SURFACES MARKED "X" TO LIE IN A TOLERANCE ZONE OF .0004. THE TOLERANCE ZONE TO BE ⊥ TO THE AXIS DETERMINED BY -A-.
7. HOLES TO BE TAPPED PRIOR TO MACHINING OF RIBS (SIX SPECIFIED HOLES). (B5)

C	8191101

REVISIONS

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED & UPGRADED TO CLASS A. TDRR 01421	6-26-63	WK
B		REVISED PER TDRR NO. 03376	9/25/63	9/26
C		REVISED PER TDRR NO. 03858	15 OCT 63	WK


A
2.2376±.0003
1.432
.220±.001
1.8113±.0003
4.440±.001
DR NO. 3 (.213) DIA x .535 DEEP
1/4-20 (NC-2B) x .315 DEEP
REDRILL "H" (.266) x .036 DEEP
4 HOLES MARKED "E"
(SEE NOTE 7)
(B1) .187
(B2) .375
4.120±.001
1.9424±.0003
2.3995±.0003
(B3)
E
1.062
.187
(B4)
B
.187
2.086
.686±.001
1.807
.375 (B5)
1.482
(B6)
.187 R TYP
.125 R x .250 DEEP
C
(A2)
9.000 REF
DR NO. 16 (.1770) x .680 DEEP
TAP .540 MIN DEEP FOR 8-32 (NC-3B)
HELICAL COIL INSERT PER MS33537
2 HOLES (SEE NOTE 7)
32
.2500 +.0005 -.0000 DIA
.250
PARTIAL SECTION B-B
SCALE 2/1
1.8380±.0002
1.9443±.0002
F
32
.1250 +.0005 -.0000 DIA x .187 DEEP
(A1) 2 HOLES MARKED "F"
(B9)
1 1/2 DIA THIS SURFACE
TO HAVE 32√ FINISH
3 PLACES.
3.1547±.0002
4.8849±.0002
(B7)
6.370
START MACHINING
5.813
⊥ C .0001
⊥ B .0001
.656±.002
⊥ C .0005
7.850±.001
.062 R
CHAMFER 45°x.062
2.891±.002
.400
32
1.3750 +.0002 -.0000 DIA
X SEE NOTE 6
4.760 DIA
4.7498±.0001 DIA
3.9998±.0001 DIA
16
◉ B .0002 TIR
-C-
-B-
PARTIAL SECTION C-C
.062 R
.062 R MAX TYP
X SEE NOTE 6
.005 STEP PERMISSIBLE (TYP)
.005 STEP PERMISSIBLE (TYP)
1.3750 +.0002 -.0000 DIA
.062 R MAX TYP
CHAMFER 45°x.062
4.646±.001 DIA
5.062 DIA REF
4.6875 +.0002 -.0000 DIA
4.3748±.0001 DIA
8.250 +.000 -.002 DIA
32
◉ A .0002 TIR
-A-
◉ A .0005 TIR
-D-
∥ B C .001
◉ D .001 TIR
⊥ A .0002
◉ A .001 TIR
.062 R
⌒ .0005
1.3750 +.0002 -.0000 DIA
2.437±.002
X SEE NOTE 6
(B8)
4.468
CHAMFER 45°x.062
4.8450±.0015
⊥ A .0002

SECTION A-A

✱ KIC PN- 52386900640

01582

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011631	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	± .005	± 1°

DO NOT SCALE THIS DRAWING
MATERIAL
1011317 ✱
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900770
DRAWN V. AMATO DATE 6-4-63
CHECKED E. [illegible] 6-4-63
APPROVAL E. [illegible] 6-4-63
APPROVAL E. [illegible] 6-26-1963
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL BASE, FINAL MACHINING

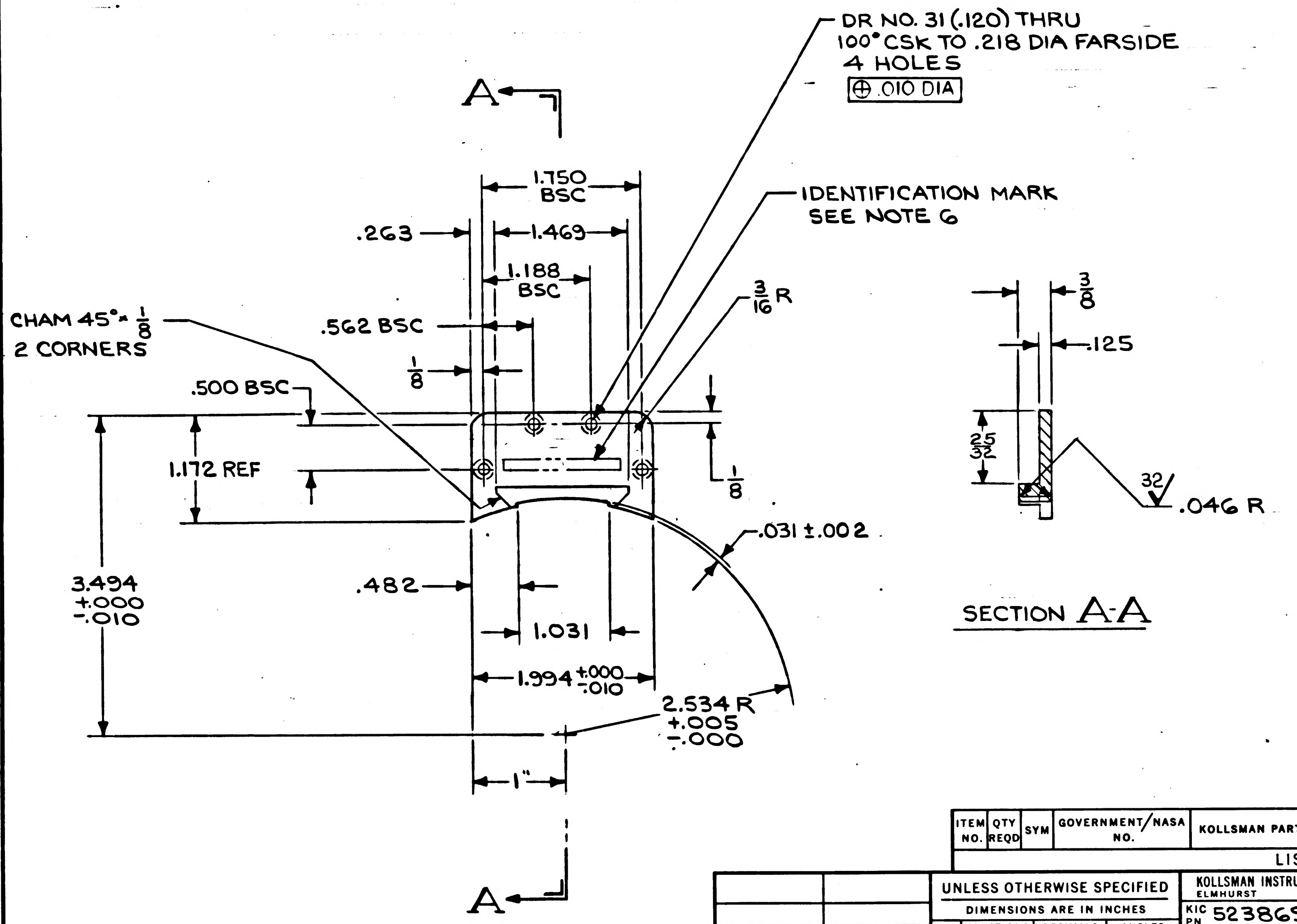
CODE IDENT NO.
SIZE E
NASA NUMBER 1011618
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

1011623

REVISIONS 01369				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORD WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63/ FINISH ALL OVER.
   b. √ BREAK SHARP CORNERS IN ACCORD WITH ND 1002078.
4. REMOVE BURRS IN ACCORD WITH ND 1002079.
5. FINISH: ANODIZE PER MIL-A-8625, TYPE II (KPS.1005A.200)
6. IDENTIFY USING NASA DWG NO. REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.


DR NO. 31 (.120) THRU
100° CSK TO .218 DIA FARSIDE
4 HOLES
⊕ .010 DIA
A
A
1.750 BSC
.263
1.469
1.188 BSC
.562 BSC
1/8
3/16 R
CHAM 45° × 1/8
2 CORNERS
.500 BSC
IDENTIFICATION MARK
SEE NOTE 6
1.172 REF
1/8
.031 ±.002
3.494 +.000 -.010
.482
1.031
1.994 +.000 -.010
2.534 R +.005 -.000
1"
3/8
.125
25/32
32
.046 R
SECTION A-A

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011000	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 2024-T4 FED. SPEC QQ-A-268 TEMPER T4

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900780

DRAWN F. Schiller DATE 3-21-63
CHECKED W. W. Lang 5-22-63
APPROVAL 5-22-63
APPROVAL E. Thomp 5-22-63
NASA APPROVAL Jack Barnard
MIT APPROVAL 24 May

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PLATE,
FLEXPRINT CONDUIT

CODE IDENT NO.
SIZE C
NASA NUMBER 1011623
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011623

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

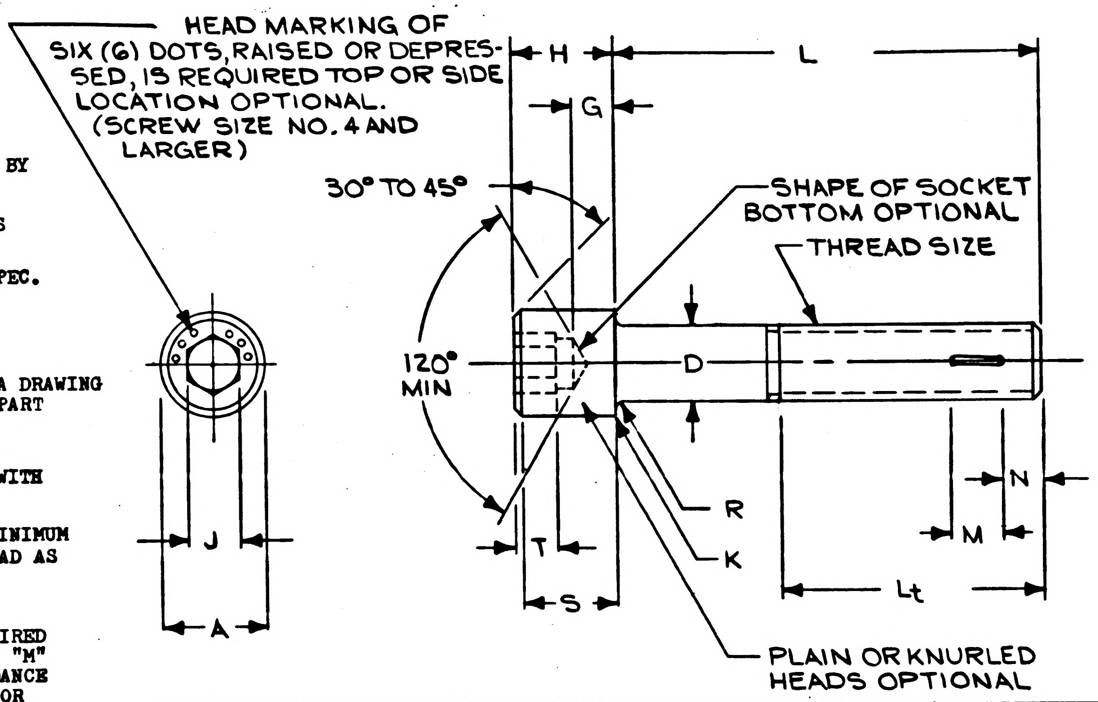
1011625 A

REVISIONS 02919				
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 14077	11-12-64	WK

REQUIREMENTS:

1. **GENERAL:**
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   - C. SCREWS SHALL BE MANUFACTURED IN ACCORDANCE WITH FEDERAL SPEC. FF-S-86; TYPE VI, NAS 1352 (FOR COARSE THREAD SERIES) AND NAS 1351 (FOR FINE THREAD SERIES)
2. **INSPECTION AND ACCEPTANCE:**
   - A. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER, DASH NUMBER, AND MANUFACTURER'S PART NUMBER PER MIL-STD-129.
   - B. DIMENSIONS AS SHOWN. NOTE THAT DIMENSIONS ARE IDENTICAL WITH NAS 1351 , NAS 1352 EXCEPT FOR LENGTHS.
   - C. THREAD LENGTH (L_t) SCREWS HAVING A LENGTH LESS THAN THE MINIMUM BASIC THREAD LENGTH, SHALL BE THREADED AS CLOSE TO THE HEAD AS PRACTICABLE.
   - D. LOCKING LENGTH (M) - MINIMUM OF FIVE (5) THREAD PITCHES. REGION OF MINIMUM ENGAGEMENT WITH FULL FEMALE THREAD REQUIRED TO MEET MIL-F-18240 REQUIREMENTS. LOCKING ELEMENT WITHIN "M" REGION MUST DEVELOP REQUIRED TORQUE WHEN TESTED IN ACCORDANCE WITH MIL-F-18240. LENGTH OF LOCKING ELEMENT MAY BE MORE OR LESS THAN "M" PROVIDING ALL OTHER REQUIREMENTS ARE MET.
   - E. LENGTH OF POINT LEAD (N) - ONE (1) COMPLETE THREAD PLUS UNTHREADED PORTION OF END. FOR EASE OF STARTING, LOCKING ELEMENT SHALL NOT BE EFFECTIVE WITHIN THIS AREA.
3. **DESIGN REQUIREMENTS:**
   - A. SELF-LOCKING ELEMENT SHALL BE STRIP TYPE IN ACCORDANCE WITH MIL-F-18240.
   - B. MATERIAL: CRES IN ACCORDANCE WITH FF-S-86.
   - C. FINISH: PASSIVATE IN ACCORDANCE WITH FF-S-86

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING.


HEAD MARKING OF SIX (6) DOTS, RAISED OR DEPRESSED, IS REQUIRED TOP OR SIDE LOCATION OPTIONAL. (SCREW SIZE NO. 4 AND LARGER)
H
G
L
30° TO 45°
SHAPE OF SOCKET BOTTOM OPTIONAL
THREAD SIZE
120° MIN
D
N
M
R
K
J
T
S
A
Lt
PLAIN OR KNURLED HEADS OPTIONAL

THREAD SIZE	D BODY DIAMETER MAX	D BODY DIAMETER MIN	A HEAD DIAMETER MAX	A HEAD DIAMETER MIN	H HEAD HEIGHT MAX	H HEAD HEIGHT MIN	S HEAD SIDE HEIGHT MIN	J SOCKET SIZE MAX	J SOCKET SIZE MIN	T KEY ENGAGEMENT MIN	G WALL TH'KNESS MIN	R RADIUS OF FILLET UNDER HEAD MAX	R RADIUS OF FILLET UNDER HEAD MIN	K CHAMFER OR RADIUS MAX	L_t MINIMUM BASIC THREAD LENGTH	MINIMUM BREAKING STRENGTH (POUNDS) CORROSION RESISTING STEEL
NO. 1-64UNC-3A	.073	.0695	.118	.112	.073	.070	.066	.0635	.0625	.031	.023	.007	.003	.003	.625	210
NO. 2-56UNC-3A	.086	.0822	.140	.134	.086	.083	.077	.0791	.0781	.038	.028	.008	.004			300
NO. 3-48UNC-3A	.099	.0949	.161	.154	.099	.095	.089			.044	.032					390
NO. 4-40UNC-3A	.112	.1075	.183	.176	.112	.108	.101	.0952	.0937	.051	.036	.009	.005	.005	.750	480
NO. 6-32UNC-3A	.138	.1329	.226	.218	.138	.134	.124	.1111	.1094	.064	.044	.010	.006			730
NO. 8-32UNC-3A	.164	.1585	.270	.262	.164	.159	.148	.1426	.1406	.077	.052	.012	.007		.875	1120
NO.10-24UNC-3A	.190	.1840	.312	.303	.190	.185	.171	.1587	.1562	.090	.061	.014	.009			1400
NO.10-32UNF-3A																1600
1/4-28UNF-3A	.250	.2435	.375	.365	.250	.244	.225	.1900	.1875	.120	.080			.008	1.000	2910

KIC
PN 74455151001-1096

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

MASTER

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 3
HEAT TREATMENT —
FINAL FINISH —

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN MARINELLI DATE 8-1-63
CHECKED Cw Contin 8/27/63
APPROVAL Lanulmann 8/27/63
APPROVAL Ea Thurup 8/30/63
NASA APPROVAL K Whilak 9/5/63
MIT APPROVAL D. Hazel 9/5/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCREW, CAP, HEX SOC HD
SELF LOCKING
(SPEC CONTROL DWG)

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011625
SCALE ~
WT
SHEET 1 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1011625 A

REVISIONS 0277

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 14077	11-12-64	WR

L LENGTH	TOL	THREAD SIZE & DASH NO.								
		1-64 UNC-3A	2-56 UNC-3A	3-48 UNC-3A	4-40 UNC-3A	6-32 UNC-3A	8-32 UNC-3A	10-24 UNC-3A	10-32 UNF-3A	1/4-28 UNF-3A
.125	±.015		-8		-25					
..188				-16	-26					
.250								-66		
.313		-4	-11	-18	-28	-39	-51	-67		
.375										
.438		-6	-13	-20	-30	-41	-53	-68		-85
.500		-7								
.563			-15	-22	-32	-43	-55		-70	-87
.625										
.688				-24	-34	-45	-57		-72	-89
.750				-96						
.813					-36	-47	-59		-74	-91
.875					-37					
.938						-49	-61		-76	-93
1.000										
1.125	+.030 -.015						-63		-78	-95
1.250										

REFERENCE ONLY

NASA DASH NO.	KIC DASH NO.	NASA DASH NO.	KIC DASH NO.	NASA DASH NO.	KIC DASH NO.	NASA DASH NO.	KIC DASH NO.
- 4	1004	-25	1025	-47	1048	-70	1071
- 6	1006	-26	1026	-49	1050	-72	1073
- 7	1007	-28	1028	-51	1052	-74	1075
- 8	1008	-30	1030	-53	1054	-76	1077
-11	1011	-32	1032	-55	1056	-78	1079
-13	1013	-34	1034	-57	1058	-85	1085
-15	1015	-36	1036	-59	1060	-87	1087
-16	1016	-37	1037	-61	1062	-89	1089
-18	1018	-39	1040	-63	1064	-91	1091
-20	1020	-41	1042	-66	1067	-93	1093
-22	1022	-43	1044	-67	1068	-95	1095
-24	1024	-45	1046	-68	1069	-96	

MASTER

KIC PART NO
74455151001-1096

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN MARINELLI DATE 8-21-63
CHECKED 8/27/63
APPROVAL 8/27
APPROVAL E. Thomp 8/30/63
NASA APPROVAL 9/5/63
MIT APPROVAL J. Hazel 9/5/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCREW, CAP, HEX SOC HD
SELF LOCKING
(SPEC CONTROL DWG)

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011625
SCALE ~
WT
SHEET 2 OF 2

1011625 A

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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B 1011625

REVISIONS 02717			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 14077	11-12-64	wk
B	REVISED PER TDRR 16133	2/5/65	WK

REQUIREMENTS:

1. GENERAL:

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.

C. SCREWS SHALL BE MANUFACTURED IN ACCORDANCE WITH FEDERAL SPEC. FF-S-86; TYPE VI, NAS 1352 (FOR COARSE THREAD SERIES) AND NAS 1351 (FOR FINE THREAD SERIES)

2. INSPECTION AND ACCEPTANCE:

A. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER, DASH NUMBER, AND MANUFACTURER'S PART NUMBER PER MIL-STD-129.

B. DIMENSIONS AS SHOWN. NOTE THAT DIMENSIONS ARE IDENTICAL WITH NAS 1351 , NAS 1352 EXCEPT FOR LENGTHS.

C. THREAD LENGTH (L_t) SCREWS HAVING A LENGTH LESS THAN THE MINIMUM BASIC THREAD LENGTH, SHALL BE THREADED AS CLOSE TO THE HEAD AS PRACTICABLE.

D. LOCKING LENGTH (M) - MINIMUM OF FIVE (5) THREAD PITCHES. REGION OF MINIMUM ENGAGEMENT WITH FULL FEMALE THREAD REQUIRED TO MEET MIL-F-18240 REQUIREMENTS. LOCKING ELEMENT WITHIN "M" REGION MUST DEVELOP REQUIRED TORQUE WHEN TESTED IN ACCORDANCE WITH MIL-F-18240. LENGTH OF LOCKING ELEMENT MAY BE MORE OR LESS THAN "M" PROVIDING ALL OTHER REQUIREMENTS ARE MET.

E. LENGTH OF POINT LEAD (N) - ONE (1) COMPLETE THREAD PLUS UNTHREADED PORTION OF END. FOR EASE OF STARTING, LOCKING ELEMENT SHALL NOT BE EFFECTIVE WITHIN THIS AREA.

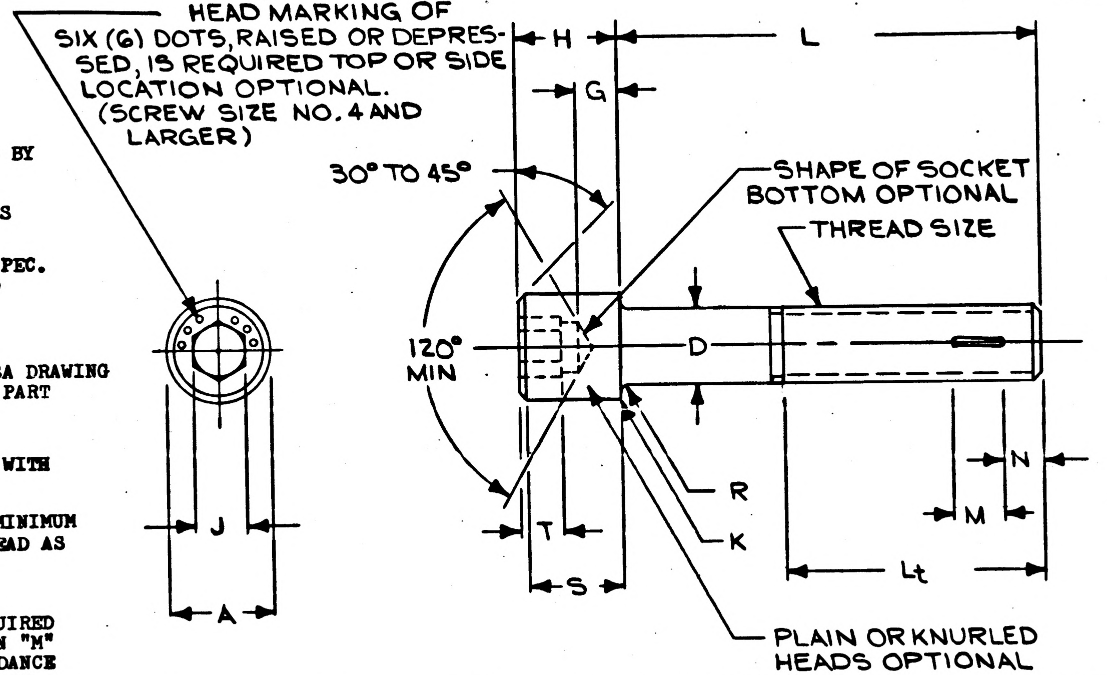
3. DESIGN REQUIREMENTS:

A. SELF-LOCKING ELEMENT SHALL BE STRIP TYPE IN ACCORDANCE WITH MIL-F-18240.

B. MATERIAL: CRES IN ACCORDANCE WITH FF-S-86.

C. FINISH: PASSIVATE IN ACCORDANCE WITH FF-S-86

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING.


HEAD MARKING OF SIX (6) DOTS, RAISED OR DEPRESSED, IS REQUIRED TOP OR SIDE LOCATION OPTIONAL. (SCREW SIZE NO. 4 AND LARGER)
H
L
G
30° TO 45°
SHAPE OF SOCKET BOTTOM OPTIONAL
THREAD SIZE
120° MIN
D
N
M
R
K
J
T
S
A
Lt
PLAIN OR KNURLED HEADS OPTIONAL

THREAD SIZE	D BODY DIAMETER		A HEAD DIAMETER		H HEAD HEIGHT		S HEAD SIDE HEIGHT	J SOCKET SIZE		T KEY ENGAGEMENT	G WALL THK'NESS	R RADIUS OF FILLET UNDER HEAD		K CHAMFER OR RADIUS	L_t MINIMUM BASIC THREAD LENGTH	MINIMUM BREAKING STRENGTH (POUNDS) CORROSION RESISTING STEEL
	MAX	MIN	MAX	MIN	MAX	MIN	MIN	MAX	MIN	MIN	MIN	MAX	MIN	MAX		
NO. 1-64UNC-3A	.073	.0695	.118	.112	.073	.070	.066	.0635	.0625	.031	.023	.007	.003	.003	.625	210
NO. 2-56UNC-3A	.086	.0822	.140	.134	.086	.083	.077	.0791	.0781	.038	.028	.008	.004			300
NO. 3-48UNC-3A	.099	.0949	.161	.154	.099	.095	.089			.044	.032					390
NO. 4-40UNC-3A	.112	.1075	.183	.176	.112	.108	.101	.0952	.0937	.051	.036	.009	.005	.005	.750	480
NO. 6-32UNC-3A	.138	.1329	.226	.218	.138	.134	.124	.1111	.1094	.064	.044	.010	.006			730
NO. 8-32UNC-3A	.164	.1585	.270	.262	.164	.159	.148	.1426	.1406	.077	.052	.012	.007		.875	1120
NO.10-24UNC-3A	.190	.1840	.312	.303	.190	.185	.171	.1587	.1562	.090	.061	.014	.009			1400
NO.10-32UNF-3A																1600
1/4-28UNF-3A	.250	.2435	.375	.365	.250	.244	.225	.1900	.1875	.120	.080			.008	1.000	2910

MASTER

KIC
PN 74455151001-1096

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 3
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN MARINELLI DATE 8-1-63
CHECKED 8/27/63
APPROVAL 8/27/63
APPROVAL 8/30/63
NASA APPROVAL 9/3/63
MIT APPROVAL 9/5/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCREW, CAP, HEX SOC HD
SELF LOCKING
(SPEC CONTROL DWG)

CODE IDENT NO. | SIZE C | NASA DRAWING NO. 1011625
SCALE ~ | WT | SHEET 1 OF 2

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1011625 B

REVISIONS 02717

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 14077	11-12-64	WK
B	REVISED PER TDRR 16133	2/9/65	WK

L LENGTH	TOL	THREAD SIZE & DASH NO.								
		1-64 UNC-3A	2-56 UNC-3A	3-48 UNC-3A	4-40 UNC-3A	6-32 UNC-3A	8-32 UNC-3A	10-24 UNC-3A	10-32 UNF-3A	1/4-28 UNF-3A
.125	±.015		-8		-25					
.188				-16	-26					
.250				-17				-66		
.313		-4	-11	-18	-28	-39	-51	-67		
.375										
.438		-6	-13	-20	-30	-41	-53	-68		-85
.500		-7								
.563			-15	-22	-32	-43	-55		-70	-87
.625										
.688				-24	-34	-45	-57		-72	-89
.750				-96						
.813					-36	-47	-59		-74	-91
.875					-37					
.938						-49	-61		-76	-93
1.000										
1.125	+.030 -.015						-63		-78	-95
1.250										

REFERENCE ONLY

NASA DASH NO.	KIC DASH NO.	NASA DASH NO.	KIC DASH NO.	NASA DASH NO.	KIC DASH NO.	NASA DASH NO.	KIC DASH NO.
-4	1004	-25	1025	-47	1048	-70	1071
-6	1006	-26	1026	-49	1050	-72	1073
-7	1007	-28	1028	-51	1052	-74	1075
-8	1008	-30	1030	-53	1054	-76	1077
-11	1011	-32	1032	-55	1056	-78	1079
-13	1013	-34	1034	-57	1058	-85	1085
-15	1015	-36	1036	-59	1060	-87	1087
-16	1016	-37	1037	-61	1062	-89	1089
-18	1018	-39	1040	-63	1064	-91	1091
-20	1020	-41	1042	-66	1067	-93	1093
-22	1022	-43	1044	-67	1068	-95	1095
-24	1024	-45	1046	-68	1069	-96	

MASTER

KIC PART NO
74455151001-1096

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN MARINELLI DATE 8-21-63
CHECKED 8/27/63
APPROVAL 8/27/63
APPROVAL E. Thomp 8/30/63
NASA APPROVAL 9/5/63
MIT APPROVAL 9/5/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCREW, CAP, HEX SOC HD
SELF LOCKING
(SPEC CONTROL DWG)

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011625
SCALE ~
WT
SHEET 2 OF 2

C 1011625

REVISIONS 02717

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 14077	11-12-64	WK
B	REVISED PER TDRR 16133	2/5/67	WK
C	REVISED PER TDRR 17172	18 May 65	WK

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REQUIREMENTS:

1. **GENERAL:**

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   B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.

   C. SCREWS SHALL BE MANUFACTURED IN ACCORDANCE WITH FEDERAL SPEC. FF-S-86; TYPE VI, NAS 1352 (FOR COARSE THREAD SERIES) AND NAS 1351 (FOR FINE THREAD SERIES)

2. **INSPECTION AND ACCEPTANCE:**

   A. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER, DASH NUMBER, AND MANUFACTURER'S PART NUMBER PER MIL-STD-129.

   B. DIMENSIONS AS SHOWN. NOTE THAT DIMENSIONS ARE IDENTICAL WITH NAS 1351, NAS 1352 EXCEPT FOR LENGTHS.

   C. THREAD LENGTH (L_t) SCREWS HAVING A LENGTH LESS THAN THE MINIMUM BASIC THREAD LENGTH, SHALL BE THREADED AS CLOSE TO THE HEAD AS PRACTICABLE.

   D. LOCKING LENGTH (M) - MINIMUM OF FIVE (5) THREAD PITCHES. REGION OF MINIMUM ENGAGEMENT WITH FULL FEMALE THREAD REQUIRED TO MEET MIL-F-18240 REQUIREMENTS. LOCKING ELEMENT WITHIN "M" REGION MUST DEVELOP REQUIRED TORQUE WHEN TESTED IN ACCORDANCE WITH MIL-F-18240. LENGTH OF LOCKING ELEMENT MAY BE MORE OR LESS THAN "M" PROVIDING ALL OTHER REQUIREMENTS ARE MET.

   E. LENGTH OF POINT LEAD (N) - ONE (1) COMPLETE THREAD PLUS UNTHREADED PORTION OF END. FOR EASE OF STARTING, LOCKING ELEMENT SHALL NOT BE EFFECTIVE WITHIN THIS AREA.

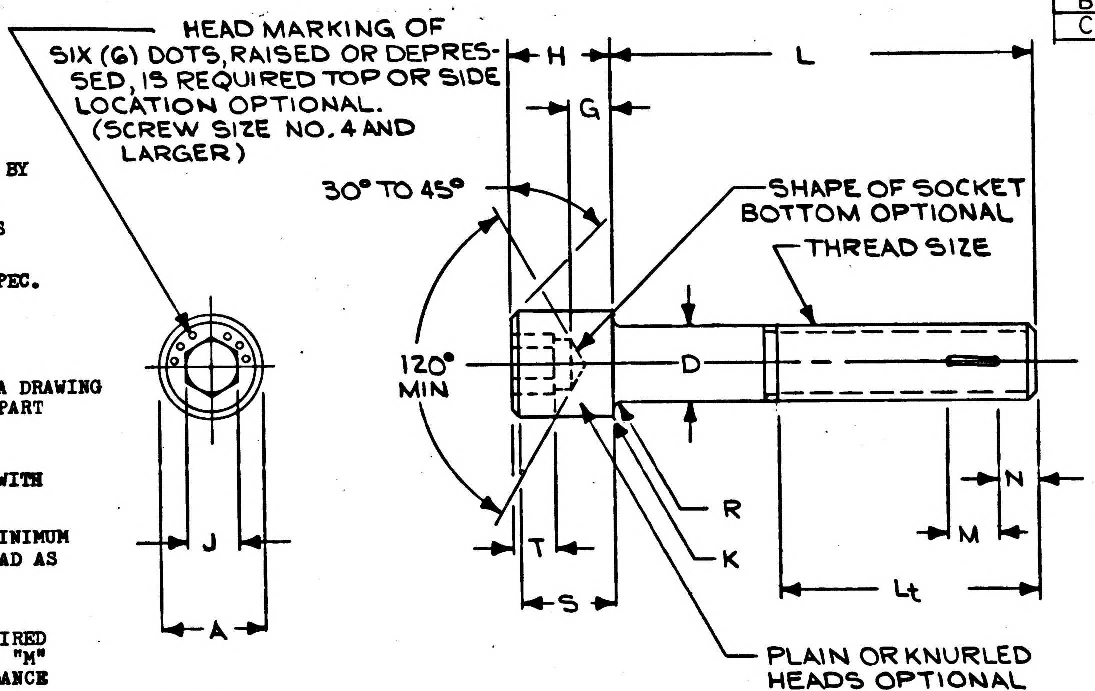
3. **DESIGN REQUIREMENTS:**

   A. SELF-LOCKING ELEMENT SHALL BE STRIP TYPE IN ACCORDANCE WITH MIL-F-18240.

   B. MATERIAL: CRES IN ACCORDANCE WITH FF-S-86.

   C. FINISH: PASSIVATE IN ACCORDANCE WITH FF-S-86

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING.


HEAD MARKING OF SIX (6) DOTS, RAISED OR DEPRESSED, IS REQUIRED TOP OR SIDE LOCATION OPTIONAL. (SCREW SIZE NO. 4 AND LARGER)
H
L
G
30° TO 45°
SHAPE OF SOCKET BOTTOM OPTIONAL
THREAD SIZE
120° MIN
D
R
K
N
M
Lt
J
T
S
A
PLAIN OR KNURLED HEADS OPTIONAL

THREAD SIZE	D BODY DIAMETER		A HEAD DIAMETER		H HEAD HEIGHT		S HEAD SIDE HEIGHT	J SOCKET SIZE		T KEY ENGAGEMENT	G WALL TH'KNESS	R RADIUS OF FILLET UNDER HEAD		K CHAMFER OR RADIUS	Lt MINIMUM BASIC THREAD LENGTH	MINIMUM BREAKING STRENGTH (POUNDS) CORROSION RESISTING STEEL
	MAX	MIN	MAX	MIN	MAX	MIN	MIN	MAX	MIN	MIN	MIN	MAX	MIN	MAX		
NO. 1-64UNC-3A	.073	.0695	.118	.112	.073	.070	.066	.0635	.0625	.031	.023	.007	.003	.003	.625	210
NO. 2-56UNC-3A	.086	.0822	.140	.134	.086	.083	.077	.0791	.0781	.038	.028	.008	.004			300
NO. 3-48UNC-3A	.099	.0949	.161	.154	.099	.095	.089			.044	.032					390
NO. 4-40UNC-3A	.112	.1075	.183	.176	.112	.108	.101	.0952	.0937	.051	.036	.009	.005	.005	.750	480
NO. 6-32UNC-3A	.138	.1329	.226	.218	.138	.134	.124	.1111	.1094	.064	.044	.010	.006			730
NO. 8-32UNC-3A	.164	.1585	.270	.262	.164	.159	.148	.1426	.1406	.077	.052	.012	.007		.875	1120
NO.10-24UNC-3A	.190	.1840	.312	.303	.190	.185	.171	.1587	.1562	.090	.061	.014	.009			1400
NO.10-32UNF-3A																1600
1/4-28UNF-3A	.250	.2435	.375	.365	.250	.244	.225	.1900	.1875	.120	.080			.008	1.000	2910

KIC
PN 74455151001-1096

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 3
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN MARINELLI DATE 8-1-63
CHECKED 8/27/63
APPROVAL 8/27/63
APPROVAL 8/30/63
NASA APPROVAL 9/3/63
MIT APPROVAL 9/5/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCREW, CAP, HEX SOC HD
SELF LOCKING
(SPEC CONTROL DWG)

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011625
SCALE ~
WT
SHEET 1 OF 2

MASTER

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

C 1011625

REVISIONS 02717

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 14077	11-12-64	WR
B	REVISED PER TDRR 16133	2/9/65	WR
C	REVISED PER TDRR 17172	[illegible]	WR

L LENGTH	TOL	THREAD SIZE & DASH NO.								
		1-64 UNC-3A	2-56 UNC-3A	3-48 UNC-3A	4-40 UNC-3A	6-32 UNC-3A	8-32 UNC-3A	10-24 UNC-3A	10-32 UNF-3A	1/4-28 UNF-3A
.125	±.015		-8		-25					
.188			-9	-16	-26					
.250				-17				-66		
.313		-4	-11	-18	-28	-39	-51	-67		
.375										
.438		-6	-13	-20	-30	-41	-53	-68		-85
.500		-7								
.563			-15	-22	-32	-43	-55		-70	-87
.625										
.688				-24	-34	-45	-57		-72	-89
.750				-96						
.813					-36	-47	-59		-74	-91
.875					-37					
.938						-49	-61		-76	-93
1.000										
1.125	+.030 -.015						-63		-78	-95
1.250										

REFERENCE ONLY

NASA DASH NO.	KIC DASH NO.	NASA DASH NO.	KIC DASH NO.	NASA DASH NO.	KIC DASH NO.	NASA DASH NO.	KIC DASH NO.
-4	1004	-25	1025	-47	1048	-70	1071
-6	1006	-26	1026	-49	1050	-72	1073
-7	1007	-28	1028	-51	1052	-74	1075
-8	1008	-30	1030	-53	1054	-76	1077
-11	1011	-32	1032	-55	1056	-78	1079
-13	1013	-34	1034	-57	1058	-85	1085
-15	1015	-36	1036	-59	1060	-87	1087
-16	1016	-37	1037	-61	1062	-89	1089
-18	1018	-39	1040	-63	1064	-91	1091
-20	1020	-41	1042	-66	1067	-93	1093
-22	1022	-43	1044	-67	1068	-95	1095
-24	1024	-45	1046	-68	1069	-96	

MASTER

NEXT ASSY	USED ON
APPLICATION	

KIC PART NO
7445515I001-1096

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN MARINELLI DATE 8-21-63
CHECKED 8/27/63
APPROVAL 8/27/63
APPROVAL E. Thomp 8/30/63
NASA APPROVAL 9/5/63
MIT APPROVAL 9/5/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCREW, CAP, HEX SOC HD
SELF LOCKING
(SPEC CONTROL DWG)

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011625
SCALE ~
WT
SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

D 1011625 (M)

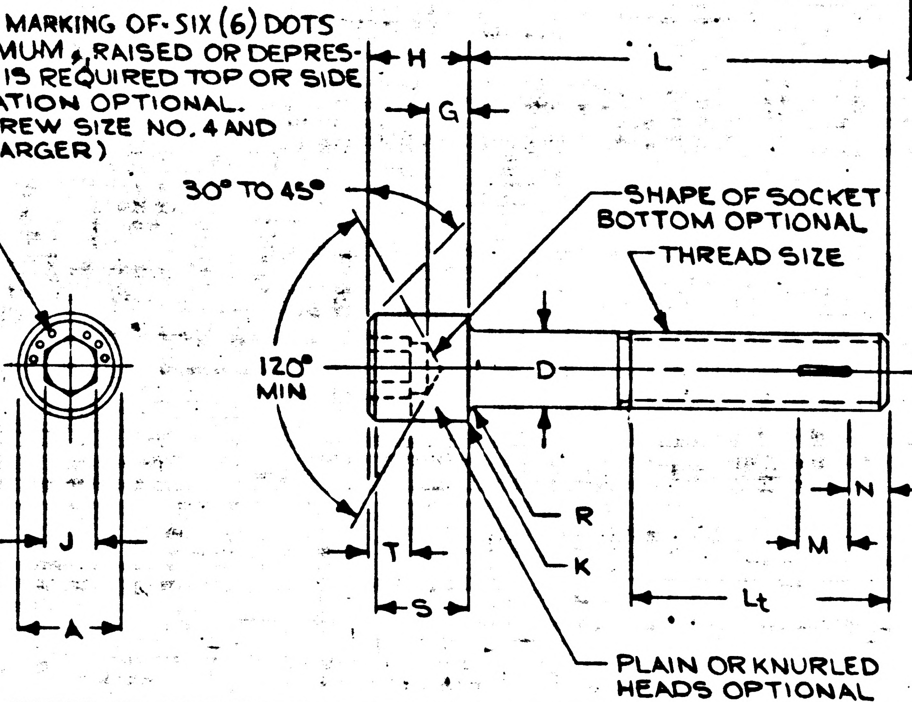
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 14077	11-12-64	WK
B	REVISED PER TDRR 16133	2/3/67	WK
C	REVISED PER TDRR 17172	18 May 67	WK
D	REVISED PER TDRR 32814	6APR67	

REVISIONS C-717

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN MD 1015404, CLASS 3.
   - C. SCREWS SHALL BE MANUFACTURED IN ACCORDANCE WITH FEDERAL SPEC. FF-S-86; TYPE VI, NAS 1352 (FOR COARSE THREAD SERIES) AND NAS 1351 (FOR FINE THREAD SERIES)
2. INSPECTION AND ACCEPTANCE:
   - A. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER, DASH NUMBER, AND MANUFACTURER'S PART NUMBER PER MIL-STD-129.
   - B. DIMENSIONS AS SHOWN. NOTE THAT DIMENSIONS ARE IDENTICAL WITH NAS 1351 , NAS 1352 EXCEPT FOR LENGTHS.
   - C. THREAD LENGTH (L_t) SCREWS HAVING A LENGTH LESS THAN THE MINIMUM BASIC THREAD LENGTH, SHALL BE THREADED AS CLOSE TO THE HEAD AS PRACTICABLE.
   - D. LOCKING LENGTH (M) - MINIMUM OF FIVE (5) THREAD PITCHES. REGION OF MINIMUM ENGAGEMENT WITH FULL FEMALE THREAD REQUIRED TO MEET MIL-F-18240 REQUIREMENTS. LOCKING ELEMENT WITHIN "M" REGION MUST DEVELOP REQUIRED TORQUE WHEN TESTED IN ACCORDANCE WITH MIL-F-18240. LENGTH OF LOCKING ELEMENT MAY BE MORE OR LESS THAN "M" PROVIDING ALL OTHER REQUIREMENTS ARE MET.
   - E. LENGTH OF POINT LEAD (N) - ONE (1) COMPLETE THREAD PLUS UNTHREADED PORTION OF END. FOR EASE OF STARTING, LOCKING ELEMENT SHALL NOT BE EFFECTIVE WITHIN THIS AREA.
3. DESIGN REQUIREMENTS:
   - A. SELF-LOCKING ELEMENT SHALL BE STRIP TYPE IN ACCORDANCE WITH MIL-F-18240.
   - B. MATERIAL: CRES IN ACCORDANCE WITH FF-S-86.
   - C. FINISH: PASSIVATE IN ACCORDANCE WITH FF-S-86

PROCURE ONLY FROM APPROVED SOURCES LISTED IN MD 1002034 FOR THIS DRAWING.


HEAD MARKING OF SIX (6) DOTS MINIMUM, RAISED OR DEPRESSED, IS REQUIRED TOP OR SIDE LOCATION OPTIONAL. (SCREW SIZE NO. 4 AND LARGER)
H
L
G
30° TO 45°
SHAPE OF SOCKET BOTTOM OPTIONAL
THREAD SIZE
120° MIN
D
N
R
J
T
M
K
S
Lt
A
PLAIN OR KNURLED HEADS OPTIONAL

THREAD SIZE	D BODY DIAMETER MAX	D BODY DIAMETER MIN	A HEAD DIAMETER MAX	A HEAD DIAMETER MIN	H HEAD HEIGHT MAX	H HEAD HEIGHT MIN	S HEAD SIDE HEIGHT MIN	J SOCKET SIZE MAX	J SOCKET SIZE MIN	T KEY ENGAGEMENT MIN	G WALL TH'KNESS MIN	R RADIUS OF FILLET UNDER HEAD MAX	R RADIUS OF FILLET UNDER HEAD MIN	K CHAMFER OR RADIUS MAX	Lt MINIMUM BASIC THREAD LENGTH	MINIMUM BREAKING STRENGTH (POUNDS) CORROSION RESISTING STEEL
NO. 1-64UNC-3A	.073	.0695	.118	.112	.073	.070	.066	.0635	.0625	.031	.023	.007	.003	.003	.625	210
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NO. 6-32UNC-3A	.138	.1329	.226	.218	.138	.134	.124	.1111	.1094	.064	.044	.010	.006			730
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NO.10-32UNF-3A																1600
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KIC
PN 74455151001-1096

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MATERIAL SEE NOTE 3
HEAT TREATMENT —
FINAL FINISH —

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INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN MARINELLI DATE 8-1-63
CHECKED
APPROVAL
APPROVAL 8/30/63
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCREW, CAP, HEX SOC HD
SELF LOCKING
(SPEC CONTROL DWG)

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011625
SCALE ~
WT
SHEET 1 OF 2

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1011625 D

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 14077	11-12-64	WK
B	REVISED PER TDRR 16133	2/9/65	WK
C	REVISED PER TDRR 17172	[illegible] 65	WK
D	REVISION STATUS CHANGED	4APR67	G.J.V. / E.F.S

L LENGTH	TOL	THREAD SIZE & DASH NO.								
		1-64 UNC-3A	2-56 UNC-3A	3-48 UNC-3A	4-40 UNC-3A	6-32 UNC-3A	8-32 UNC-3A	10-24 UNC-3A	10-32 UNF-3A	1/4-28 UNF-3A
.125			-8		-25					
.188			-9	-16	-26					
.250				-17				-66		
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.750				-96						
.813					-36	-47	-59		-74	-91
.875					-37					
.938						-49	-61		-76	-93
1.000										
1.125	+.030 -.015						-63		-78	-95
1.250										

REFERENCE ONLY

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-11	1011	-32	1032	-55	1056	-78	1079
-13	1013	-34	1034	-57	1058	-85	1085
-15	1015	-36	1036	-59	1060	-87	1087
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KIC PART NO
74455151001-1096

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LIST OF MATERIALS

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APPLICATION

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MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN MARINELLI DATE 8-21-63
CHECKED 8/27/63
APPROVAL 8/27
APPROVAL E. Thomp 8/30/63
NASA APPROVAL
MIT APPROVAL 9/5/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCREW, CAP, HEX SOC HD
SELF LOCKING
(SPEC CONTROL DWG)

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011625
SCALE ~
WT
SHEET 2 OF 2

1011625 D

1011625

REVISIONS 02917			
SYM	DESCRIPTION	DATE	APPROVAL

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   - C. THREAD LENGTH (L_t) SCREWS HAVING A LENGTH LESS THAN THE MINIMUM BASIC THREAD LENGTH, SHALL BE THREADED AS CLOSE TO THE HEAD AS PRACTICABLE.
   - D. LOCKING LENGTH (M) - MINIMUM OF FIVE (5) THREAD PITCHES. REGION OF MINIMUM ENGAGEMENT WITH FULL FEMALE THREAD REQUIRED TO MEET MIL-F-18240 REQUIREMENTS. LOCKING ELEMENT WITHIN "M" REGION MUST DEVELOP REQUIRED TORQUE WHEN TESTED IN ACCORDANCE WITH MIL-F-18240. LENGTH OF LOCKING ELEMENT MAY BE MORE OR LESS THAN "M" PROVIDING ALL OTHER REQUIREMENTS ARE MET.
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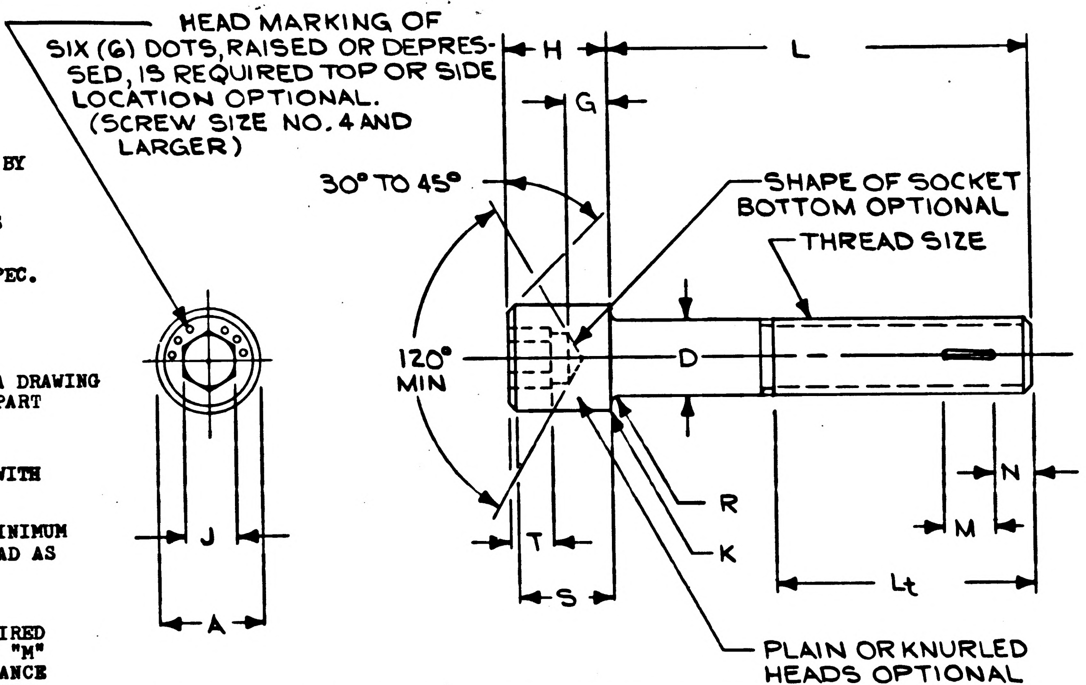
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PLAIN OR KNURLED HEADS OPTIONAL

THREAD SIZE	D BODY DIAMETER		A HEAD DIAMETER		H HEAD HEIGHT		S HEAD SIDE HEIGHT	J SOCKET SIZE		T KEY ENGAGEMENT	G WALL TH'KNESS	R RADIUS OF FILLET UNDER HEAD		K CHAMFER OR RADIUS	L_t MINIMUM BASIC THREAD LENGTH	MINIMUM BREAKING STRENGTH (POUNDS) CORROSION RESISTING STEEL
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1/4-28UNF-3A	.250	.2435	.375	.365	.250	.244	.225	.1900	.1875	.120	.080			.008	1.000	2910

SHEET 1	SHEET 2
REVISION STATUS OF SHEETS	

MASTER

NEXT ASSY	USED ON
APPLICATION	

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MANNED SPACECRAFT CENTER
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SCREW, CAP, HEX SOC HD
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CODE IDENT NO.
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SHEET 1 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011625

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1011625

REVISIONS 02919			
SYM	DESCRIPTION	DATE	APPROVAL

L LENGTH	TOL	THREAD SIZE & DASH NO.								
		1-64 UNC-3A	2-56 UNC-3A	3-48 UNC-3A	4-40 UNC-3A	6-32 UNC-3A	8-32 UNC-3A	10-24 UNC-3A	10-32 UNF-3A	1/4-28 UNF-3A
.125	±.015		-8		-25					
..188				-16	-26					
.250								-66		
.313		-4	-11	-18	-28	-39	-51	-67		
.375										
.438		-6	-13	-20	-30	-41	-53	-68		-85
.500		-7								
.563			-15	-22	-32	-43	-55		-70	-87
.625										
.688				-24	-34	-45	-57		-72	-89
.750										
.813					-36	-47	-59		-74	-91
.875					-37					
.938						-49	-61		-76	-93
1.000										
1.125	+.030 -.015						-63		-78	-95
1.250										

REFERENCE ONLY							
NASA DASH NO.	KIC DASH NO.	NASA DASH NO.	KIC DASH NO.	NASA DASH NO.	KIC DASH NO.	NASA DASH NO.	KIC DASH NO.
- 4	1004	-25	1025	-47	1048	-70	1071
- 6	1006	-26	1026	-49	1050	-72	1073
- 7	1007	-28	1028	-51	1052	-74	1075
- 8	1008	-30	1030	-53	1054	-76	1077
-11	1011	-32	1032	-55	1056	-78	1079
-13	1013	-34	1034	-57	1058	-85	1085
-15	1015	-36	1036	-59	1060	-87	1087
-16	1016	-37	1037	-61	1062	-89	1089
-18	1018	-39	1040	-63	1064	-91	1091
-20	1020	-41	1042	-66	1067	-93	1093
-22	1022	-43	1044	-67	1068	-95	1095
-24	1024	-45	1046	-68	1069		

MASTER

KIC PART NO
74455151001-1096

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN MARINELLI DATE 8-21-63
CHECKED 8/27/63
APPROVAL 8/27/63
APPROVAL E. Thomp 8/30/63
NASA APPROVAL 9/5/63
MIT APPROVAL J Hazel 9/5/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCREW, CAP, HEX SOC HD
SELF LOCKING
(SPEC CONTROL DWG)

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011625
SCALE ~
WT
SHEET 2 OF 2

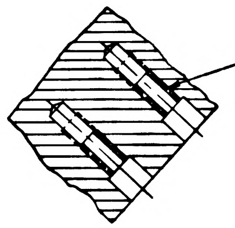
1011625

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

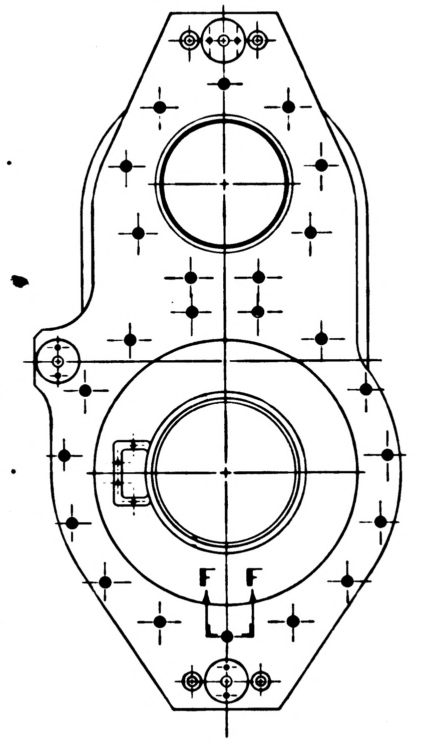
A	1011631

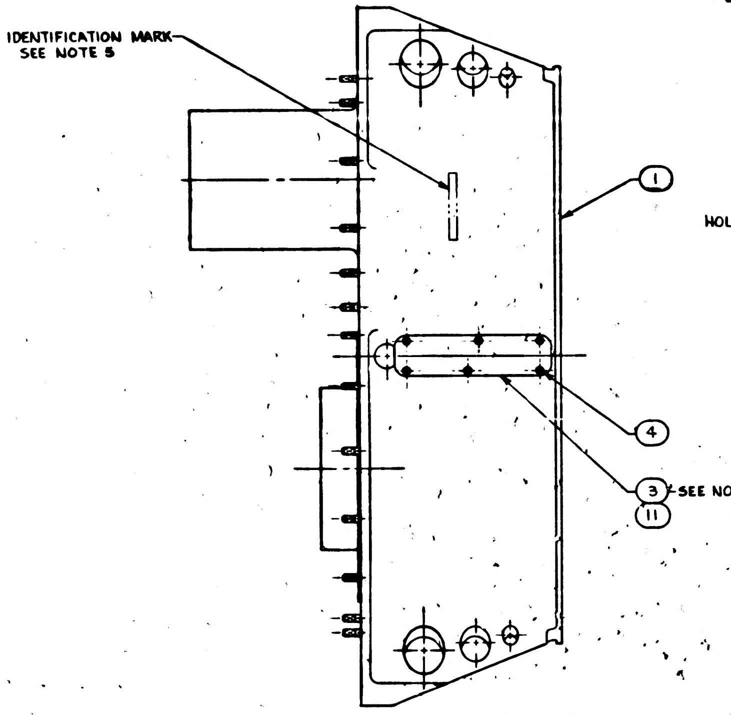
REVISIONS 02923				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A6		REVISED PER TDRR NO. 07559	4-7-64	

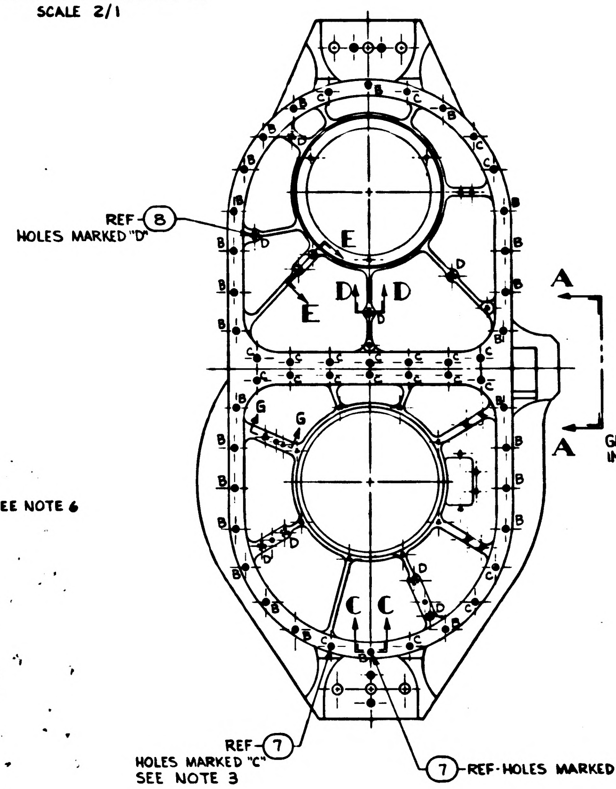
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. HEAT EXCHANGER LEAK TEST AS FOLLOWS:
   1) STATIC AIR PRESSURE PROOF TEST HEAT EXCHANGER PASSAGES AND FITTINGS AT 90 PSI PRESSURE DIFFERENTIAL FROM BASE TO AMBIENT
   2) HELIUM LEAK RATE TEST NOT TO EXCEED 5 X 10^{-8} CC/SEC. AT 77.5 PSI. PRESSURE DIFFERENTIAL FROM BASE TO AMBIENT (A3)
3. INSTALL FROM .010 TO .030 BELOW SURFACE. APPLY ITEM 13 (1011541) PER ND1002219 TO ALL TAPPED STUD HOLES WHICH BREAK THRU TO INSIDE OF BASE AS FOLLOWS: THREAD STUD INTO HOLE, STOPPING WHEN STUD IS TWO THREADS SHORT OF EXITING THRU BOTTOM OF HOLE. APPLY A CONTINUED THIN FILM OF EPOXY (ITEM13) ON THE TWO EXPOSED THREADS (IN HOLE) THREAD STUD TO DIMENSION ABOVE - NOTE - STUD SHALL BE IN TENSION DURING EPOXY CURING. (A5)
4. INSTALL FROM .010 TO .030 BELOW SURFACE AND WITH LOOP TOWARDS WALL.
5. IDENTIFY USING NASA DRAWING NO. REVISION LETTER & MANUFACTURERS SYMBOL PER ND1002019
6. CEMENT AS PER ND1002004 USING ITEM 11 EXCEPT FOR IP 3.2.1. WHEREIN THE MATERIAL PROPORTIONS SHALL BE AS FOLLOWS:
   100 PARTS EPOXY
   125 PARTS CATALYST

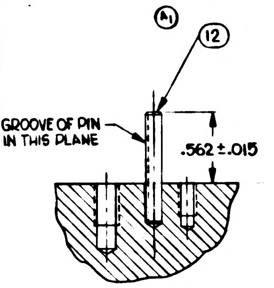


PARTIAL SECTION E-E
SCALE 2/1

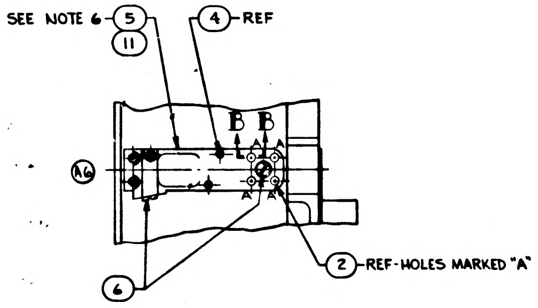




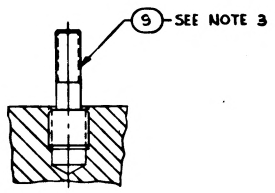




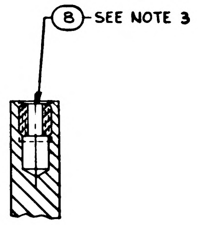
PARTIAL SECTION 'G-G'
SCALE 2/1



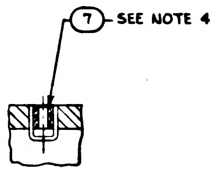
PARTIAL VIEW A-A



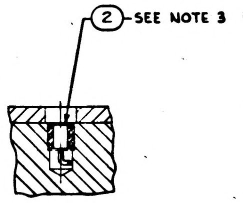
PARTIAL SECTION F-F
SCALE 2/1



PARTIAL SECTION D-D
SCALE 2/1



PARTIAL SECTION C-C
SCALE 2/1



PARTIAL SECTION B-B
SCALE 2/1

✱ COMMERCIAL PART - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
13	AR	✱	1011541	74471435001		ADHESIVE, EPOXY			
12	1		1011958			PIN, STRAIGHT, HEADLESS			
11	AR	✱	1010657			ADHESIVE			
10	2		MS122159			INSERT-CRES HELICAL COIL			
9	24	✱	1011765	74464020001		STUD, LOCKED IN			
8	8		NAS1394-08			INSERT-THREADED METAL			
7	48	✱	1000115-2			INSERT-THREADED SELF LOCKING			
6	2		1011573	57386900920		PLUG			
5	1		1011336	52386900680		COVER, FLUID PASSAGE			
4	11	✱	101625-39	74455151040		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
3	1		1011337	52386900090		COVER, FLUID PASSAGE			
2	4	✱	1000115-3			INSERT-THREADED SELF LOCKING			
1	1		1011618	52386900770		OPTICAL BASE, FINAL MACHINING			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011889	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900380
DRAWN V. AMATO DATE 8-7-63
CHECKED 8-27-63
APPROVAL 8-29-63
APPROVAL 8-29-63
NASA APPROVAL
MIT APPROVAL 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL BASE
ASSEMBLY OF

CODE IDENT NO. | SIZE E | NASA NUMBER 1011631
SCALE 1/2 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

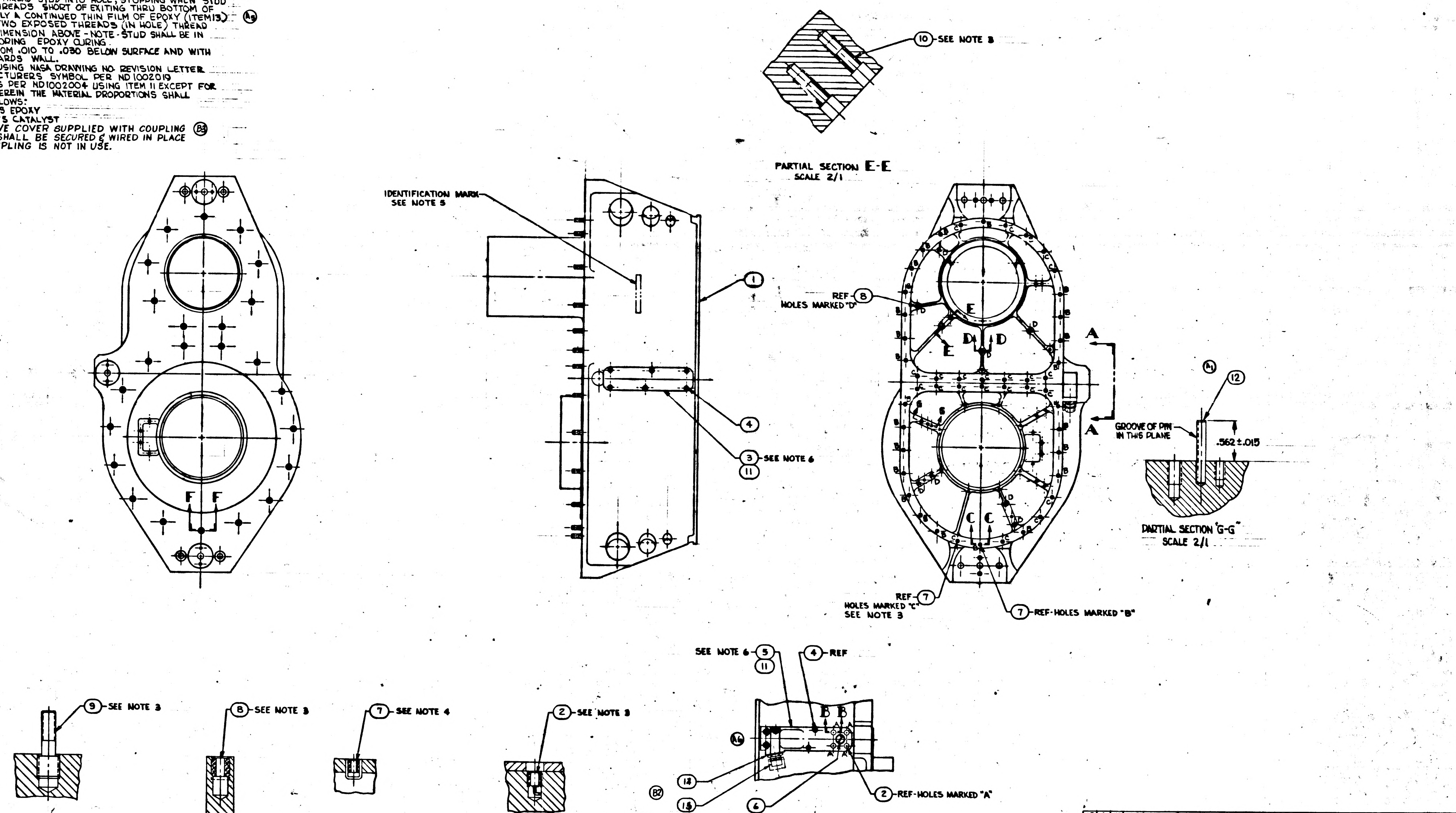
B	1011631

REVISIONS

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A6		REVISED PER TDRR NO. 07559	4-7-64	
B3		REVISED PER TDRR NO. 08620		

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. HEAT EXCHANGER LEAK TEST AS FOLLOWS:
   1) STATIC AIR PRESSURE PROOF TEST HEAT EXCHANGER PASSAGES AND FITTINGS AT 90 PSI PRESSURE DIFFERENTIAL FROM BASE TO AMBIENT (A3)
   2) HELIUM LEAK RATE TEST NOT TO EXCEED 5×10^{-8} CC/SEC. AT 77.5 PSI. PRESSURE DIFFERENTIAL FROM BASE TO AMBIENT
3. INSTALL FROM .010 TO .030 BELOW SURFACE. APPLY ITEM 13 (1011541) PER ND1002219 TO ALL TAPPED STUD HOLES WHICH BREAK THRU TO INSIDE OF BASE AS FOLLOWS: THREAD STUD INTO HOLE, STOPPING WHEN STUD IS TWO THREADS SHORT OF EXITING THRU BOTTOM OF HOLE. APPLY A CONTINUED THIN FILM OF EPOXY (ITEM 13) ON THE TWO EXPOSED THREADS (IN HOLE) THREAD STUD TO DIMENSION ABOVE - NOTE - STUD SHALL BE IN TENSION DURING EPOXY CURING. (A5)
4. INSTALL FROM .010 TO .030 BELOW SURFACE AND WITH LOOP TOWARDS WALL.
5. IDENTIFY USING NASA DRAWING NO. REVISION LETTER & MANUFACTURERS SYMBOL PER ND1002019
6. CEMENT AS PER ND1002004 USING ITEM 11 EXCEPT FOR IP 3.2.1. WHEREIN THE MATERIAL PROPORTIONS SHALL BE AS FOLLOWS:
   100 PARTS EPOXY
   125 PARTS CATALYST
7. *PROTECTIVE COVER SUPPLIED WITH COUPLING (ITEM 15) SHALL BE SECURED & WIRED IN PLACE WHEN COUPLING IS NOT IN USE.* (B3)



(10)-SEE NOTE 3
PARTIAL SECTION E-E
SCALE 2/1
IDENTIFICATION MARK-
SEE NOTE 5
(1)
(4)
(3)-SEE NOTE 6
(11)
F F
REF-(8)
HOLES MARKED "D"
E
D D
E
A
A
C C
(A1)
(12)
GROOVE OF PIN IN THIS PLANE
.562±.015
PARTIAL SECTION "G-G"
SCALE 2/1
REF-(7)
HOLES MARKED "C"
SEE NOTE 3
(7)-REF-HOLES MARKED "B"
SEE NOTE 6-(5)
(11)
(4)-REF
B B
(A6)
(13)
(15)
(6)
(B2)
(2)-REF-HOLES MARKED "A"
(9)-SEE NOTE 3
(8)-SEE NOTE 3
(7)-SEE NOTE 4
(2)-SEE NOTE 3

PARTIAL SECTION F-F
SCALE 2/1

PARTIAL SECTION D-D
SCALE 2/1

PARTIAL SECTION C-C
SCALE 2/1

PARTIAL SECTION B-B
SCALE 2/1

PARTIAL VIEW A-A

* COMMERCIAL PART-SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
15	1	*	1000135			*COUPLING, HALF, QUICK DISCONNECT*			
14	1	*	1011597-13	74453033013		*PACKING, PREFORMED, RETAINED*			
13	AR	*	1011541	74471435001		ADHESIVE, EPOXY			
12	1		1011958			PIN, STRAIGHT, HEADLESS			
11	AR	*	1010657			ADHESIVE			
10	2		MS122159			INSERT-CRES HELICAL COIL			
9	24	*	1011765	74464020001		~~STUD, LOCKED IN~~			
8	8		NAS1394-08			INSERT-THREADED METAL			
7	48	*	1000115-2			INSERT-THREADED SELF LOCKING			
6	1		1011573	57386900920		PLUG			
5	1		1011336	52386900680		COVER, FLUID PASSAGE			
4	11	*	101625-39	74455151040		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
3	1		1011337	52386900090		COVER, FLUID PASSAGE			
2	4	*	1000115-3			INSERT-THREADED SELF LOCKING			
1	1		1011618	52386900770		OPTICAL BASE, FINAL MACHINING			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011889	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS + − DECIMALS + − ANGLES + −
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900380

DRAWN V. AMATO DATE 8-7-63
CHECKED W. Kolbe 8-27-63
APPROVAL 8-29-63
APPROVAL 8-29-63
NASA APPROVAL
UNIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL BASE
ASSEMBLY OF

CODE IDENT NO.
SIZE E
NASA NUMBER 1011631
SCALE 1/2
WEIGHT
CALC ACTUAL
SHEET OF

1011631 B

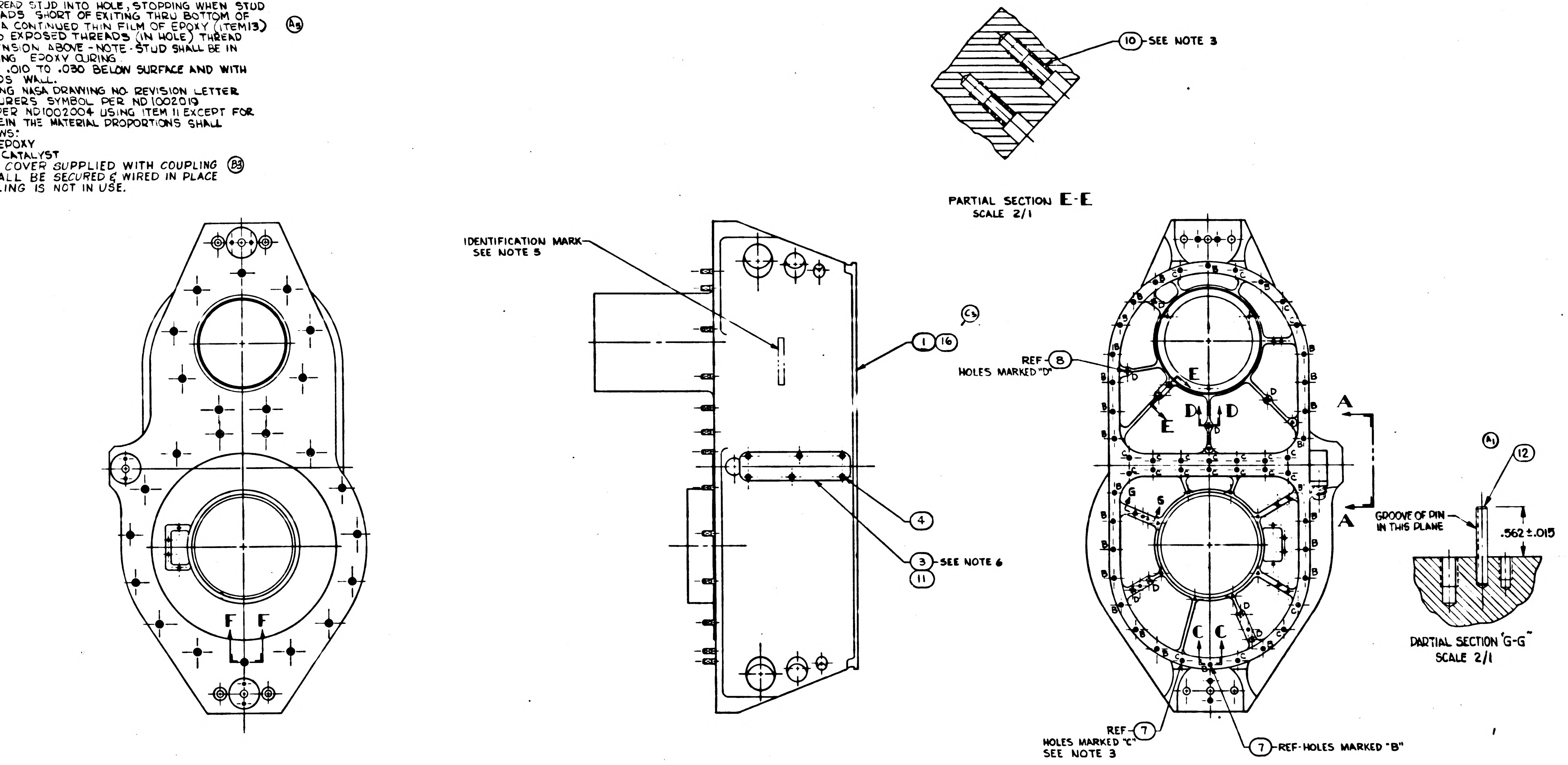
1011631 C

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A6		REVISED PER TDRR NO. 07559	4-7-64	
B3		REVISED PER TDRR NO. 08620	6-19-64	
C3		REVISED PER TDRR NO. 13446	10-14-64	

REVISIONS 02943

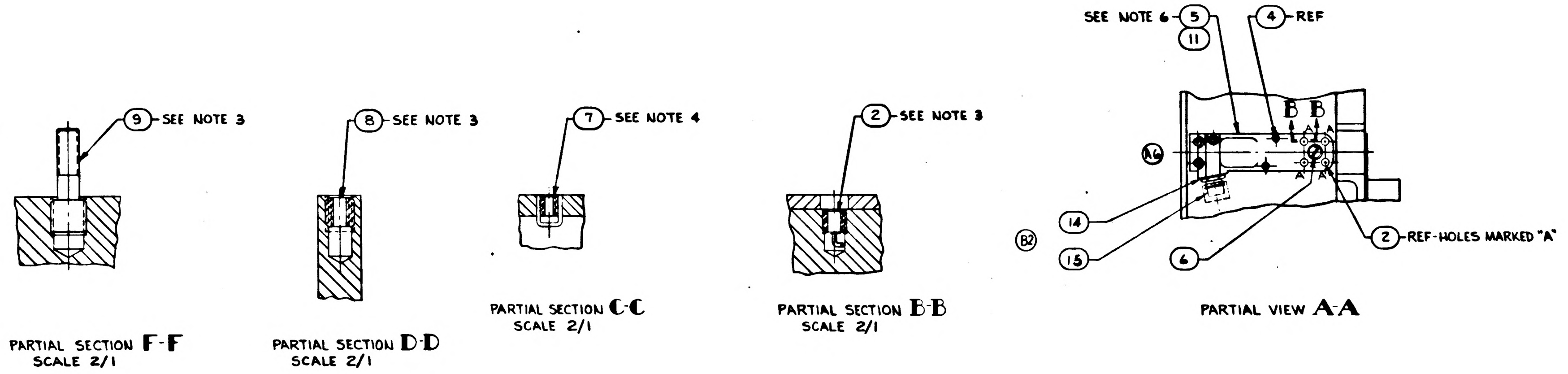
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. HEAT EXCHANGER LEAK TEST AS FOLLOWS:
   1) STATIC AIR PRESSURE PROOF TEST HEAT EXCHANGER PASSAGES AND FITTINGS AT 90 PSI PRESSURE DIFFERENTIAL FROM BASE TO AMBIENT (A3)
   2) HELIUM LEAK RATE TEST NOT TO EXCEED 5×10^{-8} CC/SEC. AT 77.5 PSI. PRESSURE DIFFERENTIAL FROM BASE TO AMBIENT
3. INSTALL FROM .010 TO .030 BELOW SURFACE, APPLY ITEM 13 (1011541) PER ND1002219 TO ALL TAPPED STUD HOLES WHICH BREAK THRU TO INSIDE OF BASE AS FOLLOWS: THREAD STUD INTO HOLE, STOPPING WHEN STUD IS TWO THREADS SHORT OF EXITING THRU BOTTOM OF HOLE. APPLY A CONTINUED THIN FILM OF EPOXY (ITEM 13) ON THE TWO EXPOSED THREADS (IN HOLE) THREAD STUD TO DIMENSION ABOVE - NOTE - STUD SHALL BE IN TENSION DURING EPOXY CURING. (A5)
4. INSTALL FROM .010 TO .030 BELOW SURFACE AND WITH LOOP TOWARDS WALL.
5. IDENTIFY USING NASA DRAWING NO. REVISION LETTER & MANUFACTURERS SYMBOL PER ND1002019
6. CEMENT AS PER ND1002004 USING ITEM 11 EXCEPT FOR IP 3.2.1. WHEREIN THE MATERIAL PROPORTIONS SHALL BE AS FOLLOWS:
   100 PARTS EPOXY
   125 PARTS CATALYST
7. *PROTECTIVE COVER SUPPLIED WITH COUPLING (ITEM 15) SHALL BE SECURED & WIRED IN PLACE WHEN COUPLING IS NOT IN USE.* (B3)


10 - SEE NOTE 3
IDENTIFICATION MARK SEE NOTE 5
1 16
C4
REF - 8 HOLES MARKED "D"
4
3 - SEE NOTE 6
11
F F
E
D D
E
B
C
G
A
A
A1
12
GROOVE OF PIN IN THIS PLANE
.562 ± .015
C C
REF - 7 HOLES MARKED "C" SEE NOTE 3
7 - REF - HOLES MARKED "B"

PARTIAL SECTION E-E
SCALE 2/1

PARTIAL SECTION "G-G"
SCALE 2/1



PARTIAL SECTION F-F
SCALE 2/1

PARTIAL SECTION D-D
SCALE 2/1

PARTIAL SECTION C-C
SCALE 2/1

PARTIAL SECTION B-B
SCALE 2/1

PARTIAL VIEW A-A

✱ COMMERCIAL PART - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

	QTY REQD 000	QTY REQD 001	ITEM NO.	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
C1	1	0	16		1012230	52386901030		OPTICAL BASE FINAL MACHINING			
	1	1	15	✱	1000135			*COUPLING, HALF, QUICK DISCONNECT*			
	1	1	14	✱	1011597-13	74453033013		*PACKING, PREFORMED, RETAINED*			
A4	AR	AR	13	✱	1011541	74471435001		ADHESIVE, EPOXY			
A1	1	1	12		1011958			PIN, STRAIGHT, HEADLESS			
	-	-	11	✱	1010657			ADHESIVE			
	2	2	10		MS122159			INSERT-CRES HELICAL COIL			
	24	24	9	✱	1011765	74464020001		STUD, LOCKED IN			
	8	8	8		NAS1394-08			INSERT-THREADED METAL			
	48	48	7	✱	1000115-2			INSERT-THREADED SELF LOCKING			
B1	1	1	6		1011573	57386900920		PLUG			
	1	1	5		1011336	52386900680		COVER, FLUID PASSAGE			
A2	11	11	4	✱	101625-39	74455151040		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
	1	1	3		1011337	52386900090		COVER, FLUID PASSAGE			
	4	4	2	✱	1000115-3			INSERT-THREADED SELF LOCKING			
	0	1	1		1011618	52386900770		OPTICAL BASE, FINAL MACHINING			

C2

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011889	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900380
DRAWN V. AMATO DATE 8-7-63
CHECKED 8-27-63
APPROVAL 8-29-63
APPROVAL 8-29-63
NASA APPROVAL
MIT APPROVAL 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL BASE
ASSEMBLY OF

CODE IDENT NO.
SIZE E
NASA NUMBER 1011631
SCALE 1/2
WEIGHT CALC ACTUAL
SHEET OF 1

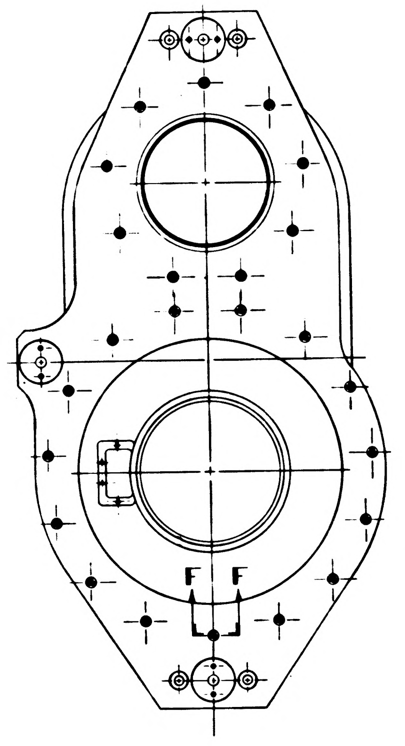
1011631

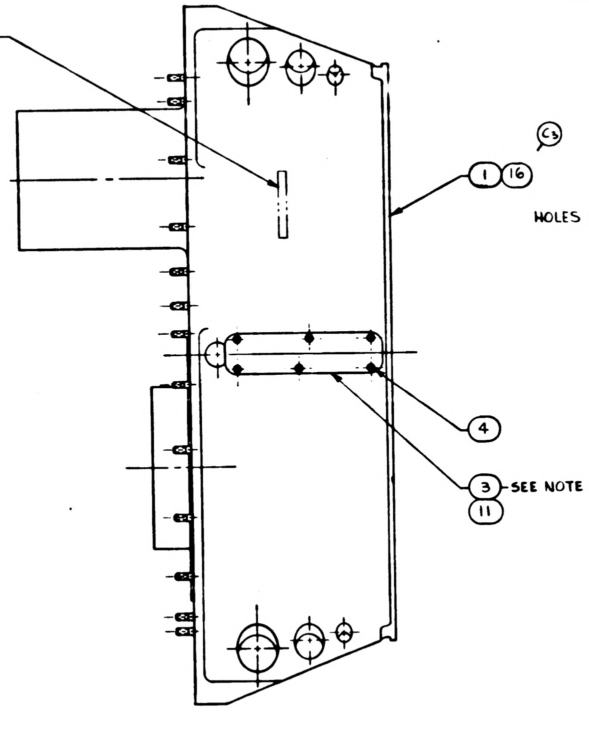
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. HEAT EXCHANGER LEAK TEST AS FOLLOWS:
   1) STATIC AIR PRESSURE PROOF TEST HEAT EXCHANGER PASSAGES AND FITTINGS AT 90 PSI PRESSURE DIFFERENTIAL FROM BASE TO AMBIENT (A3)
   2) HELIUM LEAK RATE TEST NOT TO EXCEED 5 x 10⁻⁸ CC/SEC. AT 77.5 PSI. PRESSURE DIFFERENTIAL FROM BASE TO AMBIENT
3. INSTALL FROM .010 TO .030 BELOW SURFACE. APPLY ITEM 13 (10 541) PER ND1002219 TO ALL TAPPED STUD HOLES WHICH BREAK THRU TO INSIDE OF BASE AS FOLLOWS: THREAD STUD INTO HOLE, STOPPING WHEN STUD IS TWO THREADS SHORT OF EXITING THRU BOTTOM OF HOLE. APPLY A CONTINUED THIN FILM OF EPOXY (ITEM 13) ON THE TWO EXPOSED THREADS (IN HOLE) THREAD STUD TO DIMENSION ABOVE - NOTE - STUD SHALL BE IN TENSION DURING EPOXY CURING. (A5)
4. INSTALL FROM .010 TO .030 BELOW SURFACE AND WITH LOOP TOWARDS WALL.
5. IDENTIFY USING NASA DRAWING NO. REVISION LETTER & MANUFACTURERS SYMBOL PER ND1002019
6. CEMENT AS PER ND1002004 USING ITEM 11 EXCEPT FOR P 3.21. WHEREIN THE MATERIAL PROPORTIONS SHALL BE AS FOLLOWS:
   100 PARTS EPOXY
   125 PARTS CATALYST
7. PROTECTIVE COVER SUPPLIED WITH COUPLING (ITEM 15) SHALL BE SECURED & WIRED IN PLACE WHEN COUPLING IS NOT IN USE. (B3)

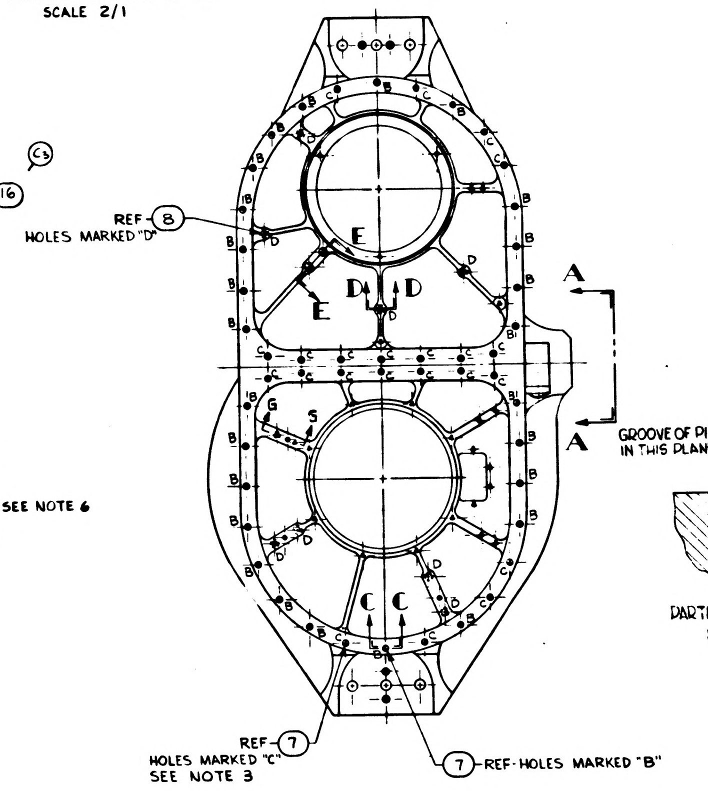
1011631 D

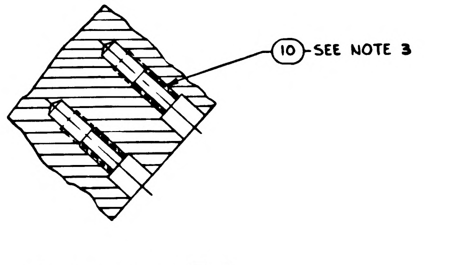
REVISIONS 0224

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A6		REVISED PER TDRR NO. 07559	4-3-64	Jms
B3		REVISED PER TDRR NO. 08620	5-19-64	Jms
C3		REVISED PER TDRR NO. 13446	10-14-64	Jms
D		REVISED PER TDRR No. 18586	4/27/65	Jms

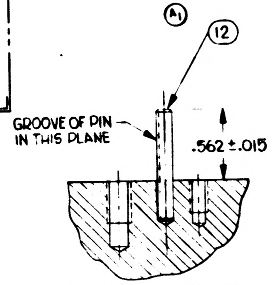



IDENTIFICATION MARK
SEE NOTE 5
1
16
C3
4
3 SEE NOTE 6
11

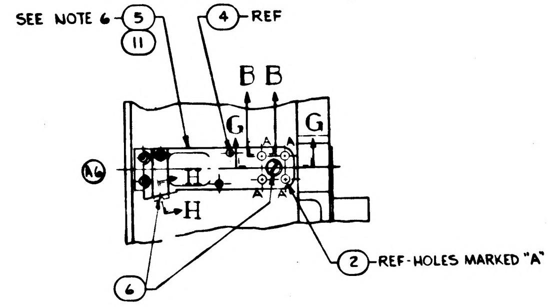

REF 8
HOLES MARKED "D"
E
E
D
D
A
A
S
G
C C
B
C
D
REF 7
HOLES MARKED "C"
SEE NOTE 3
7 REF-HOLES MARKED "B"


10 SEE NOTE 3

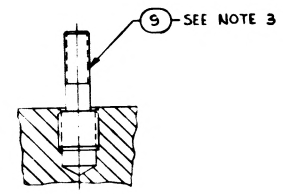
PARTIAL SECTION E-E
SCALE 2/1


A1
12
GROOVE OF PIN IN THIS PLANE
.562 ± .015

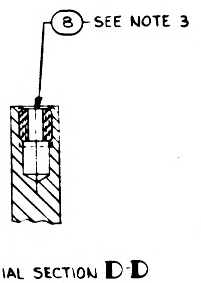
PARTIAL SECTION "G-G"
SCALE 2/1


SEE NOTE 6 5
11
4 REF
B B
G
G
A6
H
H
A
2 REF-HOLES MARKED "A"
6

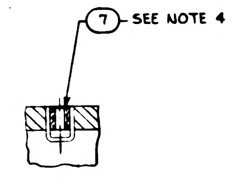
PARTIAL VIEW A-A



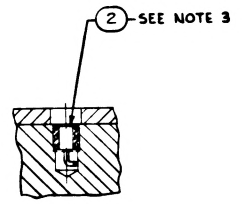
PARTIAL SECTION F F
SCALE 2/1



PARTIAL SECTION D-D
SCALE 2/1

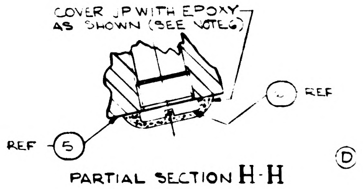


PARTIAL SECTION C-C
SCALE 2/1



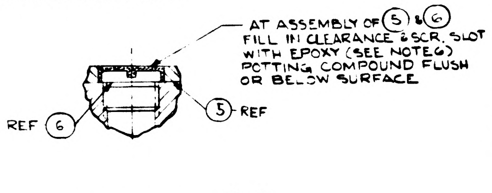
PARTIAL SECTION B-B
SCALE 2/1

B2


COVER UP WITH EPOXY AS SHOWN (SEE NOTE 6)
REF
REF 5

PARTIAL SECTION H-H
SCALE 2/1

D


AT ASSEMBLY OF 5 & 6 FILL IN CLEARANCE & SCR. SLOT WITH EPOXY (SEE NOTE 6) POTTING COMPOUND FLUSH OR BELOW SURFACE
REF 6
5 REF

PARTIAL SECTION G G
SCALE 2/1

COMMERCIAL PART - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

	QTY REQD 000	QTY REQD 001	ITEM NO.	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
C1	1	0	16		1012230	52386901030		OPTICAL BASE FINAL MACHINING			
			15								
			14								
A4	AR	AR	13	*	1011541	74471435001		ADHESIVE, EPOXY			
A1	1	1	12		1011958			PIN, STRAIGHT, HEADLESS			
	-		11	*	1010657			ADHESIVE			
	2	2	10		MS122159			INSERT-CRES HELICAL COIL			
	24	24	9	*	1011765	74464020001		STUD, LOCKED IN			
	8	8	8		NAS1394-08			INSERT-THREADED METAL			
	48	48	7	*	1000 15-2			INSERT-THREADED SELF LOCKING			
B1	2	2	6		1011573	57386900920		PLUG			
	1	1	5		1011336	52386900680		COVER, FLUID PASSAGE			
A2	11	11	4	*	101625-39	74455151040		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
	1	1	3		1011337	52386900090		COVER, FLUID PASSAGE			
	4	4	2	*	1000115-3			INSERT-THREADED SELF LOCKING			
	0	1	1		1011618	52386300770		OPTICAL BASE, FINAL MACHINING			
C2											

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011889	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900380
DRAWN V. AMATO DATE 8-7-63
CHECKED
APPROVAL
APPROVAL 29.3
NASA APPROVAL
MIT APPROVAL 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

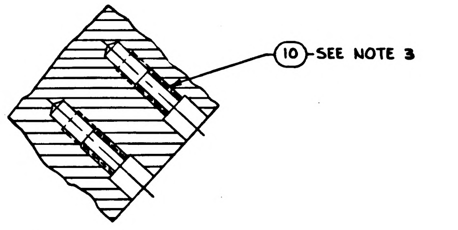
TITLE
OPTICAL BASE
ASSEMBLY OF

CODE IDENT NO.
SIZE E
NASA NUMBER 1011631
SCALE 1/1 & 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

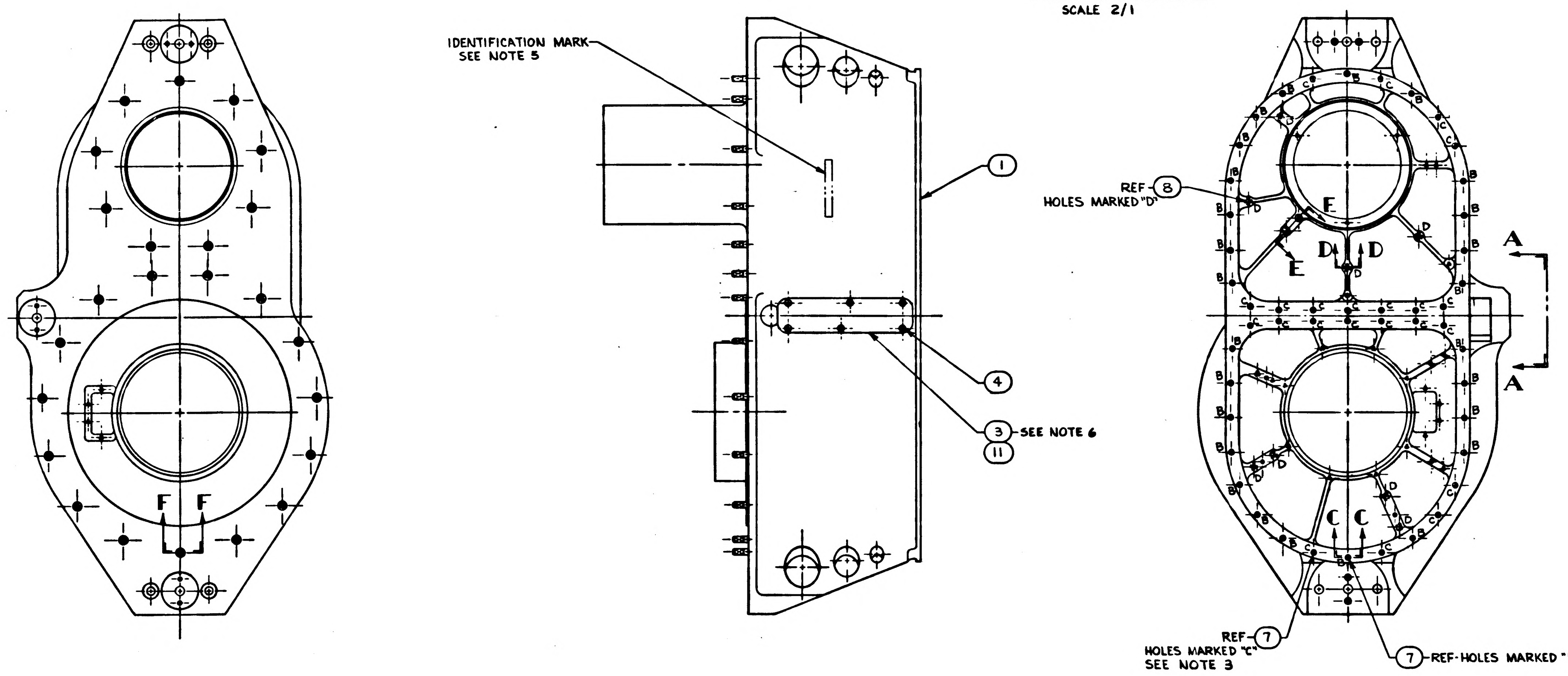
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLE AND TEST IN ACCORDANCE WITH ATP 1011631.
3. INSTALL FROM .010 TO .030 BELOW SURFACE.
4. INSTALL FROM .010 TO .030 BELOW SURFACE AND WITH LOOP TOWARDS WALL.
5. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019.
6. CEMENT AS PER ND 1002004 USING ITEM ⑪ EXCEPT FOR ¶ 3.2.1 WHEREIN THE MATERIAL PROPORTIONS SHALL BE AS FOLLOWS:-
    100 PARTS EPOXY
    125 PARTS CATALYST.

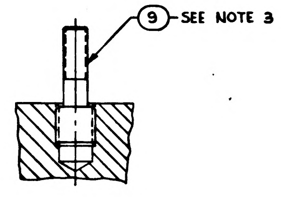
1011631

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
		REVISIONS		

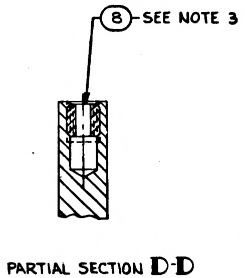

10 - SEE NOTE 3

PARTIAL SECTION E-E
SCALE 2/1

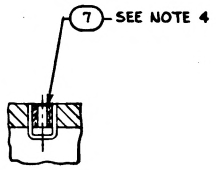

IDENTIFICATION MARK - SEE NOTE 5
1
4
3 - SEE NOTE 6
11
F F
REF - 8 HOLES MARKED "D"
E
D D
E
A
A
B
C
C C
REF - 7 HOLES MARKED "C" SEE NOTE 3
7 - REF - HOLES MARKED "B"



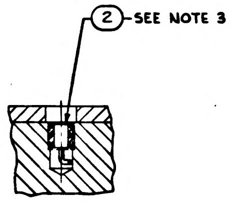
PARTIAL SECTION F-F
SCALE 2/1



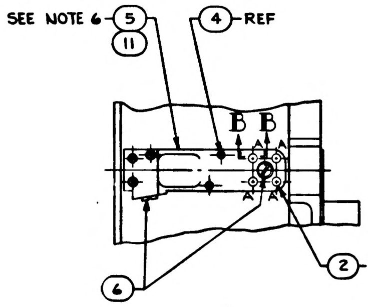
PARTIAL SECTION D-D
SCALE 2/1



PARTIAL SECTION C-C
SCALE 2/1



PARTIAL SECTION B-B
SCALE 2/1


SEE NOTE 6 - 5
11
4 - REF
B B
2 - REF - HOLES MARKED "A"
6

PARTIAL VIEW A-A

✱ COMMERCIAL PART - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
11	AS REQ	✱	1010657			ADHESIVE			
10	2		MS122159			INSERT-CRES HELICAL COIL			
9	24	✱	1011765	74464020001		STUD, LOCKED IN			
8	8		NAS1394-08			INSERT-THREADED METAL			
7	48	✱	1000115-2			INSERT-THREADED SELF LOCKING			
6	2		1011573	57386900920		PLUG			
5	1		1011336	52386900680		COVER, FLUID PASSAGE			
4	11	NAS	1352C06LL4	74435157018		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
3	1		1011337	52386900090		COVER, FLUID PASSAGE			
2	4	✱	1000115-3			INSERT-THREADED SELF LOCKING			
1	1		1011618	52386900770		OPTICAL BASE, FINAL MACHINING			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011889	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900380
DRAWN V. AMATO DATE 8-7-63
CHECKED W. [illegible] 8-27-63
APPROVAL [illegible] 8-29-63
APPROVAL [illegible] 8-29-63
NASA APPROVAL
MIT APPROVAL 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL BASE
ASSEMBLY OF

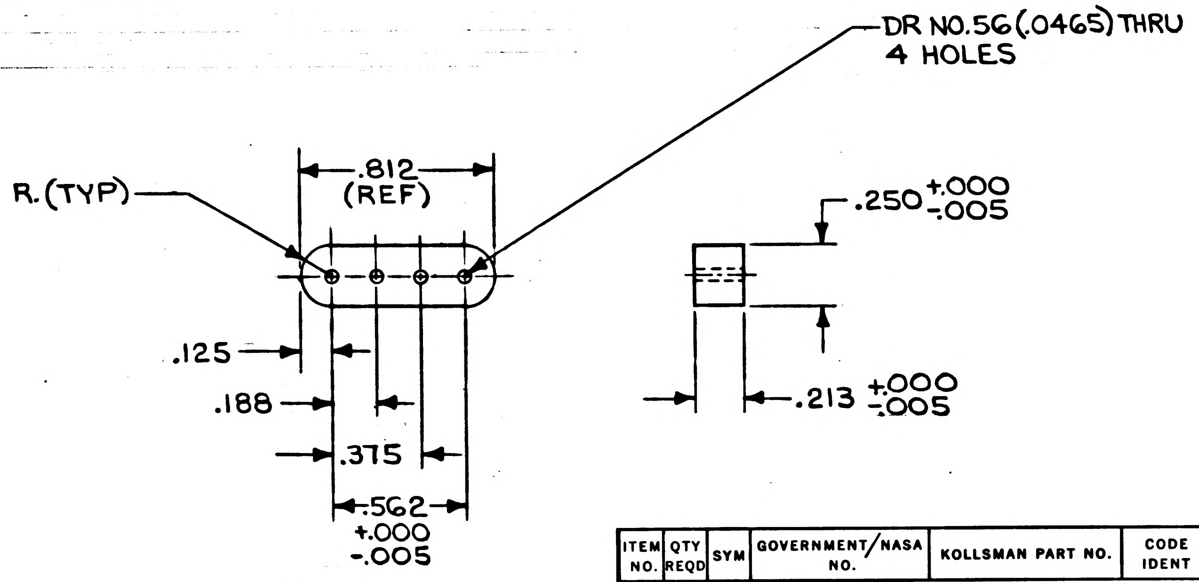
CODE IDENT NO.
SIZE E
NASA NUMBER 1011631
SCALE 1/2
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
PHOTOGRAPHIC SCALE ONLY

1011632

TDR 01015	REVISIONS		
SYM	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORD WITH ND 1002078.
3. a. 63✓ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORD WITH ND 1002078.
4. REMOVE BURRS IN ACCORD WITH ND 1002079.



MASTER

ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011704	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON: FRACTIONS ± 1/64; DECIMALS ±.010; ANGLES ± ~
DO NOT SCALE THIS DRAWING

MATERIAL
NYLON PER MIL-P-17091 TYPE I

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 25386900010

DRAWN J. Schiller DATE 4-1-63
CHECKED W. Kabau 4-10-63
APPROVAL F. Ruschmann 4-12-63
APPROVAL E. Thomp 4-12-63
NASA APPROVAL
MIT APPROVAL 25 Apr 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
INSERT, CONDUIT, RESOLVER WIRE

CODE IDENT NO. | SIZE B | NASA NUMBER 1011632
SCALE 2/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

E-153

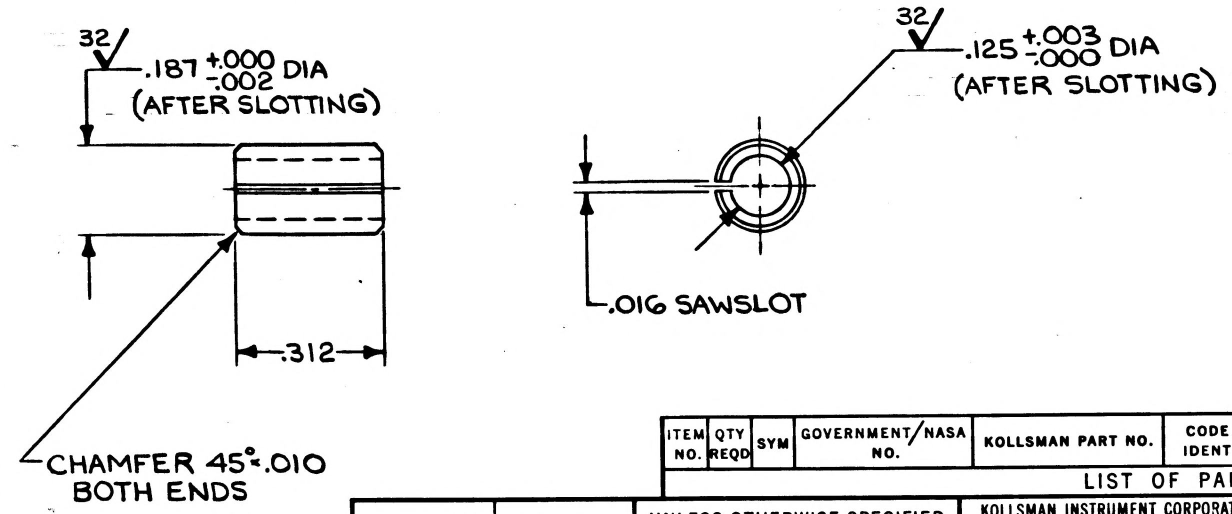
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011633

TDR 01015 REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORD WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER
   b. √ BREAK SHARP CORNERS IN ACCORD WITH ND1002078.
4. REMOVE BURRS IN ACCORD WITH ND1002079.
5. FINISH: PASSIVATE PER MIL-STD-171 (KES.10051.200)



MASTER

ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011704	1011000
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± -; DECIMALS ±.005; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL STAINLESS STEEL AISI 440C FED. SPEC QQ-S-763 CLASS 440C, COND A
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901050
DRAWN F. Schiller DATE 4-1-63
CHECKED 4-2-63
APPROVAL 4-12-63
APPROVAL 4-12-63
NASA APPROVAL
MIT APPROVAL 25 Apr 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SLEEVE, SPLIT,
ILLUMINATING ROD

CODE IDENT NO.
SIZE B
NASA NUMBER 1011633
SCALE 4/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-153

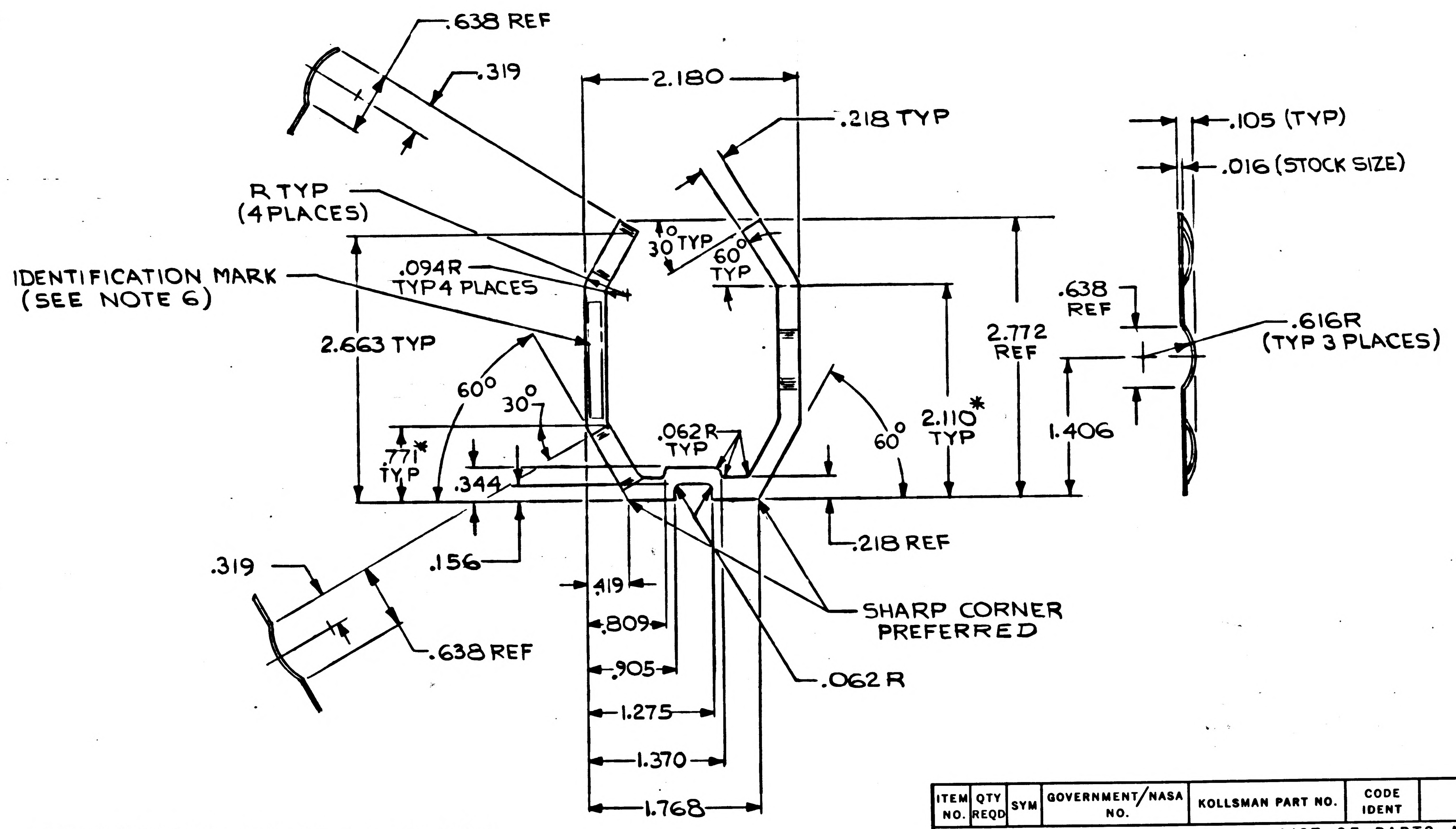
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011634

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REVISIONS TDRR01099

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. HEAT TREAT (STABILIZE AND STRESS RELIEVE) PER MIL-H-7199 (KPS 1001C.105).
6. IDENTIFY USING NASA DRAWING NO. REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019.
7. LOAD AT .031 IN DEFLECTION 8LB ± 10% AT EACH CONTACT


.638 REF
.319
2.180
.218 TYP
.105 (TYP)
.016 (STOCK SIZE)
R TYP
(4 PLACES)
30° TYP
60° TYP
IDENTIFICATION MARK
(SEE NOTE 6)
.094R
TYP 4 PLACES
.638
REF
.616R
(TYP 3 PLACES)
2.772
REF
2.663 TYP
60°
30°
2.110*
TYP
1.406
60°
.062R
TYP
.771*
TYP
.344
.218 REF
.319
.156
.419
.809
SHARP CORNER
PREFERRED
.905
.062 R
.638 REF
1.275
1.370
1.768

* DIMENSIONS ARE TO THEORETICAL INTERSECTIONS OF INSIDE PLANES

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011700	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING
MATERIAL BERYLLIUM COPPER
ASTM B194 1/2 H
FED. SPEC. QQ-C-533 COND 1/2H
(SEE NOTE 5)
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 56386900370
DRAWN E. DRAPALA DATE 4-2-63
CHECKED J. SULLIVAN 4-24-63
APPROVAL 4-26-63
APPROVAL E. Thorup 4-29-63
NASA APPROVAL W J R 5-1-63
MIT APPROVAL 1 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS
TITLE
SPRING, BEAM SPLITTER

CODE IDENT NO. | SIZE C | NASA NUMBER 1011634
SCALE 1/1 | WEIGHT | CALC ACTUAL | SHEET 1 OF 1

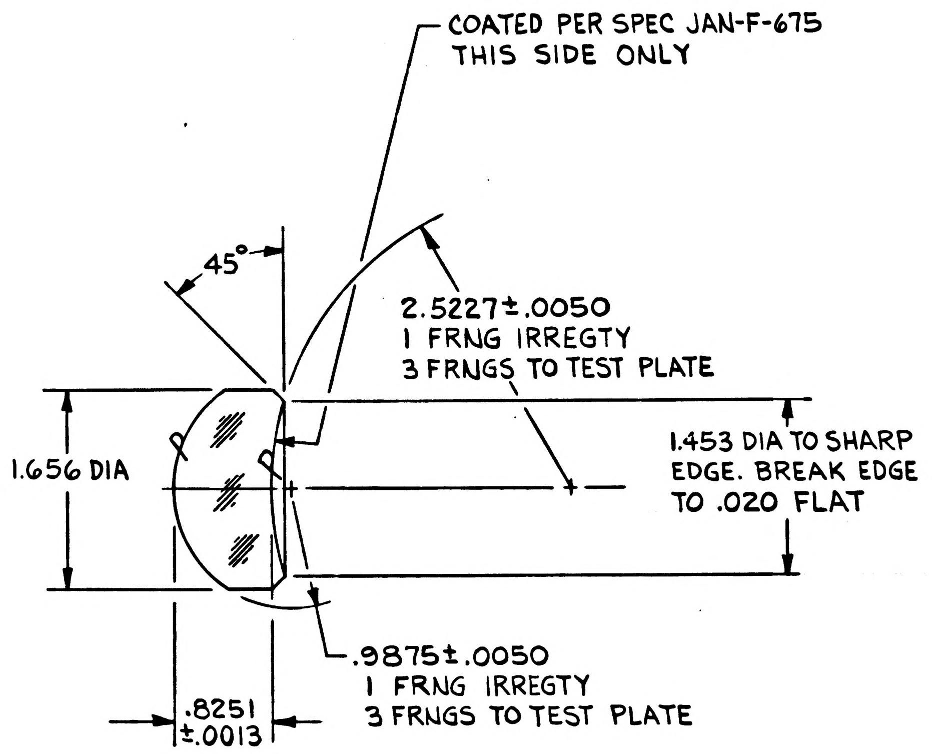
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011634

1011636

REVISIONS TDRR 01220				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ELEMENT IN ACCORDANCE WITH SPEC MIL-O-13830.
3. MATL: GLASS, OPTICAL PER JAN-G-174
   GRADE B-FINE ANNEALED
   TYPE 652-585
4. CA: ENT= 1.600 EXIT= 1.410
   SURF. QUAL: 60-40
   CTRG ERROR 3 MINUTES.
5. SURFACES MARKED "P" POL ALL OTHERS GRD.


COATED PER SPEC JAN-F-675
THIS SIDE ONLY
45°
2.5227±.0050
1 FRNG IRREGTY
3 FRNGS TO TEST PLATE
1.656 DIA
1.453 DIA TO SHARP
EDGE. BREAK EDGE
TO .020 FLAT
P
P
.9875±.0050
1 FRNG IRREGTY
3 FRNGS TO TEST PLATE
.8251
±.0013

1011636

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011707	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 3

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 28386900420

DRAWN V. AMATO DATE 4-2-63
CHECKED Thornton Stevens 5-6-63
APPROVAL Thornton Stevens 5-6-63
APPROVAL E. Dhong 5-7-63

NASA APPROVAL W J Adkins 5-9-63
MIT APPROVAL W Kupfer 9/4/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LENS, POSITIVE
(TELESCOPE OBJECTIVE)

CODE IDENT NO.
SIZE C
NASA NUMBER 1011636
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

8.9

E-154

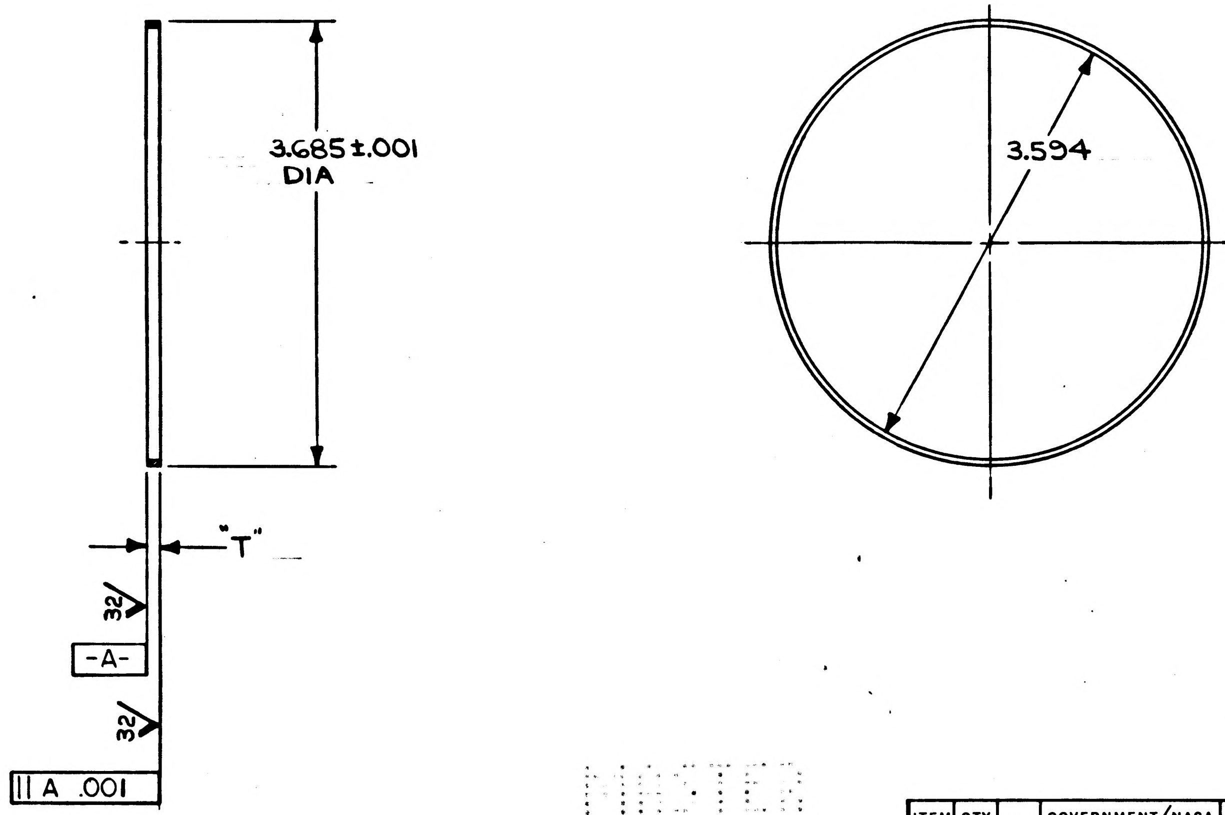
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011638 A

TDRR 01015

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	A-4	"NEXT ASSY" NO. WAS 1011704 TDRR 02561	7-17-63	WK

NOTES:
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORD WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   - a. 63√ FINISH ALL OVER.
   - b. BREAK SHARP CORNERS IN ACCORD WITH ND1002078.
4. REMOVE BURRS IN ACCORD WITH ND1002079.
5. FINISH: PASSIVATE IN ACCORD WITH MIL-STD-171 (KES.10051.200)



DIM. "T"	NASA PART NO.	KIC PART NO.
.094	1011638-1	57386901060
.109	1011638-2	57386901070

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
Ⓐ 1011906	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	±.005	± ~

DO NOT SCALE THIS DRAWING

MATERIAL STAINLESS STEEL AISI 440C FED. SPEC QQ-S-763 CLASS 440C, COND A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 5738690 1060 1070

DRAWN F. Zegilla DATE 4-4-63
CHECKED W. Valvera 4-10-63
APPROVAL 4-12-63
APPROVAL E. Nkomp 4-12-63
NASA APPROVAL
MIT APPROVAL 29 Apr 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SPACER, STATOR
(16 SPEED RESOLVER)

CODE IDENT NO. SIZE C NASA NUMBER 1011638

SCALE 1/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011638 A

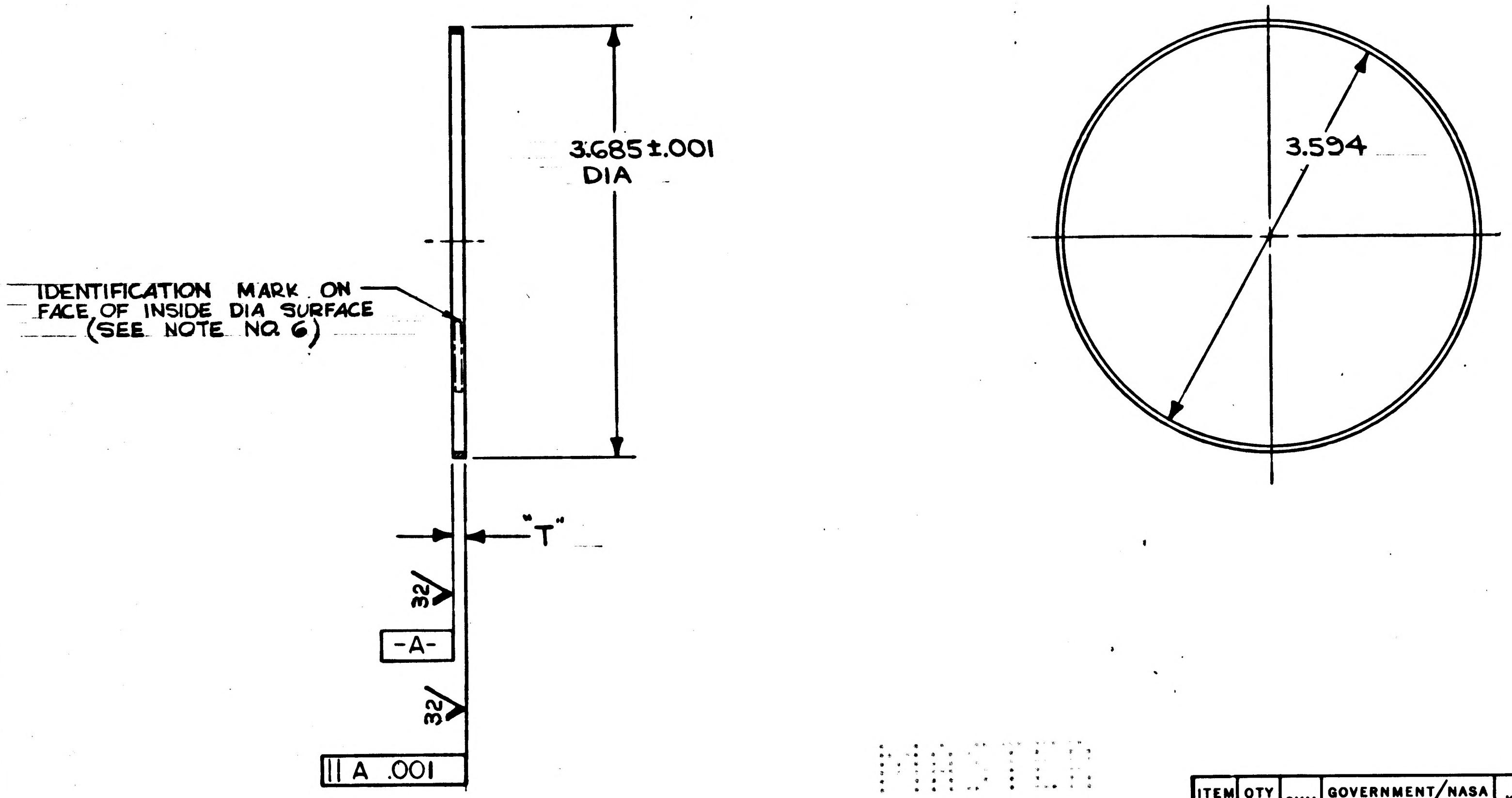
1011638 B

NOTES:

1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORD WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER.
4. REMOVE BURRS IN ACCORD WITH ND1002079.
5. FINISH: PASSIVATE IN ACCORD WITH MIL-STD-171 TABLE V-A FINISH NO. 5.4.1 (KPS-10051.200)
6. IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019

TDRR 01015

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	A-4	NEXT ASSY NO. WAS 1011704 TDRR 02561	7-17-63	WK
B4		REVISED PER TDRR NO. 03152	9-17-63	


3.685±.001 DIA
3.594
IDENTIFICATION MARK ON FACE OF INSIDE DIA SURFACE (SEE NOTE NO. 6)
"T"
32√
-A-
32√
∥ A .001

MASTER

DIM. "T"	NASA PART NO.	KIC PART NO.
.094	1011638-1	57386901060
.109	1011638-2	57386901070

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
Ⓐ 1011906	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± —; DECIMALS ±.005; ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL CORROSION RESISTANT STEEL FED. SPEC. QQ-S-763 CLASS 440C, COND A
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 5738690 1060 1070

DRAWN DATE 4-4-63
CHECKED W. Gabra 4-10-63
APPROVAL 4-12-63
APPROVAL E. Thomp 4-12-63
NASA APPROVAL
MIT APPROVAL 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SPACER, STATOR
(16 SPEED RESOLVER)

CODE IDENT NO.
SIZE C
NASA NUMBER 1011638
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

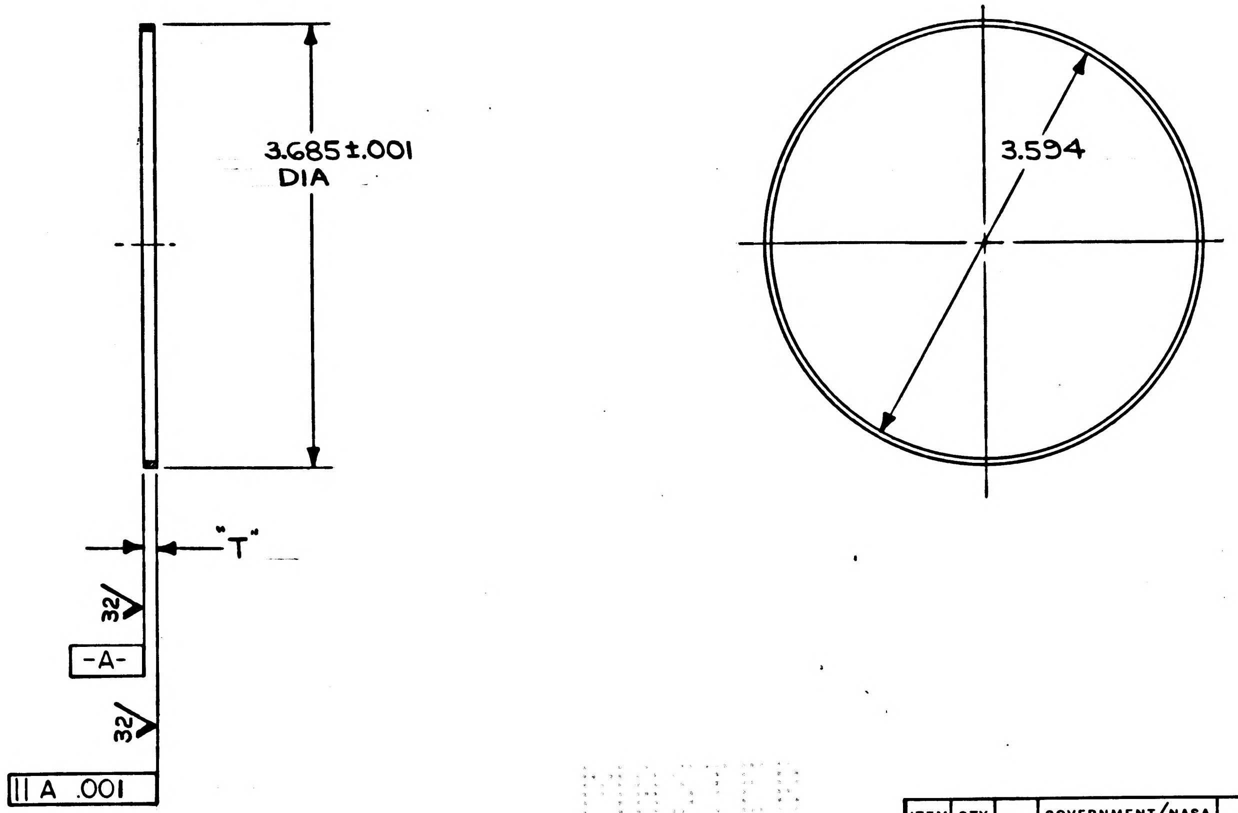
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011638

TDRR 01015

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORD WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63✓ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORD WITH ND1002078.
4. REMOVE BURRS IN ACCORD WITH ND1002079.
5. FINISH: PASSIVATE IN ACCORD WITH MIL-STD-171 (KES.10051.200)



DIM. "T"	NASA PART NO.	KIC PART NO.
.094	1011638-1	57386901060
.109	1011638-2	57386901070

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011704	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± x	±.005	± x

DO NOT SCALE THIS DRAWING

MATERIAL STAINLESS STEEL AISI 440C FED. SPEC QQ-S-763 CLASS 440C, COND A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 5738690 1060 1070

DRAWN DATE 4-4-63
CHECKED W. [illegible] 4-10-63
APPROVAL [illegible] 4-12-63
APPROVAL E. Thomp 4-12-63

NASA APPROVAL
MIT APPROVAL 25 Apr 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SPACER, STATOR
(16 SPEED RESOLVER)

CODE IDENT NO.
SIZE C
NASA NUMBER 1011638
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

1011638

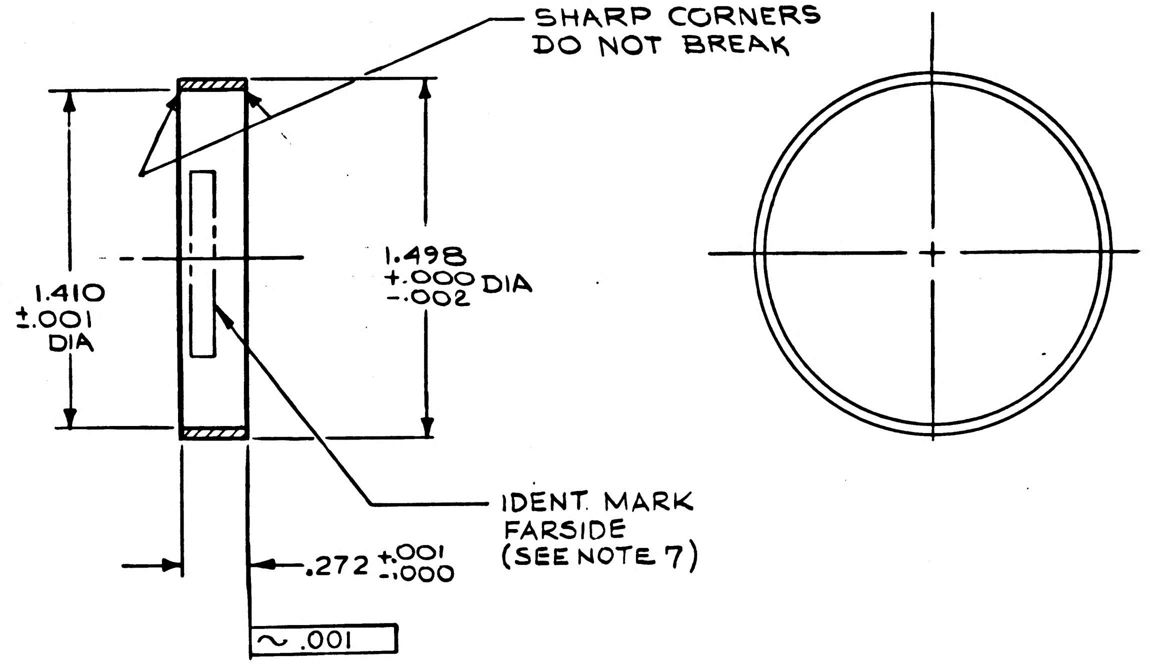
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

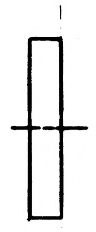
1011641

REVISIONS TDRR 01565				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG. IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. FINISH: BLACK ANODIZE (SULFURIC) PER MIL-A-8625, TYPE II BLACK (KPS-1005A.201).
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.





ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011793	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ -	+ -	+ -

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM
ALLOY 6061-T6
FED SPEC QQ-A-325
TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901080

DRAWN Borenstein DATE 4-5-63
CHECKED M Fauvell
APPROVAL Thornton Adams 6-11-63
APPROVAL E. Thomp 6-11-63
NASA APPROVAL Jack Barnard
MIT APPROVAL Perry K Bryant

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SPACER, LENS

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011641

SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

E-154

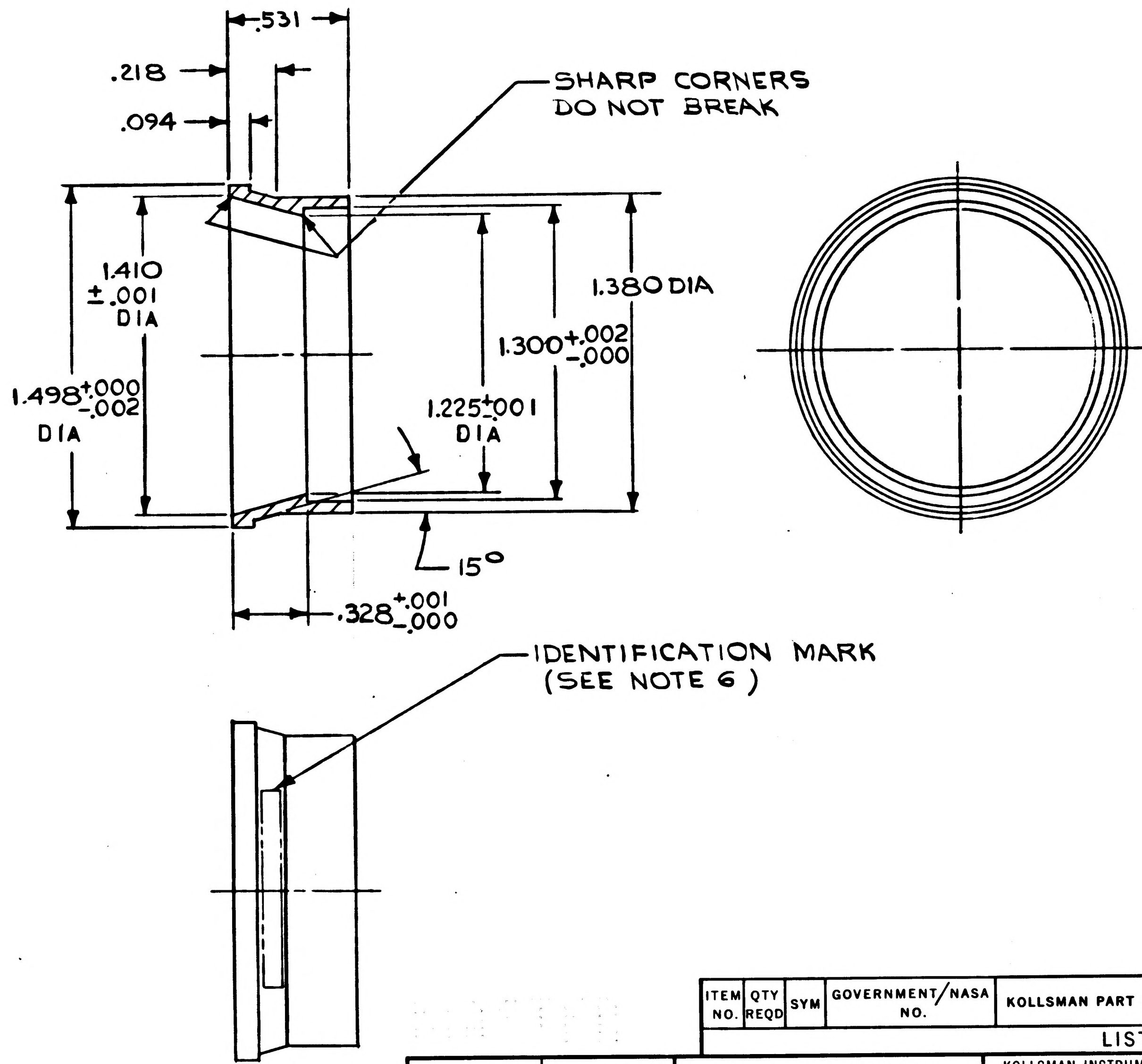
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

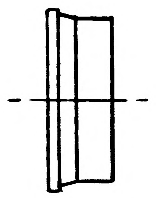
	1011642

REVISIONS TARR 01565

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. $\overset{63}{\checkmark}$ FINISH ALL OVER
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: BLACK ANODIZE IN ACCORDANCE WITH MIL-A-8625, TYPE II BLACK (KPS. 1005A.201)
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019





ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011793	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM
ALLOY 6061-T6
FED SPEC QQ-A-325
TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901090

DRAWN E. DRAPALA DATE 5-21-63
CHECKED Mc Farrell
APPROVAL [illegible] 6-11-63
APPROVAL E. Mooney 6-10-63
NASA APPROVAL Jack Barnard
MIT APPROVAL Perry K Bryant

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SPACER, LENS

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011642

SCALE 2/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011642

6 | 5 | 4 | 3 | 2 | 1

1011645 | A

REVISIONS 02560				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR NO. 06660	3 MAR 64	WK

Ⓐ

REQUIREMENTS:

1. GENERAL:

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

   C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.

   D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052

   E. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-C-8384

2. INSPECTION AND ACCEPTANCE:

   A. MECHANICAL REQUIREMENTS

      1. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION PER MIL-STD-129.

      2. PARTS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER PER MIL-STD-130, EXCEPT INK OR PAINT NOT ACCEPTABLE.

      3. MECHANICAL DIMENSIONS AS SHOWN.

      4. CONTACTS 29 #22 SOCKETS TO ACCOMMODATE .030 ± .001 IN PIN DIAMETER.

      5. ALL SOCKETS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.

      6. ENGAGEMENT: SCREWLOCKS, POLARIZED.

      7. THIS DRAWING SHALL MATE WITH A MATCHING PART NASA DRAWING 1011756 (REF).

      8. WIRE TERMINATION: SOLDER CUP TO ACCOMMODATE #22 AWG STRANDED WIRE.

      9. INSERTION AND WITHDRAWAL FORCE 2 TO 11 OZ/PIN WITH MATING CONNECTOR.

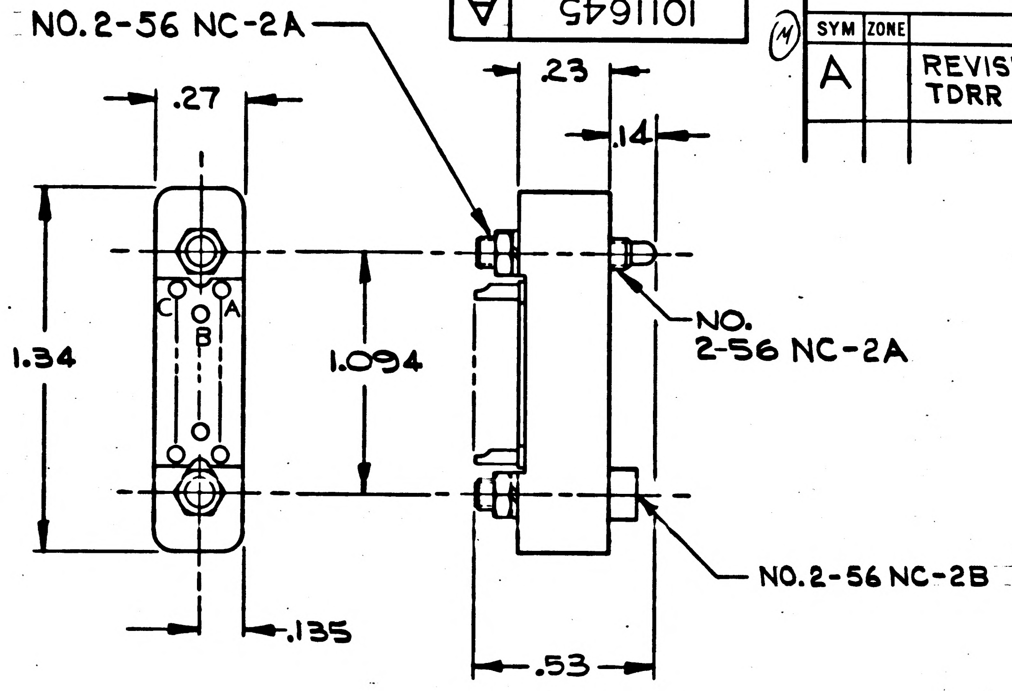
   B. ELECTRICAL REQUIREMENTS:

1. INSULATION RESISTANCE:	1000 MEGOHMS MIN AT 1000 VDC
2. SERVICE RATING:	SEA LEVEL 530 V RMS
3. DIELECTRIC STRENGTH:	SEA LEVEL 1600 V RMS

3. DESIGN REQUIREMENTS:

A. MOUNTING:	PANEL
B. SERVICE RATING:	70,000 FEET 140 V RMS
C. DIELECTRIC STRENGTH:	70,000 FEET 425 V RMS
D. INSULATION (BODY):	GLASS FILLED DIALLYL PHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN)
E. CONTACTS:	PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204, TYPE I, CLASS 2
F. SCREWLOCKS:	STAINLESS STEEL, PASSIVATED
G. CONTACT RATING:	3 AMPS
H. CONTACT CENTER TO CENTER:	3/32 ± .002
I. SURFACE-CREEPAGE DISTANCE:	1/16 MIN.
J. AIR SPACE:	.040 MIN.
K. CONTACT RESISTANCE:	20 MV MAX AT 3 AMPS

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



TOLERANCES:-
TWO PLACE DECIMAL, ±.010
THREE PLACE DECIMAL, ±.005

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ −	+ −	+ −

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 68502016501

DRAWN E. PIZZO DATE 4-5-63
CHECKED P H Graham
APPROVAL E. Costy 8/9/63
APPROVAL E. Thomp 8-12-63
NASA APPROVAL W J Rhine 8-14-63
MIT APPROVAL W Kupfer 14 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE CONNECTOR, ELECTRICAL
RECTANGULAR, 29 #22 SOCKET CONTACTS
SPECIFICATION CONTROL
DRAWING

CODE IDENT NO. | SIZE C | NASA NUMBER 1011645
SCALE ~ | WEIGHT | CALC ACTUAL | SHEET 1 OF 1

E-184

6 | 5 | 4 | 3 | 2 | 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011645

REVISIONS D2560

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REQUIREMENTS:

1. GENERAL:

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

   C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.

   D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052

   E. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-C-8384

2. INSPECTION AND ACCEPTANCE:

   A. MECHANICAL REQUIREMENTS

      1. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION PER MIL-STD-129.

      2. PARTS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER PER MIL-STD-130, EXCEPT INK OR PAINT NOT ACCEPTABLE.

      3. MECHANICAL DIMENSIONS AS SHOWN.

      4. CONTACTS 29 #22 SOCKETS TO ACCOMMODATE .030 ± .001 IN PIN DIAMETER.

      5. ALL SOCKETS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.

      6. ENGAGEMENT: SCREWLOCKS, POLARIZED.

      7. THIS DRAWING SHALL MATE WITH A MATCHING PART NASA DRAWING 1011756 (REF).

      8. WIRE TERMINATION: SOLDER CUP TO ACCOMMODATE #22 AWG STRANDED WIRE.

      9. INSERTION AND WITHDRAWAL FORCE 2 TO 11 OZ/PIN WITH MATING CONNECTOR.

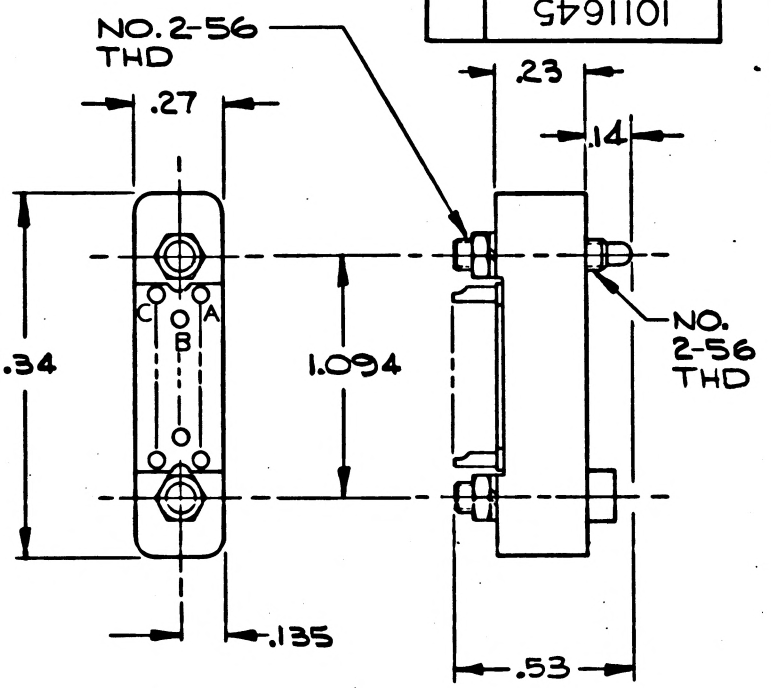
   B. ELECTRICAL REQUIREMENTS:

1.	INSULATION RESISTANCE:	1000 MEGOHMS MIN AT 1000 VDC
2.	SERVICE RATING:	SEA LEVEL 530 V RMS
3.	DIELECTRIC STRENGTH:	SEA LEVEL 1600 V RMS

3. DESIGN REQUIREMENTS:

A.	MOUNTING:	PANEL
B.	SERVICE RATING:	70,000 FEET 140 V RMS
C.	DIELECTRIC STRENGTH:	70,000 FEET 425 V RMS
D.	INSULATION (BODY):	GLASS FILLED DIALLYL PHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN)
E.	CONTACTS:	PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204, TYPE I, CLASS 2
F.	SCREWLOCKS:	STAINLESS STEEL, PASSIVATED
G.	CONTACT RATING:	3 AMPS
H.	CONTACT CENTER TO CENTER:	3/32 ± .002
I.	SURFACE-CREEPAGE DISTANCE:	1/16 MIN.
J.	AIR SPACE:	.040 MIN.
K.	CONTACT RESISTANCE:	20 MV MAX AT 3 AMPS

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



TOLERANCES:~
TWO PLACE DECIMAL, ±.010
THREE PLACE DECIMAL, ±.005

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ −	+ −	+ −

DO NOT SCALE THIS DRAWING

MATERIAL

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 68502016501

DRAWN E. Pizzo DATE 4-5-63
CHECKED R H Graham
APPROVAL E. Costey 8/9/63
APPROVAL E. Thorp 8-12-63
NASA APPROVAL W J Rhine 8-14-63
MIT APPROVAL W Kupfer 14 Aug 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE CONNECTOR, ELECTRICAL
RECTANGULAR, 29 #22 SOCKET CONTACTS
SPECIFICATION CONTROL
DRAWING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011645

SCALE ~
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011645

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011646

SYM	ZONE	REVISIONS D2560 DESCRIPTION	DATE	APPROVAL

REQUIREMENTS

1. GENERAL:

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

   C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.

   D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052

   E. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-C-8384

2. INSPECTION AND ACCEPTANCE:

   A. MECHANICAL REQUIREMENTS

      1. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION PER MIL-STD-129.

      2. PARTS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER PER MIL-STD-130, EXCEPT INK OR PAINT NOT ACCEPTABLE.

      3. MECHANICAL DIMENSIONS AS SHOWN.

      4. CONTACTS 5 #22 SOCKETS TO ACCOMMODATE .030 ± .001 IN PIN DIAMETER.

      5. ALL SOCKETS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.

      6. ENGAGEMENT: GUIDE PINS, POLARIZED.

      7. THIS DRAWING SHALL MATE WITH A MATCHING PART NASA DRAWING 1011647 (REF).

      8. WIRE TERMINATION: SOLDER CUP TO ACCOMMODATE #22 AWG STRANDED WIRE.

      9. INSERTION AND WITHDRAWAL FORCE 2 TO 11 OZ/PIN WITH MATING CONNECTOR.

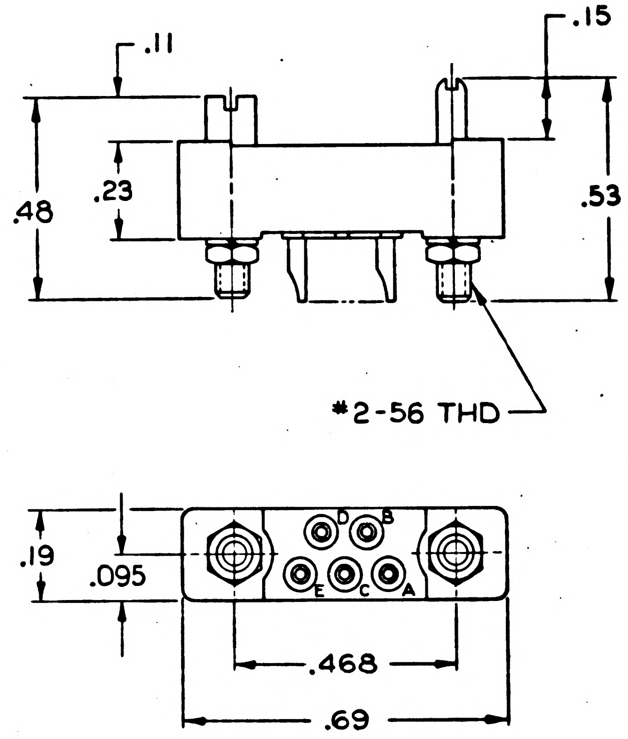
   B. ELECTRICAL REQUIREMENTS:

1.	INSULATION RESISTANCE:	1000 MEGOHMS MIN AT 1000 VDC
2.	SERVICE RATING:	SEA LEVEL 530 V RMS
3.	DIELECTRIC STRENGTH:	SEA LEVEL 1600 V RMS

3. DESIGN REQUIREMENTS:

A.	MOUNTING:	PANEL
B.	SERVICE RATING:	70,000 FEET 140 V RMS
C.	DIELECTRIC STRENGTH:	70,000 FEET 425 V RMS
D.	INSULATION (BODY):	GLASS FILLED DIALLYL PHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN)
E.	CONTACTS:	PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204, TYPE I, CLASS 2
F.	GUIDE PINS AND SOCKETS:	STAINLESS STEEL, PASSIVATED
G.	CONTACT RATING:	3 AMPS
H.	CONTACT CENTER TO CENTER:	3/32 ± .002
I.	SURFACE-CREEPAGE DISTANCE:	1/16 MIN.
J.	AIR SPACE:	.040 MIN.
K.	CONTACT RESISTANCE:	20 MV MAX AT 3 AMPS

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



TOLERANCES:
TWO PLACE DECIMAL, ±.010
THREE PLACE DECIMAL, ±.005

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

	FRACTIONS	DECIMALS	ANGLES
TOL ON	+ −	+ −	+ −

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 68502017401
DRAWN V. Malizewski DATE 4-8-63
CHECKED M Ruggiero
APPROVAL 8/9/63
APPROVAL 8-12-63
NASA APPROVAL W. J. Rhine 8-14-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
CONNECTOR, ELECTRICAL
RECTANGULAR, 5 #22 SOCKET CONTACTS
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. SIZE C NASA NUMBER 1011646
SCALE WEIGHT CALC ACTUAL SHEET 1 OF 1

1011646

R-06640

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

A	1011647

REVISIONS 01560

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR 14841	12-22-69	WK

REQUIREMENTS:

1. GENERAL:

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

   C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.

   D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052

   E. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-C-8384

2. INSPECTION AND ACCEPTANCE.

   A. MECHANICAL REQUIREMENTS

      1. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION PER MIL-STD-129.

      2. PARTS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER PER MIL-STD-130, EXCEPT INK OR PAINT NOT ACCEPTABLE.

      3. MECHANICAL DIMENSIONS AS SHOWN.

      4. CONTACTS 5 #22 PINS .030 ± .001 IN. DIAMETER.

      5. ALL PINS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.

      6. ENGAGEMENT: GUIDE PINS, POLARIZED.

      7. THIS DRAWING SHALL MATE WITH A MATCHING PART NASA DRAWING 1011646(REF).

      8. WIRE TERMINATION: SOLDER CUP TO ACCOMMODATE #22 AWG STRANDED WIRE.

      9. INSERTION AND WITHDRAWAL FORCE 2 TO 11 OZ/PIN WITH MATING CONNECTOR.

   B. ELECTRICAL REQUIREMENTS:

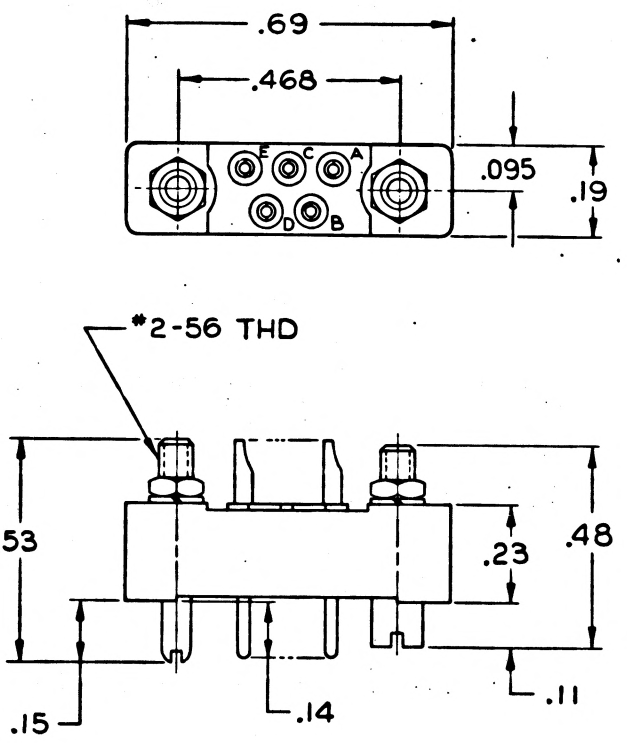
1.	INSULATION RESISTANCE:	1000 MEGOHMS MIN. AT 1000 VDC
2.	SERVICE RATING:	SEA LEVEL 530 V RMS
3.	DIELECTRIC STRENGTH:	SEA LEVEL 1600 V RMS

3. DESIGN REQUIREMENTS:

A.	MOUNTING	PANEL
B.	SERVICE RATING:	70,000 FEET 140 V RMS
C.	DIELECTRIC STRENGTH:	70,000 FEET 425 V RMS
D.	INSULATION (BODY):	GLASS FILLED DIALLYL PHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN)
E.	CONTACTS:	PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204, TYPE II, CLASS 2 OVER COPPER FLASH
F.	GUIDE PINS AND SOCKETS:	STAINLESS STEEL, PASSIVATED
G.	CONTACT RATING:	3 AMPS
H.	CONTACT CENTER TO CENTER:	3/32 ± .002
I.	SURFACE-CREEPAGE DISTANCE:	1/16 MIN.
J.	AIR SPACE:	.040 MIN.
K.	CONTACT RESISTANCE:	

   1. 20 MV MAX AT 3 AMPS
   2. 25 MICROVOLTS MAXIMUN AT 250 MICROAMPS D.C. AFTER 500 INSERTIONS AND WITHDRAWALS.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



TOLERANCES:
TWO PLACE DECIMAL, ±.010
THREE PLACE DECIMAL, ±.005

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ −	+ −	+ −

DO NOT SCALE THIS DRAWING

MATERIAL

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK

KIC PN 68502017501

DRAWN V. Slafoneguky DATE 4-8-63
CHECKED W. Russus
APPROVAL E. Bay 8/9/63
APPROVAL E. Thomas 8-12-63
NASA APPROVAL W. J. Rhine 8-14-63
MIT APPROVAL W. Coffin 14 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
CONNECTOR, ELECTRICAL
RECTANGULAR, 5 #22 PIN CONTACTS
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011647

SCALE	WEIGHT	CALC ACTUAL	SHEET 1 OF 1

E-184

R-06640

1011647

REVISIONS 0L560

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REQUIREMENTS:

1. GENERAL:

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

   C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.

   D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052

   E. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-C-8384

2. INSPECTION AND ACCEPTANCE.

   A. MECHANICAL REQUIREMENTS

      1. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION PER MIL-STD-129.

      2. PARTS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER PER MIL-STD-130, EXCEPT INK OR PAINT NOT ACCEPTABLE.

      3. MECHANICAL DIMENSIONS AS SHOWN.

      4. CONTACTS 5 #22 PINS .030 ± .001 IN. DIAMETER.

      5. ALL PINS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.

      6. ENGAGEMENT: GUIDE PINS, POLARIZED.

      7. THIS DRAWING SHALL MATE WITH A MATCHING PART NASA DRAWING 1011646(REF).

      8. WIRE TERMINATION: SOLDER CUP TO ACCOMMODATE #22 AWG STRANDED WIRE.

      9. INSERTION AND WITHDRAWAL FORCE 2 TO 11 OZ/PIN WITH MATING CONNECTOR.

   B. ELECTRICAL REQUIREMENTS:

      1. INSULATION RESISTANCE: 1000 MEGOHMS MIN. AT 1000 VDC

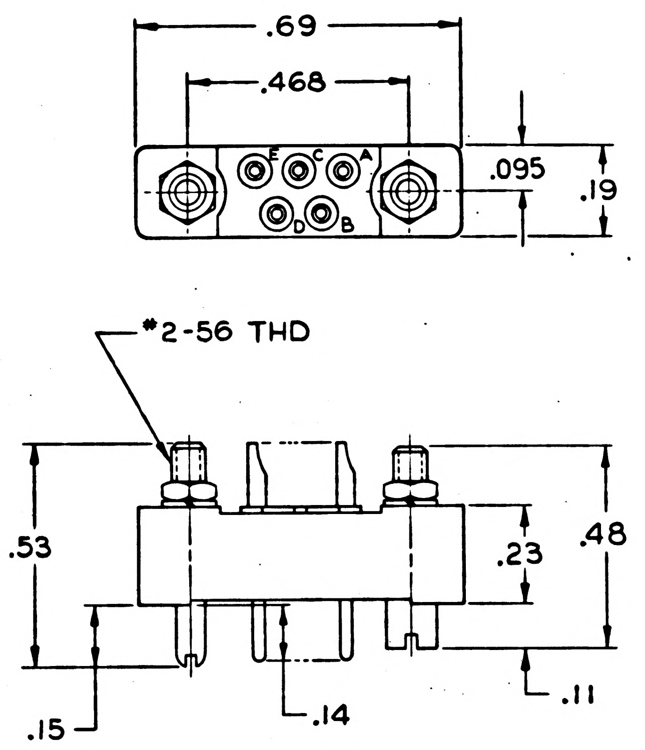
      2. SERVICE RATING: SEA LEVEL 530 V RMS

      3. DIELECTRIC STRENGTH: SEA LEVEL 1600 V RMS

3. DESIGN REQUIREMENTS:

A.	MOUNTING	PANEL
B.	SERVICE RATING:	70,000 FEET 140 V RMS
C.	DIELECTRIC STRENGTH:	70,000 FEET 425 V RMS
D.	INSULATION (BODY):	GLASS FILLED DIALLYL PHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN)
E.	CONTACTS:	PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204, TYPE II, CLASS 2
F.	GUIDE PINS AND SOCKETS:	STAINLESS STEEL, PASSIVATED
G.	CONTACT RATING:	3 AMPS
H.	CONTACT CENTER TO CENTER:	3/32 ± .002
I.	SURFACE-CREEPAGE DISTANCE:	1/16 MIN.
J.	AIR SPACE:	.040 MIN.
K.	CONTACT RESISTANCE:	20 MV MAX AT 3 AMPS

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



TOLERANCES:
TWO PLACE DECIMAL, ±.010
THREE PLACE DECIMAL, ±.005

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ −	+ −	+ −

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 68502017501

DRAWN DATE 4-8-63
CHECKED
APPROVAL 8/9/63
APPROVAL 8-12-63
NASA APPROVAL W J Rhine 8-14-63
MIT APPROVAL 14 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
CONNECTOR, ELECTRICAL
RECTANGULAR, 5 #22 PIN CONTACTS
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011647
SCALE
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011647

R-06640

E-184

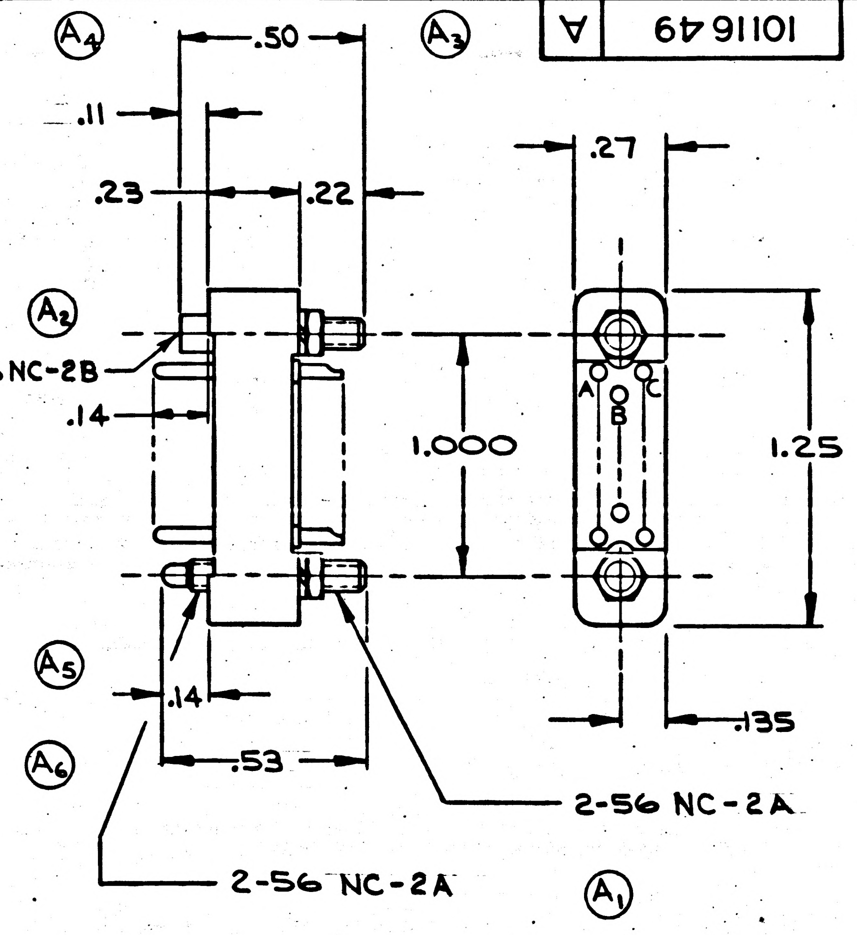
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

REVISIONS 02560				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A6		REVISED PER TDRR NO. 06920	17 MAR 64	

1011649 A

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.
   - D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052
   - E. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-C-8384
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     1. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION PER MIL-STD-129.
     2. PARTS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER PER MIL-STD-130, EXCEPT INK OR PAINT NOT ACCEPTABLE.
     3. MECHANICAL DIMENSIONS AS SHOWN.
     4. CONTACTS 26 #22 PINS TO ACCOMMODATE .030 ± .001 IN. PIN DIAMETER.
     5. ALL PINS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.
     6. ENGAGEMENT: SCREWLOCKS, POLARIZED.
     7. THIS DRAWING SHALL MATE WITH A MATCHING PART NASA DRAWING 1000121 (REF).
     8. WIRE TERMINATIONS: SOLDER CUP TO ACCOMMODATE #22 AWG STRANDED WIRE.
     9. INSERTION AND WITHDRAWAL FORCE 2 TO 11 OZ/PIN WITH MATING CONNECTOR.
   - B. ELECTRICAL REQUIREMENTS:
     1. INSULATION RESISTANCE: 1000 MEGOHMS MIN AT 1000 VDC
     2. SERVICE RATING: SEA LEVEL 530 V RMS
     3. DIELECTRIC STRENGTH: SEA LEVEL 1600 V RMS
3. DESIGN REQUIREMENTS:
   - A. MOUNTING: PANEL
   - B. SERVICE RATING: 70,000 FEET 140 V RMS
   - C. DIELECTRIC STRENGTH: 70,000 FEET 425 V RMS
   - D. INSULATION (BODY): GLASS FILLED DIALLYL PHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN)
   - E. CONTACTS: PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204, TYPE II. CLASS 2
   - F. SCREWLOCKS: STAINLESS STEEL, PASSIVATED
   - G. CONTACT RATING: 3 AMPS
   - H. CONTACT CENTER TO CENTER: 3/32 ± .002
   - I. SURFACE-CREEPAGE DISTANCE: 1/16 MIN.
   - J. AIR SPACE: .040 MIN.
   - K. CONTACT RESISTANCE: 20 MV MAX AT 3 AMPS



TOLERANCES:~
TWO PLACE DECIMAL, ±.010
THREE PLACE DECIMAL, ±.005

MASTER

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY | USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS + − | DECIMALS + − | ANGLES + −
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 68502016601
DRAWN E. Pizzo DATE 4-8-63
CHECKED
APPROVAL J. E. Costa 8/9/63
APPROVAL 8-12-63
NASA APPROVAL W. J. 5-14-63
MIT APPROVAL 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE CONNECTOR, ELECTRICAL RECTANGULAR, 26 #22 PIN CONTACTS SPECIFICATION CONTROL DRAWING

CODE IDENT NO. | SIZE C | NASA NUMBER 1011649

SCALE ~ | WEIGHT CALC ACTUAL | SHEET 1 OF 1

1011649 A

26638

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

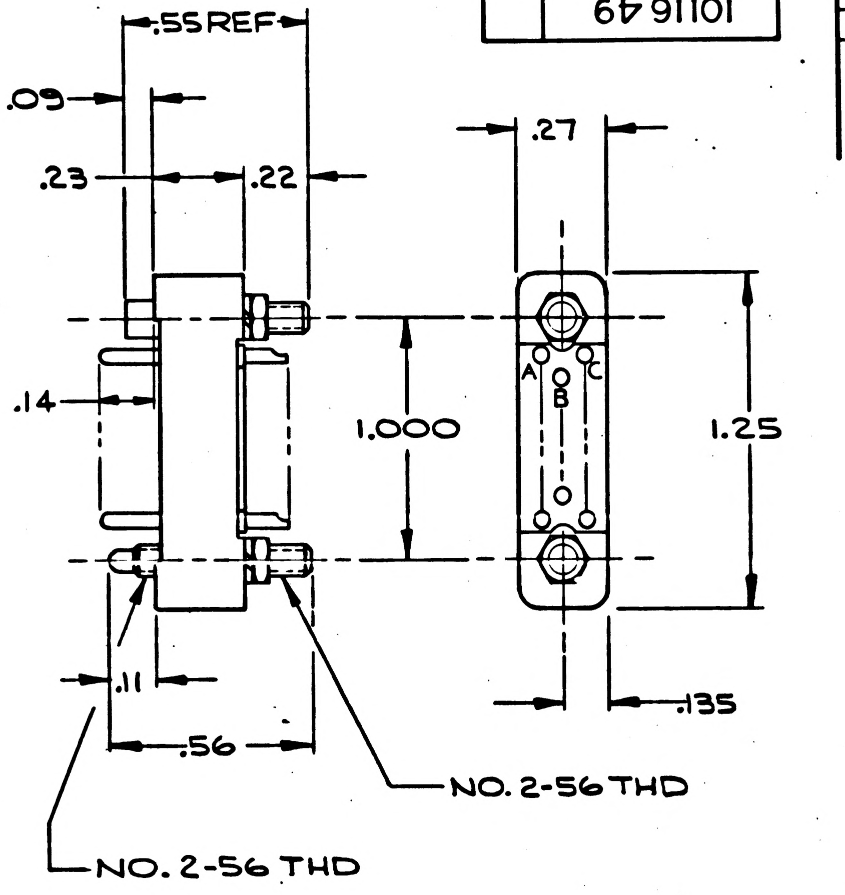
1011649

REVISIONS 02560				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.
   - D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052
   - E. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-C-8384
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     1. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION PER MIL-STD-129.
     2. PARTS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER PER MIL-STD-130, EXCEPT INK OR PAINT NOT ACCEPTABLE.
     3. MECHANICAL DIMENSIONS AS SHOWN.
     4. CONTACTS 26 #22 PINS TO ACCOMMODATE .030 ± .001 IN. PIN DIAMETER.
     5. ALL PINS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.
     6. ENGAGEMENT: SCREWLOCKS, POLARIZED.
     7. THIS DRAWING SHALL MATE WITH A MATCHING PART NASA DRAWING 1000121 (REF).
     8. WIRE TERMINATIONS: SOLDER CUP TO ACCOMMODATE #22 AWG STRANDED WIRE.
     9. INSERTION AND WITHDRAWAL FORCE 2 TO 11 OZ/PIN WITH MATING CONNECTOR.
   - B. ELECTRICAL REQUIREMENTS:
     1. INSULATION RESISTANCE: 1000 MEGOHMS MIN AT 1000 VDC
     2. SERVICE RATING: SEA LEVEL 530 V RMS
     3. DIELECTRIC STRENGTH: SEA LEVEL 1600 V RMS
3. DESIGN REQUIREMENTS:
   - A. MOUNTING: PANEL
   - B. SERVICE RATING: 70,000 FEET 140 V RMS
   - C. DIELECTRIC STRENGTH: 70,000 FEET 425V RMS
   - D. INSULATION (BODY): GLASS FILLED DIALLYL PHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN)
   - E. CONTACTS: PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204, TYPE II. CLASS 2
   - F. SCREWLOCKS: STAINLESS STEEL, PASSIVATED
   - G. CONTACT RATING: 3 AMPS
   - H. CONTACT CENTER TO CENTER: 3/32 ± .002
   - I. SURFACE-CREEPAGE DISTANCE: 1/16 MIN.
   - J. AIR SPACE: .040 MIN.
   - K. CONTACT RESISTANCE: 20 MV MAX AT 3 AMPS

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



TOLERANCES:–
TWO PLACE DECIMAL, ±.010
THREE PLACE DECIMAL, ±.005

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ –	+ –	+ –

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 68502016601
DRAWN E.Pizzo DATE 4-8-63
CHECKED
APPROVAL J.E. Costey 8/9/63
APPROVAL E. Thomp 8-12-63
NASA APPROVAL W J Rhine 8-14-63
MIT APPROVAL W 14 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE CONNECTOR, ELECTRICAL RECTANGULAR, 26 #22 PIN CONTACTS SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011649
SCALE ~
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011649

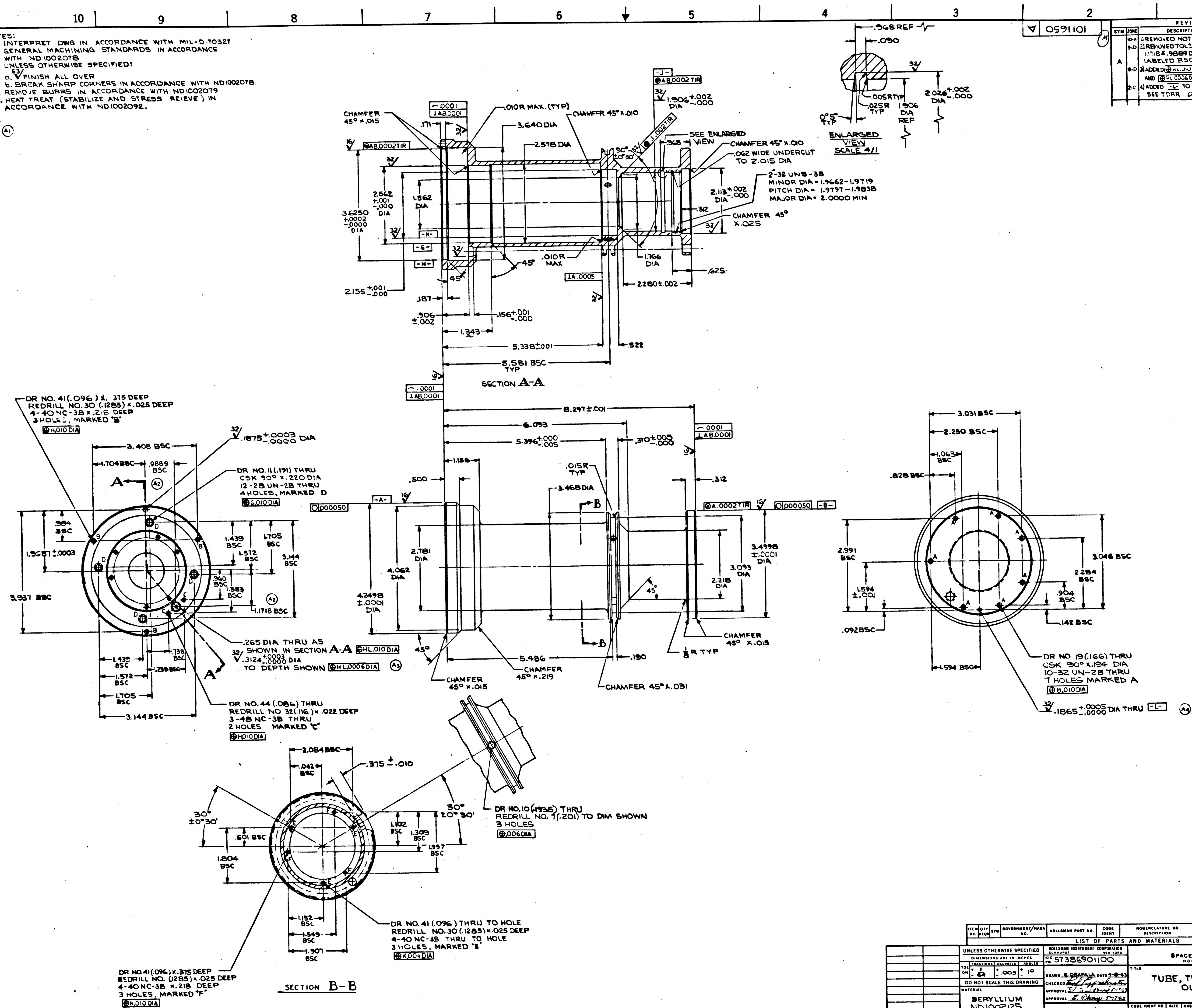
NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:
   c. 63/√ FINISH ALL OVER
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. HEAT TREAT (STABILIZE AND STRESS REIEVE) IN ACCORDANCE WITH ND1002092.

(A1)

A	1011650

REVISIONS TDRR 01279

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	10-H 9-D 8-D 2-C	1) REMOVED NOTE NO. 6 2) REMOVED TOL ±.0003 ON 1.1718 & .9889 DIM. AND LABELED BSC. 3) ADDED ⊕HL.010DIA TO .256 DIA AND ⊕HL.0006DIA TO .3124 DIA 4) ADDED -L- TO .1865 DIA SEE TDRR 01491	6-6-63	WA



.968 REF
.090
32/
.005R TYP
.025R TYP
0°5' TYP
1.906 DIA REF
2.026 +.002 -.000 DIA
ENLARGED VIEW SCALE 4/1
CHAMFER 45° x .015
.171
⌒.0001
⊥AB.0001
32/
.010R MAX. (TYP)
3.640 DIA
2.578 DIA
CHAMFER 45° x .010
-J-
●AB.0002 TIR
1.906 +.002 -.000 DIA
●J.002 TIR
90° ±0°30'
.968
SEE ENLARGED VIEW
CHAMFER 45° x .010
.062 WIDE UNDERCUT TO 2.015 DIA
2-32 UNS-3B
MINOR DIA = 1.9662-1.9719
PITCH DIA = 1.9797-1.9838
MAJOR DIA = 2.0000 MIN
16/
●AB.0002 TIR
3.6250 +.0002 -.0000 DIA
2.562 +.001 -.000 DIA
1.562 DIA
-K-
-G-
-H-
2.113 +.002 -.000 DIA
.312
CHAMFER 45° x .025
45°
.010R MAX
1.766 DIA
.625
⊥A.0005
2.280 ±.002
2.155 +.001 -.000
.187
.906 ±.002
.156 +.001 -.000
1.343
5.338 ±.001
.522
5.581 BSC TYP
SECTION A-A
⌒.0001
⊥AB.0001
DR NO. 41 (.096) x .375 DEEP
REDRILL NO. 30 (.1285) x .025 DEEP
4-40 NC-3B x .216 DEEP
3 HOLES, MARKED "B"
⊕H.010 DIA
.1875 +.0003 -.0000 DIA
3.408 BSC
1.704 BSC
.9889 BSC
A
(A2)
DR NO. 11 (.191) THRU
CSK 90° x .220 DIA
12-28 UN-2B THRU
4 HOLES, MARKED D
⊕G.010 DIA
.984 BSC
1.9687 ±.0003
3.937 BSC
1.439 BSC
1.572 BSC
1.705 BSC
3.144 BSC
.960 BSC
1.383 BSC
1.1718 BSC
(A2)
.265 DIA THRU AS SHOWN IN SECTION A-A ⊕HL.010 DIA
.3124 +.0003 -.0000 DIA TO DEPTH SHOWN ⊕HL.0006 DIA
(A3)
1.439 BSC
.738 BSC
1.572 BSC
1.299 BSC
1.705 BSC
3.144 BSC
A
DR NO. 44 (.086) THRU
REDRILL NO 32 (.116) x .022 DEEP
3-48 NC-3B THRU
2 HOLES MARKED "C"
⊕H.010 DIA
8.297 ±.001
6.093
5.396 +.000 -.005
.370 +.005 -.000
⌒.0001
⊥AB.0001
1.156
.500
.015R TYP
3.468 DIA
.312
-A-
○.000050
●A.0002 TIR
○.000050
-B-
B
2.781 DIA
4.062 DIA
4.2498 ±.0001 DIA
3.4998 ±.0001 DIA
3.093 DIA
2.218 DIA
45°
45°
5.486
.190
1/8 R TYP
CHAMFER 45° x .015
CHAMFER 45° x .219
CHAMFER 45° x .031
CHAMFER 45° x .015
3.031 BSC
2.250 BSC
1.063 BSC
.828 BSC
2.991 BSC
1.594 ±.001
.092 BSC
3.046 BSC
2.284 BSC
.904 BSC
.142 BSC
1.594 BSC
DR NO 19 (.166) THRU
CSK 90° x .194 DIA
10-32 UN-2B THRU
7 HOLES MARKED A
⊕B.010 DIA
.1865 +.0005 -.0000 DIA THRU -L-
(A4)
2.084 BSC
1.042 BSC
.375 ±.010
30° ±0°30'
30° ±0°30'
.601 BSC
1.804 BSC
1.102 BSC
1.309 BSC
1.997 BSC
DR NO. 10 (.1935) THRU
REDRILL NO. 7 (.201) TO DIM SHOWN
3 HOLES
⊕.006 DIA
1.152 BSC
1.549 BSC
1.907 BSC
DR NO. 41 (.096) THRU TO HOLE
REDRILL NO. 30 (.1285) x .025 DEEP
4-40 NC-3B THRU TO HOLE
3 HOLES, MARKED "E"
⊕K.004 DIA
DR NO. 41 (.096) x .375 DEEP
REDRILL NO. (.1285) x .025 DEEP
4-40 NC-3B x .218 DEEP
3 HOLES, MARKED "F"
⊕K.010 DIA
SECTION B-B

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT W+

LIST OF PARTS AND MATERIALS

1011722	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
BERYLLIUM
ND1002125

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901100

DRAWN E. DRAPALA DATE 4-8-63
CHECKED Paul Pappenhausen
APPROVAL E. Trautmann 5-17-63
APPROVAL E. Thomas 5-17-63
NASA APPROVAL 5/17/63
MIT APPROVAL W. Kupfer 17 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
TUBE, TELESCOPE
OUTER

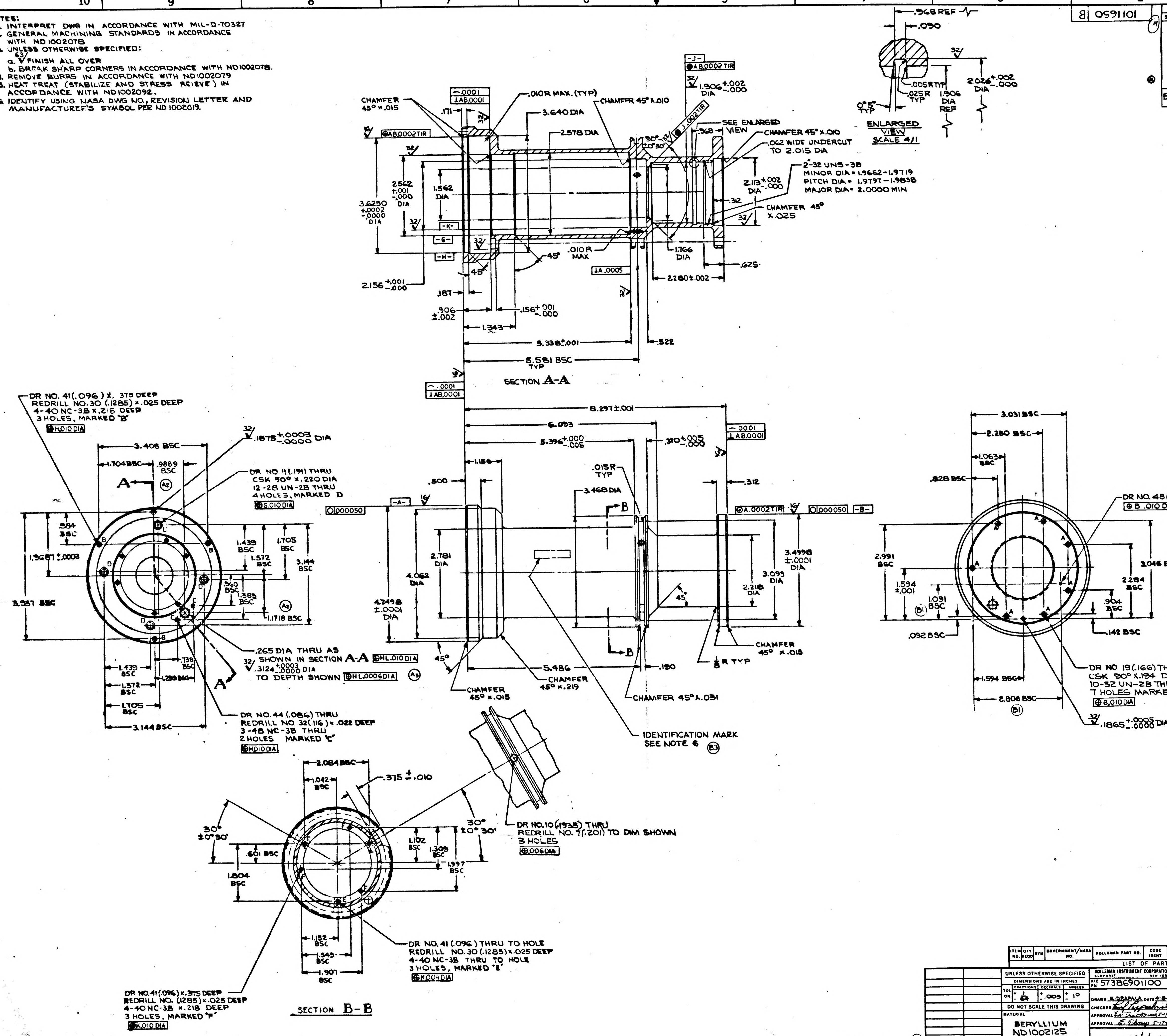
CODE IDENT NO.	SIZE	NASA NUMBER
	E	1011650

SCALE 1/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

1011650 A

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:
   - a. 63 √ FINISH ALL OVER
   - b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. HEAT TREAT (STABILIZE AND STRESS REIEVE) IN ACCOFDANCE WITH ND1002092.
6. (A) (B3) IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURER'S SYMBOL PER ND 1002019.


1011650 B
.968 REF
.090
32/
.005R TYP
.025R TYP
.906 DIA REF
2.026 +.002 -.000 DIA
0°-5' TYP
ENLARGED VIEW SCALE 4/1
CHAMFER 45° x .015
.0001
⊥AB.0001
.010R MAX. (TYP)
3.640 DIA
2.578 DIA
CHAMFER 45° x .010
-J-
⊕AB.0002 TIR
1.906 +.002 -.000 DIA
SEE ENLARGED VIEW
CHAMFER 45° x .010
.062 WIDE UNDERCUT TO 2.015 DIA
2-32 UNS-3B
MINOR DIA = 1.9662-1.9719
PITCH DIA = 1.9797-1.9838
MAJOR DIA = 2.0000 MIN
2.113 +.002 -.000 DIA
CHAMFER 45° x .025
3.6250 +.0002 -.0000 DIA
2.562 +.001 -.000 DIA
1.562 DIA
-K-
-G-
-H-
.010R MAX
1.766 DIA
2.280±.002
.625
1A.0005
2.156 +.001 -.000
.187
.906 ±.002
.156 +.001 -.000
1.343
5.338±.001
.522
5.581 BSC TYP
SECTION A-A
8.297±.001
6.093
5.396 +.000 -.005
.310 +.005 -.000
1.156
.015R TYP
3.468 DIA
.312
⊙A.0002 TIR
⊙.000050
-B-
-A-
⊙.000050
2.781 DIA
4.062 DIA
4.2498 ±.0001 DIA
3.093 DIA
2.218 DIA
3.4998 ±.0001 DIA
5.486
CHAMFER 45° x .219
CHAMFER 45° x .015
CHAMFER 45° x .031
1/8 R TYP
CHAMFER 45° x .015
.190
IDENTIFICATION MARK SEE NOTE 6 (B3)
DR NO. 41 (.096) x .375 DEEP REDRILL NO. 30 (.1285) x .025 DEEP 4-40 NC-3B x .218 DEEP 3 HOLES, MARKED "B"
⊕H.010 DIA
3.408 BSC
1.704 BSC
.9889 BSC
.1875 +.0003 -.0000 DIA
DR NO 11 (.191) THRU CSK 90° x .220 DIA 12-28 UN-2B THRU 4 HOLES, MARKED D
⊕G.010 DIA
.984 BSC
1.9687±.0003
3.937 BSC
1.439 BSC
1.572 BSC
1.705 BSC
3.144 BSC
.960 BSC
1.383 BSC
1.1718 BSC
.265 DIA THRU AS SHOWN IN SECTION A-A ⊕HL.010 DIA
.3124 +.0003 -.0000 DIA TO DEPTH SHOWN ⊕HL.0006 DIA (A3)
DR NO. 44 (.086) THRU REDRILL NO 32 (.116) x .022 DEEP 3-48 NC-3B THRU 2 HOLES MARKED "C"
⊕H.010 DIA
3.031 BSC
2.280 BSC
1.063 BSC
.828 BSC
DR NO. 48 (.076) THRU (B1)
⊕B .010 DIA
2.991 BSC
1.594 ±.001
1.091 BSC
3.046 BSC
2.284 BSC
.904 BSC
.142 BSC
.092 BSC
1.594 BSC
2.806 BSC
DR NO 19 (.166) THRU CSK 90° x .194 DIA 10-32 UN-2B THRU 7 HOLES MARKED A
⊕B.010 DIA
.1865 +.0005 -.0000 DIA THRU -L- (A4)
2.084 BSC
1.042 BSC
.375 ±.010
30° ±0°30'
.601 BSC
1.804 BSC
1.102 BSC
1.309 BSC
1.997 BSC
DR NO.10 (.1935) THRU REDRILL NO. 7 (.201) TO DIM SHOWN 3 HOLES
⊕.006 DIA
1.152 BSC
1.549 BSC
1.907 BSC
DR NO. 41 (.096) THRU TO HOLE REDRILL NO. 30 (.1285) x .025 DEEP 4-40 NC-3B THRU TO HOLE 3 HOLES, MARKED "E"
⊕K.004 DIA
DR NO.41 (.096) x .375 DEEP REDRILL NO. (1285) x .025 DEEP 4-40 NC-3B x .218 DEEP 3 HOLES, MARKED "F"
⊕K.010 DIA
SECTION B-B

REVISIONS TDRR 01279

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	10-H 9-D 8-D 2-C	1) REMOVED NOTE NO. 6 2) REMOVED TOL ±.0003 ON 1.1718 & .9889 DIM. AND LABELED BSC. 3) ADDED ⊕HL.010 DIA TO .256 DIA AND ⊕HL.0006 DIA TO .3124 DIA 4) ADDED -L- TO .1865 DIA SEE TDRR 01491	6-6-63	WAK
B4		REVISED PER TDRR NO. 03578	3 Oct 63	

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
(B4) 1011729	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ± .005; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL: BERYLLIUM ND1002125
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION ELMHURST NEW YORK
KIC PN 57386901100
DRAWN E. DRAPALA DATE 4-8-63
CHECKED
APPROVAL 5-17-63
APPROVAL E. Dhomp 5-17-63
NASA APPROVAL 5/17/63
MIT APPROVAL 17 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE: TUBE, TELESCOPE OUTER

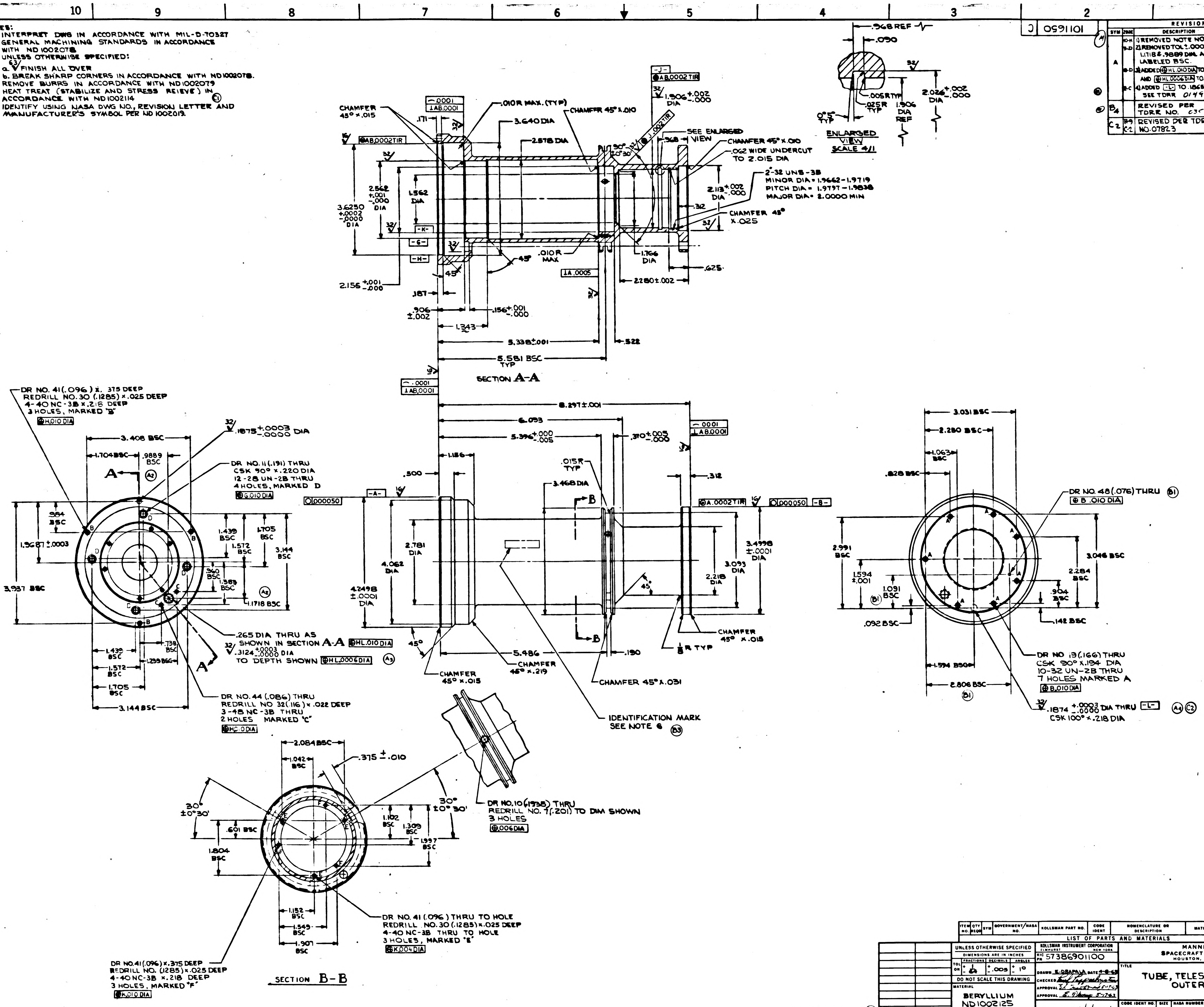
CODE IDENT NO.
SIZE E
NASA NUMBER 1011650
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. HEAT TREAT (STABILIZE AND STRESS REIEVE) IN ACCORDANCE WITH ND1002114 (C1)
(A1) (B2) 6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURER'S SYMBOL PER ND 1002019.

J | 1011650

REVISIONS TDRR 01279

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	10-H 9-D 8-D 2-C	1) REMOVED NOTE NO. 6 2) REMOVED TOL ±.0003 ON 1.1718 & .9889 DIM AND LABELED BSC. 3) ADDED ⊕HL.010 DIA TO .256 DIA AND ⊕HL.0006 DIA TO .3124 DIA 4) ADDED -L- TO .1865 DIA SEE TDRR 01491	6-6-63	WAK
B4		REVISED PER TDRR NO. 03578	3 Oct 63	
C2	11-9 C-2	REVISED PER TDRR NO. 07823	4-2-64	



CHAMFER 45° x .015
⌒ .0001
⊥ AB .0001
.171
.010R MAX. (TYP)
3.640 DIA
2.878 DIA
CHAMFER 45° x .010
-J-
◎ AB .0002 TIR
1.906 +.002 -.000 DIA
◎ J .002 TIR
SEE ENLARGED VIEW
.368
CHAMFER 45° x .010
.062 WIDE UNDERCUT TO 2.015 DIA
2-32 UNS-3B
MINOR DIA = 1.9662-1.9719
PITCH DIA = 1.9797-1.9838
MAJOR DIA = 2.0000 MIN
2.113 +.002 -.000 DIA
.312
CHAMFER 45° x .025
90° ±0°30'
◎ AB .0002 TIR
3.6250 +.0002 -.0000 DIA
2.562 +.001 -.000 DIA
1.562 DIA
-K-
-G-
-H-
45°
.010R MAX
⊥ A .0005
1.766 DIA
.625
2.280 ±.002
2.156 +.001 -.000
.187
.906 ±.002
.156 +.001 -.000
1.343
5.338 ±.001
.522
5.581 BSC TYP
SECTION A-A
.968 REF
.090
.005R TYP
.025R TYP
0°5' TYP
1.906 DIA REF
2.026 +.002 -.000 DIA
ENLARGED VIEW SCALE 4/1
⌒ .0001
⊥ AB .0001
8.297 ±.001
6.093
5.396 +.000 -.005
.370 +.005 -.000
⌒ .0001
⊥ AB .0001
1.186
.500
.015R TYP
3.468 DIA
.312
○ .000050
-A-
◎ A .0002 TIR
○ .000050
-B-
B
B
2.781 DIA
4.062 DIA
4.2498 ±.0001 DIA
3.4998 ±.0001 DIA
3.093 DIA
2.218 DIA
45°
45°
5.486
.190
1/8 R TYP
CHAMFER 45° x .015
CHAMFER 45° x .219
CHAMFER 45° x .031
CHAMFER 45° x .015
IDENTIFICATION MARK SEE NOTE 6 (B3)
DR NO. 41 (.096) x .375 DEEP
REDRILL NO. 30 (.1285) x .025 DEEP
4-40 NC-3B x .218 DEEP
3 HOLES, MARKED "B"
⊕ H .010 DIA
.1875 +.0003 -.0000 DIA
3.408 BSC
1.704 BSC
.9889 BSC
A
(A2)
DR NO. 11 (.191) THRU
CSK 90° x .220 DIA
12-28 UN-2B THRU
4 HOLES, MARKED D
⊕ G .010 DIA
.984 BSC
1.9687 ±.0003
3.937 BSC
1.439 BSC
1.572 BSC
1.705 BSC
3.144 BSC
.960 BSC
1.383 BSC
1.1718 BSC
(A2)
.265 DIA THRU AS SHOWN IN SECTION A-A ⊕HL.010 DIA
.3124 +.0003 -.0000 DIA TO DEPTH SHOWN ⊕HL.0006 DIA (A3)
.738 BSC
1.239 BSC
1.439 BSC
1.572 BSC
1.705 BSC
3.144 BSC
A
DR NO. 44 (.086) THRU
REDRILL NO 32 (.116) x .022 DEEP
3-48 NC-3B THRU
2 HOLES MARKED "C"
⊕ HC .010 DIA
3.031 BSC
2.250 BSC
1.063 BSC
.828 BSC
DR NO. 48 (.076) THRU (B1)
⊕ B .010 DIA
2.991 BSC
1.594 ±.001
1.091 BSC
(B1)
.092 BSC
3.046 BSC
2.284 BSC
.904 BSC
.142 BSC
DR NO 19 (.166) THRU
CSK 90° x .194 DIA
10-32 UN-2B THRU
7 HOLES MARKED A
⊕ B .010 DIA
1.594 BSC
2.806 BSC
(B1)
.1874 +.0003 -.0000 DIA THRU -L- (A4) (C2)
CSK 100° x .218 DIA
2.084 BSC
1.042 BSC
.375 ±.010
30° ±0°30'
30° ±0°30'
.601 BSC
1.804 BSC
1.102 BSC
1.309 BSC
1.997 BSC
1.152 BSC
1.549 BSC
1.907 BSC
DR NO. 10 (.1935) THRU
REDRILL NO. 7 (.201) TO DIM SHOWN
3 HOLES
⊕ .006 DIA
DR NO. 41 (.096) THRU TO HOLE
REDRILL NO. 30 (.1285) x .025 DEEP
4-40 NC-3B THRU TO HOLE
3 HOLES, MARKED "E"
⊕ K .004 DIA
DR NO. 41 (.096) x .375 DEEP
REDRILL NO. (.1285) x .025 DEEP
4-40 NC-3B x .218 DEEP
3 HOLES, MARKED "F"
⊕ K .010 DIA
SECTION B-B

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011729	1011000

(B4) APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± 1/64 DECIMALS ± .005 ANGLES ± 1°
DO NOT SCALE THIS DRAWING

MATERIAL
BERYLLIUM
ND1002125

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901100

DRAWN E. DRAPALA DATE 4-8-63
CHECKED
APPROVAL 5-17-63
APPROVAL E. [illegible] 5-17-63
NASA APPROVAL 5/17/63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
TUBE, TELESCOPE
OUTER

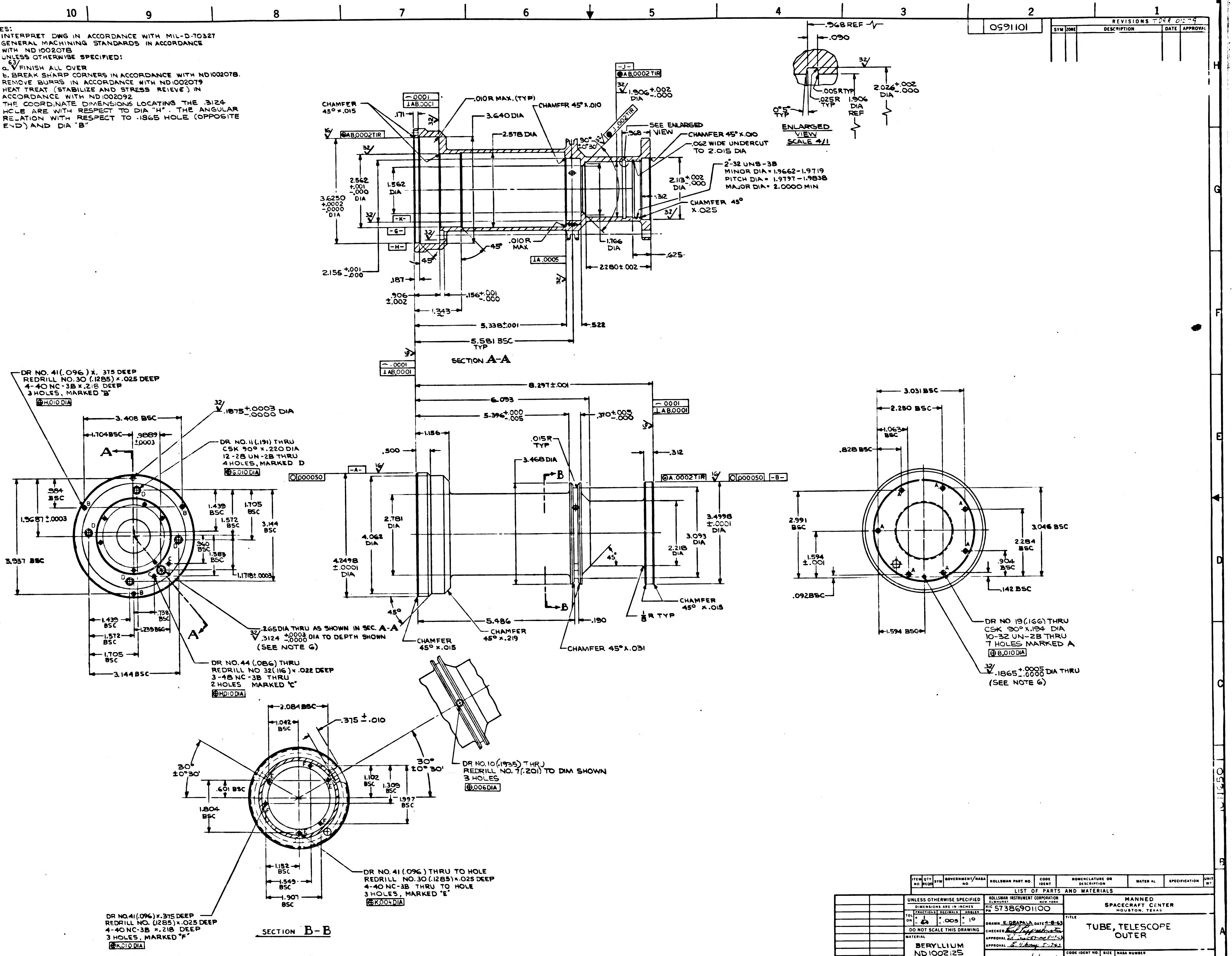
CODE IDENT NO.
SIZE E
NASA NUMBER 1011650
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011650

REVISIONS TDRR 01279

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078
3. UNLESS OTHERWISE SPECIFIED:
   a. 63/√ FINISH ALL OVER
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. HEAT TREAT (STABILIZE AND STRESS REIEVE) IN ACCORDANCE WITH ND1002092
6. THE COORDINATE DIMENSIONS LOCATING THE .3124 HOLE ARE WITH RESPECT TO DIA "H". THE ANGULAR RELATION WITH RESPECT TO .1865 HOLE (OPPOSITE END) AND DIA "B"



.968 REF
.090
32/
.005R TYP
.025R TYP
0°5' TYP
1.906 DIA REF
2.026 +.002 -.000 DIA
ENLARGED VIEW SCALE 4/1
CHAMFER 45° x .015
.0001
⊥AB.0001
.171
32/
.010R MAX. (TYP)
3.640 DIA
2.578 DIA
CHAMFER 45° X .010
-J-
AB.0002 TIR
1.906 +.002 -.000 DIA
J .002 TIR
16/
AB.0002TIR
SEE ENLARGED VIEW
.968
90° ±0°30'
CHAMFER 45° X .010
.062 WIDE UNDERCUT TO 2.015 DIA
2-32 UNS-3B
MINOR DIA = 1.9662-1.9719
PITCH DIA = 1.9797-1.9838
MAJOR DIA = 2.0000 MIN
2.113 +.002 -.000 DIA
.312
CHAMFER 45° X .025
2.562 +.001 -.000 DIA
1.562 DIA
3.6250 +.0002 -.0000 DIA
-K-
-G-
-H-
45°
.010R MAX
⊥A .0005
1.766 DIA
.625
2.280 ± .002
2.155 +.001 -.000
.187
.906 ±.002
.156 +.001 -.000
1.343
5.338 ±.001
.522
5.581 BSC TYP
SECTION A-A
.0001
⊥AB.0001
8.297 ±.001
6.093
5.396 +.000 -.005
.370 +.005 -.000
.0001
⊥AB.0001
1.156
.500
.015R TYP
3.468 DIA
.312
-A-
○.000050
A.0002 TIR
○.000050
-B-
2.781 DIA
4.062 DIA
4.2498 ±.0001 DIA
B
B
3.4998 ±.0001 DIA
3.093 DIA
2.218 DIA
45°
45°
5.486
.190
CHAMFER 45° x .015
CHAMFER 45° x .219
CHAMFER 45° X .031
1/8 R TYP
CHAMFER 45° x .015
DR NO. 41 (.096) x .375 DEEP
REDRILL NO. 30 (.1285) x .025 DEEP
4-40 NC-3B x .218 DEEP
3 HOLES, MARKED "B"
⊕H.010 DIA
32/ .1875 +.0003 -.0000 DIA
3.408 BSC
1.704 BSC
.9889 ±.0003
DR NO. 11 (.191) THRU
CSK 90° x .220 DIA
12-28 UN-2B THRU
4 HOLES, MARKED D
⊕G.010 DIA
A
.984 BSC
1.9687 ±.0003
3.937 BSC
1.439 BSC
1.705 BSC
1.572 BSC
3.144 BSC
.960 BSC
1.383 BSC
1.1718 ±.0003
1.439 BSC
.738 BSC
1.572 BSC
1.239 BSC
1.705 BSC
3.144 BSC
A
.265 DIA THRU AS SHOWN IN SEC. A-A
32/ .3124 +.0003 -.0000 DIA TO DEPTH SHOWN
(SEE NOTE 6)
DR NO. 44 (.086) THRU
REDRILL NO 32 (.116) x .022 DEEP
3-48 NC-3B THRU
2 HOLES MARKED "C"
⊕H.010 DIA
3.031 BSC
2.250 BSC
1.063 BSC
.828 BSC
2.991 BSC
1.594 ±.001
.092 BSC
3.046 BSC
2.284 BSC
.904 BSC
.142 BSC
1.594 BSC
DR NO 19 (.166) THRU
CSK 90° X .194 DIA
10-32 UN-2B THRU
7 HOLES MARKED A
⊕B.010 DIA
32/ .1865 +.0005 -.0000 DIA THRU
(SEE NOTE 6)
2.084 BSC
1.042 BSC
.375 ±.010
30° ±0°30'
30° ±0°30'
.601 BSC
1.804 BSC
1.102 BSC
1.309 BSC
1.997 BSC
1.152 BSC
1.549 BSC
1.907 BSC
DR NO. 10 (.1935) THRU
REDRILL NO. 7 (.201) TO DIM SHOWN
3 HOLES
⊕.006 DIA
DR NO. 41 (.096) THRU TO HOLE
REDRILL NO. 30 (.1285) x .025 DEEP
4-40 NC-3B THRU TO HOLE
3 HOLES, MARKED "E"
⊕K.004 DIA
DR NO. 41 (.096) x .375 DEEP
REDRILL NO. (.1285) x .025 DEEP
4-40 NC-3B x .218 DEEP
3 HOLES, MARKED "F"
⊕K.010 DIA
SECTION B-B

LIST OF PARTS AND MATERIALS

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

NEXT ASSY	USED ON
1011722	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
BERYLLIUM
ND1002125

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901100

DRAWN E. DRAPALA DATE 4-8-63
CHECKED Paul Pappalardo
APPROVAL Ed Trachtman 5-17-63
APPROVAL E. Thomas 5-17-63
NASA APPROVAL 5/17/63
MIT APPROVAL 17 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
TUBE, TELESCOPE
OUTER

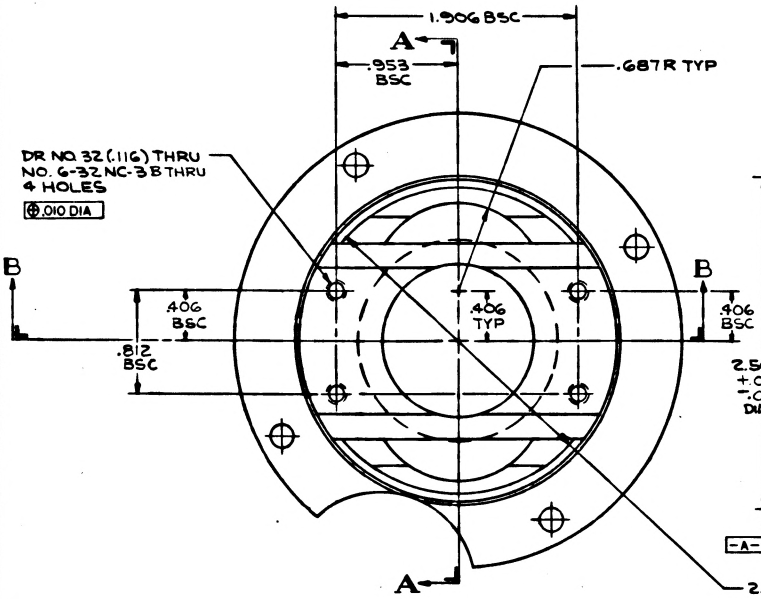
CODE IDENT NO.
SIZE E
NASA NUMBER 1011650
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

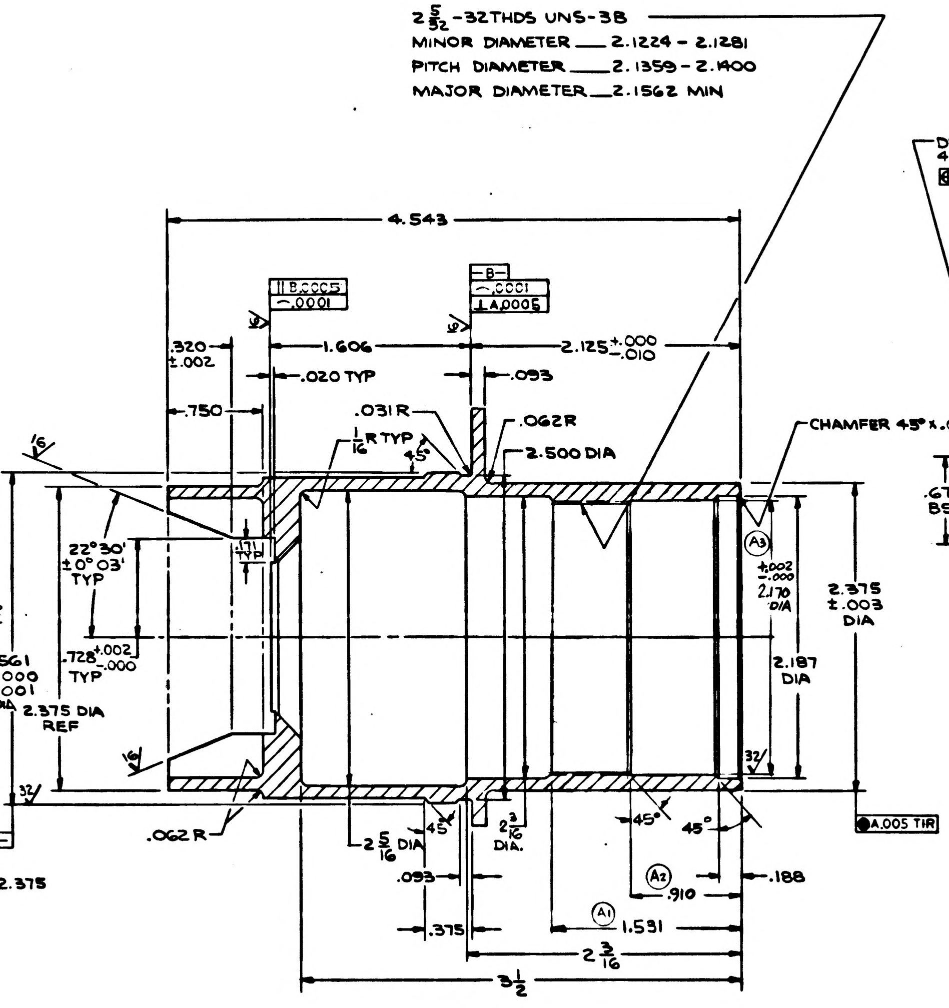
INCHES
PHOTOGRAPHIC SCALE ONLY

A | 101653

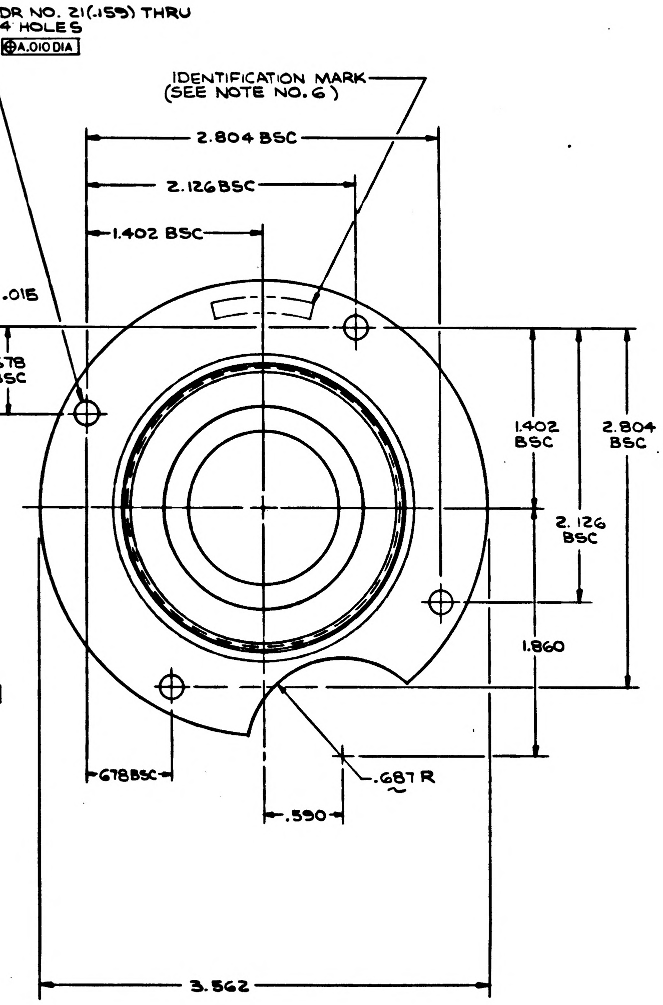
REVISIONS TDRR 01279				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	D5 D5	1) WAS 1.125 DIM. 2) ADDED .910 DIM. & 45° 3) ADDED 2.170 +.002 -.000 DIA. TDRR 01642	6-18-63 P.P. 6/19/63	P.P.L.

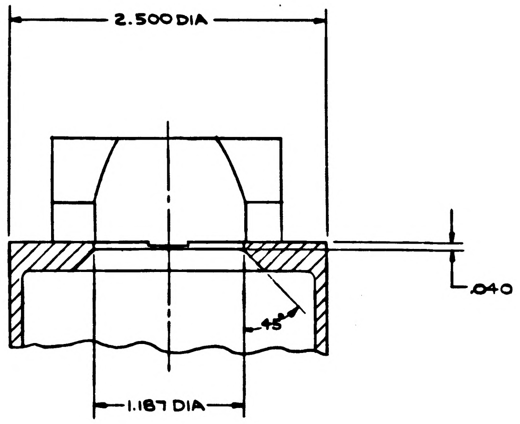
NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3 UNLESS OTHERWISE SPECIFIED:-
   a) 63√ FINISH ALL OVER
   b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. HEAT TREAT (STABILIZE & STRESS RELIEVE) IN ACCORDANCE WITH ND 1002092
6 IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019


1.906 BSC
A
.953 BSC
.687 R TYP
DR NO. 32 (.116) THRU
NO. 6-32 NC-3B THRU
4 HOLES
⊕ .010 DIA
B
B
.406 BSC
.812 BSC
.406 TYP
.406 BSC
A
2.375

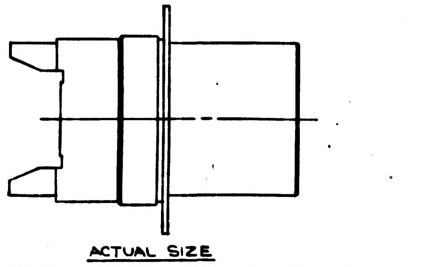

2 5/32 -32THDS UNS-3B
MINOR DIAMETER ___ 2.1224 - 2.1281
PITCH DIAMETER ___ 2.1359 - 2.1400
MAJOR DIAMETER ___ 2.1562 MIN
4.543
∥ B .0005
⌒ .0001
-B-
⌒ .0001
⊥ A .0005
16
.320 ±.002
1.606
2.125 +.000 -.010
.020 TYP
.093
.750
.031 R
1/16 R TYP
45°
.062 R
2.500 DIA
CHAMFER 45° x .015
22°30' ±0°03' TYP
.171 TYP
A3
2.170 +.002 -.000 DIA
2.375 ±.003 DIA
2.561 +.000 -.001 DIA
.728 +.002 -.000 TYP
2.375 DIA REF
2.187 DIA
32
-A-
.062 R
2 5/16 DIA
45°
2 3/16 DIA.
45°
45°
⬤ A .005 TIR
.093
A2
.910
.188
.375
A1
1.531
2 3/16
3 1/2

SECTION A-A


DR NO. 21 (.159) THRU
4 HOLES
⊕ A .010 DIA
IDENTIFICATION MARK (SEE NOTE NO. 6)
2.804 BSC
2.126 BSC
1.402 BSC
.678 BSC
1.402 BSC
2.804 BSC
2.126 BSC
1.860
.678 BSC
.687 R
.590
3.562


2.500 DIA
.040
45
1.187 DIA

PARTIAL SECTION B-B



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011724	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
BERYLLIUM
ND 1002125

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901110

DRAWN R. BRUNELLE DATE 4-8-63
CHECKED
APPROVAL 5-17-63
APPROVAL 5-17-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
TUBE, TELESCOPE INNER

CODE IDENT NO.	SIZE	NASA NUMBER
	E	101653

SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

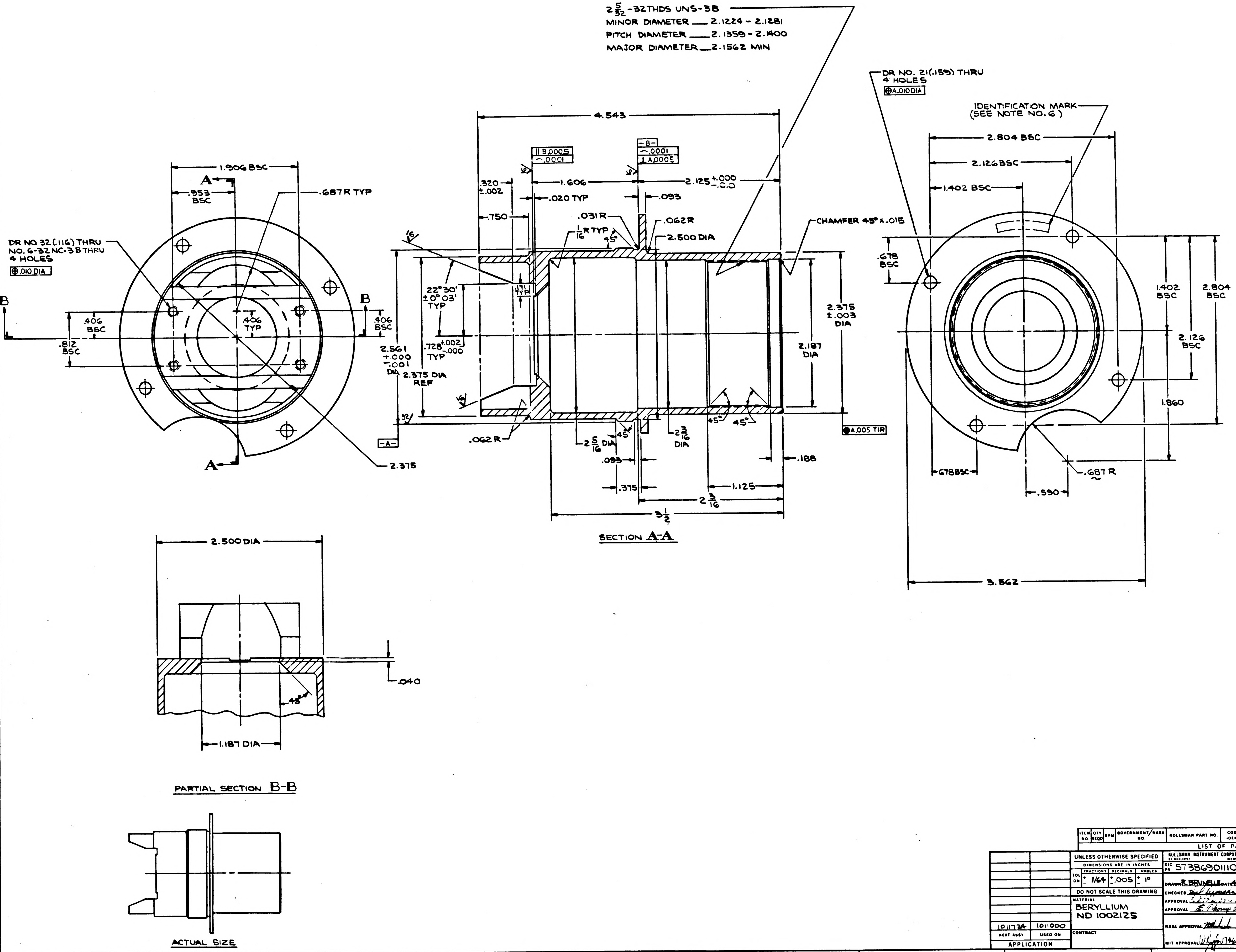
101653 A

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3 UNLESS OTHERWISE SPECIFIED:-
 a) 63√ FINISH ALL OVER
 b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. HEAT TREAT (STABILIZE & STRESS RELIEVE) IN ACCORDANCE WITH ND 1002092
6 IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019

1011653

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL


2 5/32 -32THDS UNS-3B
MINOR DIAMETER 2.1224 - 2.1281
PITCH DIAMETER 2.1359 - 2.1400
MAJOR DIAMETER 2.1562 MIN
DR NO. 21(.159) THRU 4 HOLES
⊕ A .010 DIA
IDENTIFICATION MARK (SEE NOTE NO. 6)
4.543
1.906 BSC
.953 BSC
.687 R TYP
A
B
DR NO 32 (.116) THRU
NO. 6-32NC-3B THRU
4 HOLES
⊕ .010 DIA
.406 BSC
.406 TYP
.812 BSC
2.375
.320 ±.002
.750
1.606
.020 TYP
2.125 +.000 -.010
.093
.031 R
.062 R
1/16 R TYP
45°
2.500 DIA
CHAMFER 45° x .015
// B .0005
⌒ .0001
-B-
⌒ .0001
⊥ A .0005
22°30' ±0° 03' TYP
.171 TYP
.728 +.002 -.000 TYP
2.561 +.000 -.001 DIA
2.375 DIA REF
2.375 ±.003 DIA
2.187 DIA
-A-
.062 R
2 5/16 DIA
2 3/16 DIA
.093
.375
1.125
2 3/16
3 1/2
.188
↗ A .005 TIR
16
32
SECTION A-A
2.804 BSC
2.126 BSC
1.402 BSC
.678 BSC
1.402 BSC
2.804 BSC
2.126 BSC
1.860
.678 BSC
.687 R
.590
3.562
2.500 DIA
.040
45°
1.187 DIA
PARTIAL SECTION B-B
ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011724	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ±.005; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL
BERYLLIUM
ND 1002125
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901110
DRAWN R. BRUNELLE DATE 4-8-63
CHECKED
APPROVAL
APPROVAL E. Thorup 5-17-63
NASA APPROVAL 5/7/63
MIT APPROVAL W. [illegible] 17 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS
TITLE
TUBE, TELESCOPE, INNER
CODE IDENT NO.
SIZE E
NASA NUMBER 1011653
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET OF

1011653

INCHES
PHOTOGRAPHIC SCALE ONLY

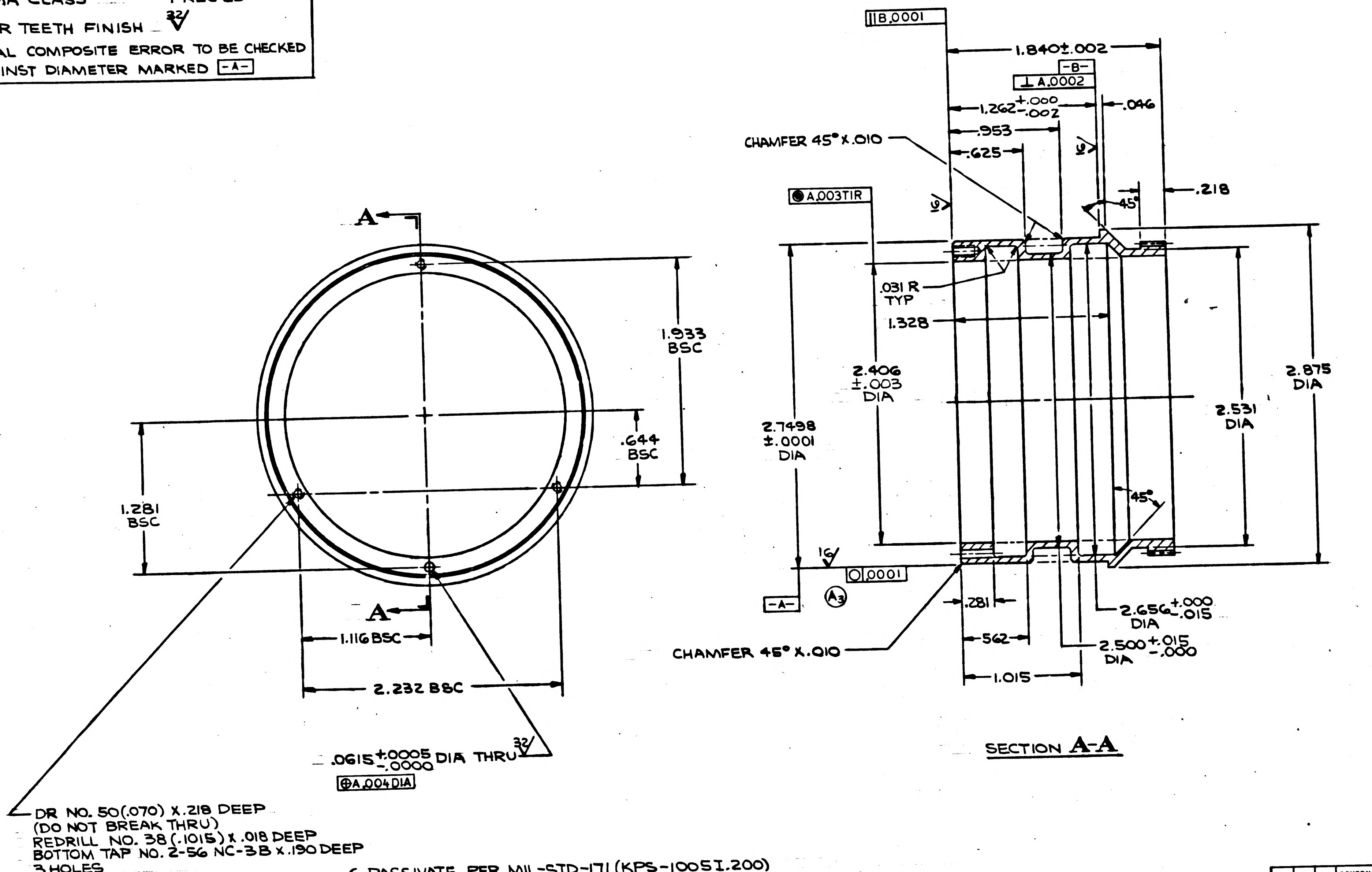
1011654 A

REVISIONS 01370				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER T.D.R.R. NO. 04598	1/14/63	UK

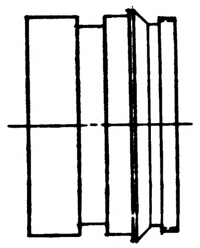
SPUR GEAR DATA	
NO. OF TEETH	252
DIAMETRAL PITCH	96
PRESSURE ANGLE	20°
PITCH DIAMETER	2.62500
OUTSIDE DIAMETER	$2.6458^{+.0000}_{-.0020}$
AGMA CLASS	PREC 2D

GEAR TEETH FINISH $\sqrt{32}$

TOTAL COMPOSITE ERROR TO BE CHECKED AGAINST DIAMETER MARKED [-A-]


A
A
1.933 BSC
.644 BSC
1.281 BSC
1.116 BSC
2.232 BSC
$.0615^{+.0005}_{-.0000}$ DIA THRU 32
⊕ A .004 DIA
DR NO. 50(.070) X .218 DEEP
(DO NOT BREAK THRU)
REDRILL NO. 38 (.1015) X .018 DEEP
BOTTOM TAP NO. 2-56 NC-3B X .190 DEEP
3 HOLES
⊕ A .004 DIA
// B .0001
1.840±.002
-B-
⊥ A .0002
$1.262^{+.000}_{-.002}$
.046
.953
.625
CHAMFER 45° X .010
16
16
◎ A .003 TIR
45°
.218
.031 R TYP
1.328
2.406 ±.003 DIA
2.7498 ±.0001 DIA
2.531 DIA
2.875 DIA
45°
16
○ .0001
-A-
A3
.281
$2.656^{+.000}_{-.015}$ DIA
.562
$2.500^{+.015}_{-.000}$ DIA
1.015
CHAMFER 45° X .010

SECTION A-A



ACTUAL SIZE

NOTES:-

1. INTERPRET DRAWING PER MIL-D-70327
2. GENERAL MACHINING STANDARDS PER ND 1002078
3. UNLESS OTHERWISE SPECIFIED:- $\sqrt{63}$ FINISH ALL OVER
4. REMOVE BURRS PER ND 1002079
5. (A2) HEAT TREAT PER ND 1002114 Rc 28-32
6. PASSIVATE PER MIL-STD-171 (KPS-1005I.200)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011709	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± -	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL CORROSION RESISTANT STEEL (A1) FED SPEC QQ-S-763 CLASS 416 COND A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 33386900560

DRAWN R. BRUNELLE DATE 4-3-63
CHECKED Paul Papachristou
APPROVAL E. Armstrong 5-22-63
APPROVAL E. Thomp 5-23-63
NASA APPROVAL
MIT APPROVAL 24 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
GEAR, TRUNNION DRIVE
(252T-96P)

CODE IDENT NO. | SIZE D | NASA NUMBER 1011654

SCALE 2/1 | WEIGHT CALC ACTUAL | SHEET 1 OF

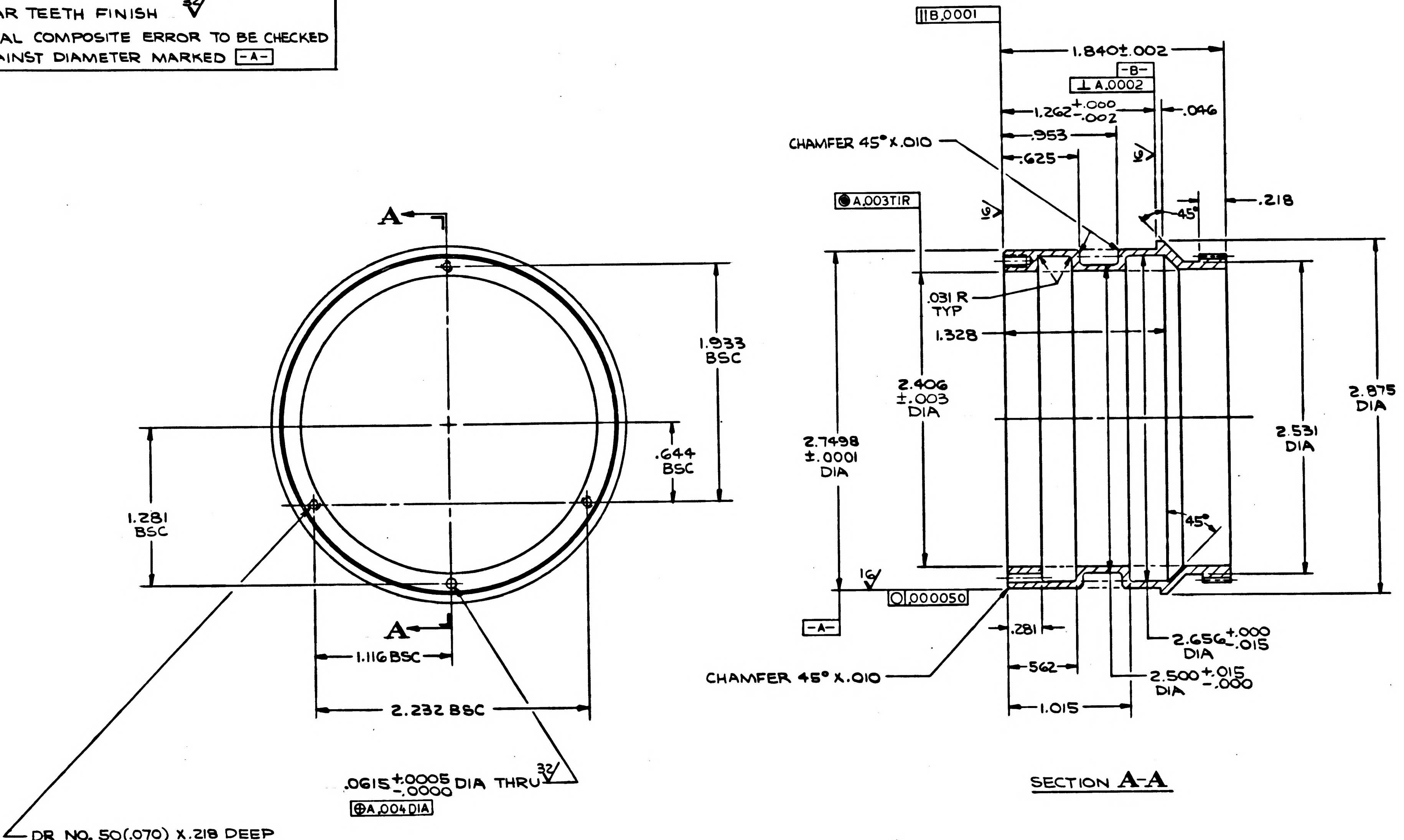
INCHES 0 1 2 PHOTOGRAPHIC SCALE ONLY

SPUR GEAR DATA	
NO. OF TEETH	252
DIAMETRAL PITCH	96
PRESSURE ANGLE	20°
PITCH DIAMETER	2.62500
OUTSIDE DIAMETER	$2.6458^{+.0000}_{-.0020}$
AGMA CLASS	PREC 2D
GEAR TEETH FINISH	$\overset{32}{\vee}$

TOTAL COMPOSITE ERROR TO BE CHECKED AGAINST DIAMETER MARKED [-A-]

REVISIONS			0.379	
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

1011654



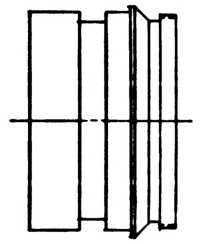
A
A
1.933 BSC
.644 BSC
1.281 BSC
1.116 BSC
2.232 BSC
||B.0001
1.840±.002
-B-
⊥A.0002
$1.262^{+.000}_{-.002}$
.046
.953
.625
CHAMFER 45° X.010
16
A.003TIR
45°
.218
.031 R TYP
1.328
2.406 ±.003 DIA
2.7498 ±.0001 DIA
2.531 DIA
2.875 DIA
45°
16
○.000050
-A-
.281
$2.656^{+.000}_{-.015}$ DIA
.562
$2.500^{+.015}_{-.000}$ DIA
1.015
CHAMFER 45° X.010

$.0615^{+.0005}_{-.0000}$ DIA THRU $\overset{32}{\vee}$

⊕A.004DIA

SECTION A-A

DR NO. 50(.070) X.218 DEEP
(DO NOT BREAK THRU)
REDRILL NO. 38(.1015) X.018 DEEP
BOTTOM TAP NO. 2-56 NC-3B X.190 DEEP
3 HOLES
⊕A.004 DIA



ACTUAL SIZE

6 PASSIVATE PER MIL-STD-171 (KPS-1005I.200)
5. HEAT TREAT (STABILIZE & STRESS RELIEVE) PER ND 1002087
4. REMOVE BURRS PER ND 1002079
3. UNLESS OTHERWISE SPECIFIED:-
$\overset{63}{\vee}$ FINISH ALL OVER
2. GENERAL MACHINING STANDARDS PER ND 1002078
1. INTERPRET DRAWING PER MIL-D-70327
NOTES:-

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011709	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± -	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL STAINLESS STEEL AISI 440
FED SPEC QQ-S-763
CLASS 440 COND A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK

KIC PN 33386900560

DRAWN R. BRUNELLE DATE 4-3-63
CHECKED Paul Papachristou
APPROVAL 5-22-63
APPROVAL E. Thorup 5-23-63
NASA APPROVAL
MIT APPROVAL 24 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
GEAR, TRUNNION DRIVE
(252T-96P)

CODE IDENT NO.	SIZE	NASA NUMBER
	D	1011654

SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

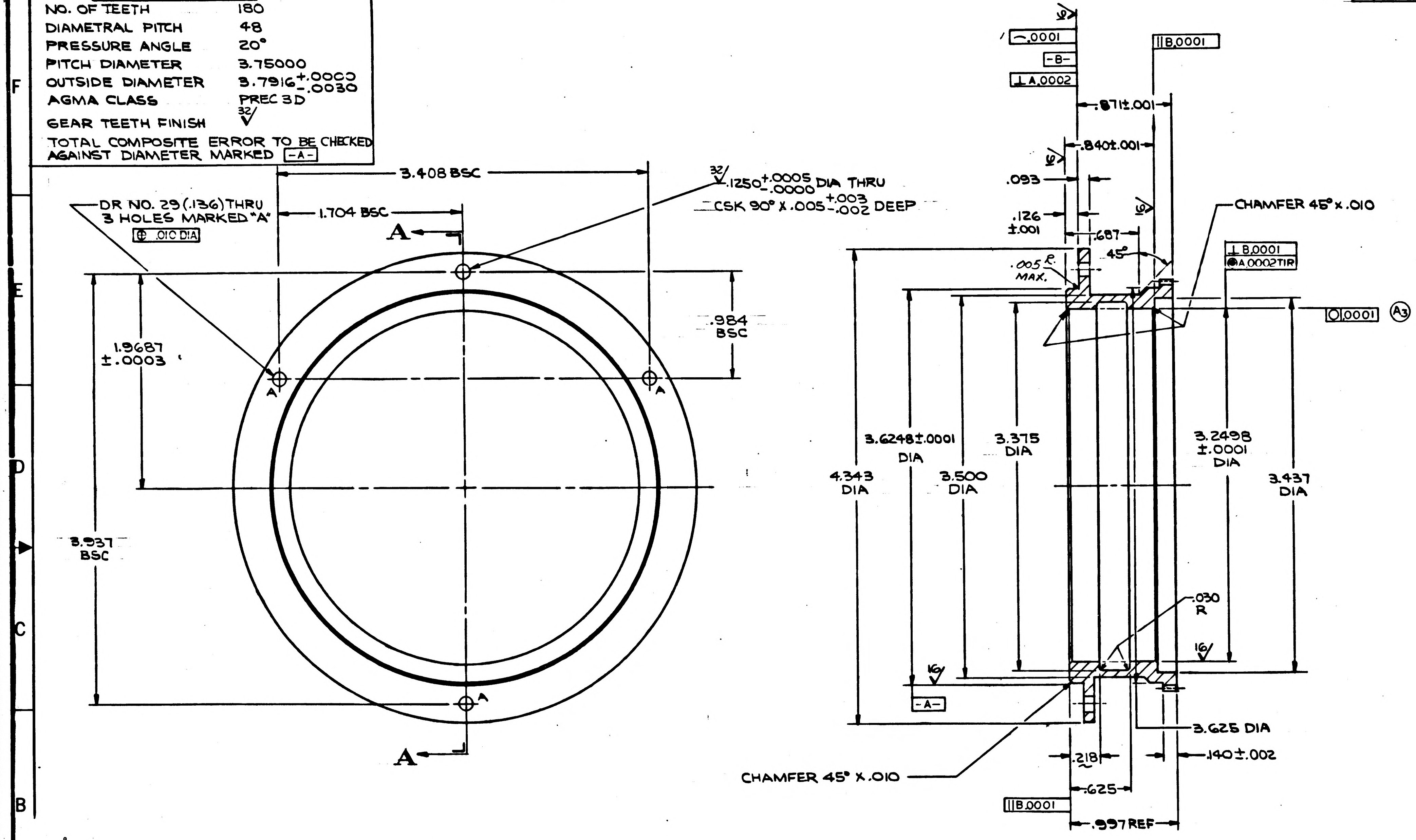
1011654

1011655 A

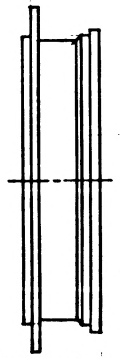
REVISIONS 01370				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDDR NO. 04597	1/17/63	WK

SPUR GEAR DATA	
NO. OF TEETH	180
DIAMETRAL PITCH	48
PRESSURE ANGLE	20°
PITCH DIAMETER	3.75000
OUTSIDE DIAMETER	$3.7916^{+.0000}_{-.0030}$
AGMA CLASS	PREC 3D
GEAR TEETH FINISH	32√

TOTAL COMPOSITE ERROR TO BE CHECKED AGAINST DIAMETER MARKED -A-


3.408 BSC
1.704 BSC
DR NO. 29 (.136) THRU 3 HOLES MARKED "A"
⊕ .010 DIA
32√ $.1250^{+.0005}_{-.0000}$ DIA THRU
CSK 90° X .005 $^{+.003}_{-.002}$ DEEP
A
A
.984 BSC
1.9687 ±.0003
3.937 BSC
A
A
A
A
⌒.0001
-B-
⊥ A .0002
∥ B .0001
.871±.001
.840±.001
16√
.093
.126 ±.001
.687
.005 R. MAX.
45°
CHAMFER 45° x .010
⊥ B .0001
◉ A .0002 TIR
○ .0001
A3
3.6248±.0001 DIA
3.375 DIA
3.500 DIA
4.343 DIA
3.2498 ±.0001 DIA
3.437 DIA
.030 R
16√
-A-
3.625 DIA
.218
.140±.002
.625
∥ B .0001
.997 REF
CHAMFER 45° X .010

SECTION A-A



ACTUAL SIZE

NOTES:-
1. INTERPRET DRAWING PER MIL-D-70327
2. GENERAL MACHINING STANDARDS PER ND 1002078
3. UNLESS OTHERWISE SPECIFIED:-
63√ FINISH ALL OVER
4. REMOVE BURRS PER ND 1002079
(A2) 5. HEAT TREAT PER ND 1002114 Rc 28-32
6. PASSIVATE PER MIL-STD-171 (KPS-1005I.200)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011718	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — ; DECIMALS ±.005 ; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL CORROSION RESISTANT STEEL, FED. SPEC QQ-S-763 CLASS 410 COND. A (A1)
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 33386900570
DRAWN R. BRUNELLE DATE 4-4-63
CHECKED
APPROVAL 5-22-63
APPROVAL E. Thomp 5-22-63
NASA APPROVAL
MIT APPROVAL 24 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
GEAR, SHAFT DRIVE
(180T-48P)

CODE IDENT NO.
SIZE D
NASA NUMBER 1011655
SCALE 2/1
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

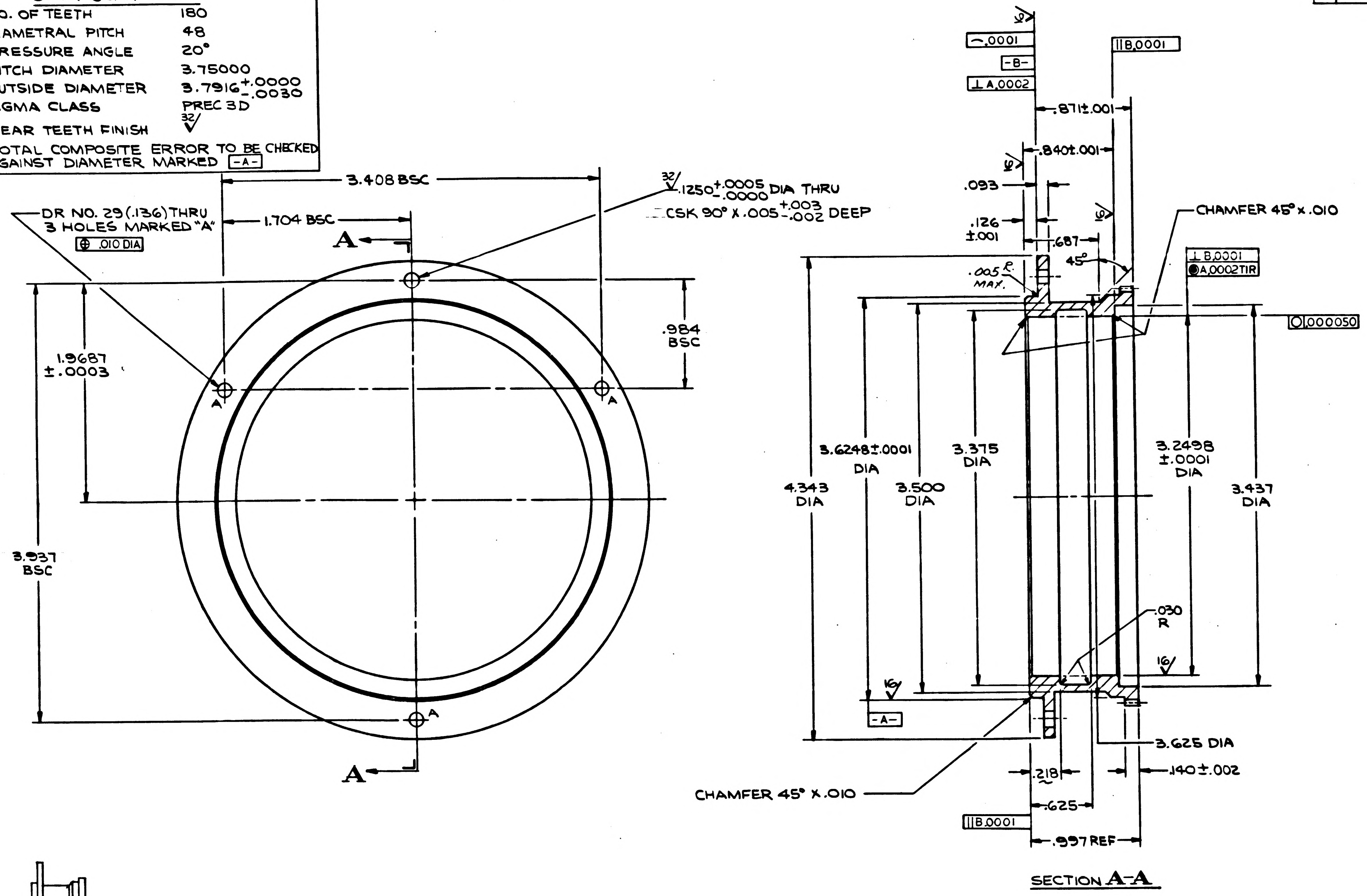
1011655

REVISIONS C 370				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

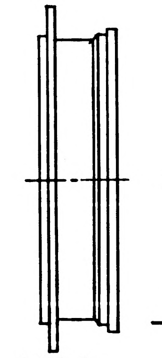
SPUR GEAR DATA

NO. OF TEETH	180
DIAMETRAL PITCH	48
PRESSURE ANGLE	20°
PITCH DIAMETER	3.75000
OUTSIDE DIAMETER	$3.7916^{+.0000}_{-.0030}$
AGMA CLASS	PREC 3D
GEAR TEETH FINISH	$\overset{32}{\surd}$

TOTAL COMPOSITE ERROR TO BE CHECKED AGAINST DIAMETER MARKED -A-


3.408 BSC
1.704 BSC
DR NO. 29 (.136) THRU
3 HOLES MARKED "A"
⊕ .010 DIA
32/ .1250 +.0005 -.0000 DIA THRU
CSK 90° X .005 +.003 -.002 DEEP
A
A
A
A
A
A
.984 BSC
1.9687 ±.0003
3.937 BSC
A
A
⌒ .0001
-B-
⊥ A .0002
∥ B .0001
.871±.001
.840±.001
16/
.093
.126 ±.001
.687
16/
45°
CHAMFER 45° X .010
.005 R MAX.
⊥ B .0001
◉ A .0002 TIR
○ .000050
4.343 DIA
3.6248±.0001 DIA
3.500 DIA
3.375 DIA
3.2498 ±.0001 DIA
3.437 DIA
.030 R
16/
16/
-A-
3.625 DIA
.218
.140±.002
.625
CHAMFER 45° X .010
∥ B .0001
.997 REF

SECTION A-A



ACTUAL SIZE

NOTES:-
1. INTERPRET DRAWING PER MIL-D-70327
2. GENERAL MACHINING STANDARDS PER ND 1002078
3. UNLESS OTHERWISE SPECIFIED:-
$\overset{63}{\surd}$ FINISH ALL OVER
4. REMOVE BURRS PER ND 1002079
5. HEAT TREAT (STABILIZE & STRESS RELIEVE) PER ND 1002087
6. PASSIVATE PER MIL-STD-171 (KPS-1005I.200)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011718	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL STAINLESS STEEL AISI 440
FED SPEC QQ-S-763
CLASS 440 COND A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 33386900570

DRAWN R. BRUNELLE DATE 4-4-63
CHECKED Paul Pappachristou
APPROVAL E. McDonald 5-22-63
APPROVAL E. Thorup 5-22-63
NASA APPROVAL
MIT APPROVAL 24 May

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
GEAR, SHAFT DRIVE
(180T-48P)

CODE IDENT NO.	SIZE	NASA NUMBER
	D	1011655

SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

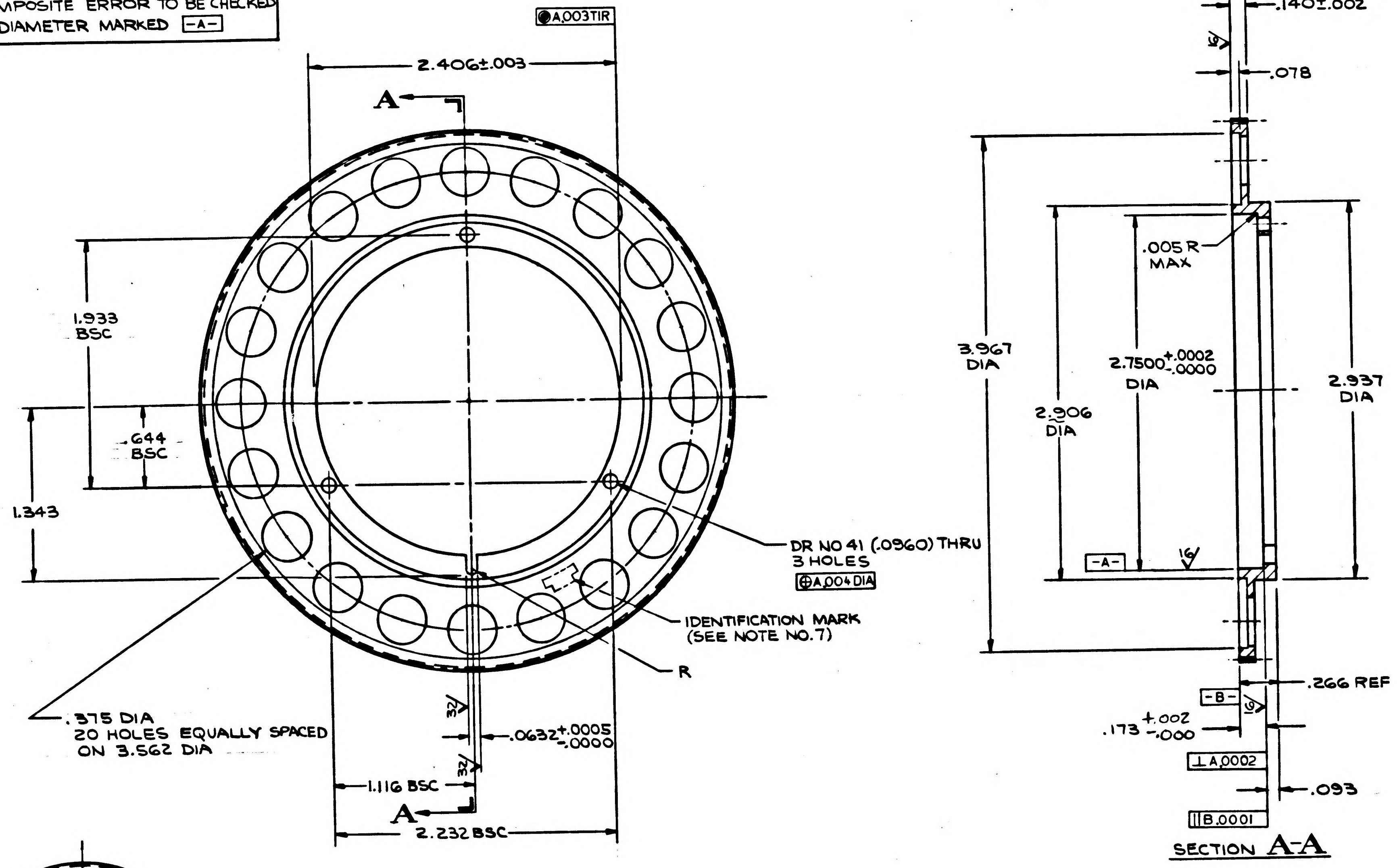
1011655

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

SPUR GEAR DATA	
NO. OF TEETH	400
DIAMETRAL PITCH	96
PRESSURE ANGLE	20°
PITCH DIAMETER	4.16666
OUTSIDE DIAMETER	4.1875 $^{+.0000}_{-.0020}$
AGMA CLASS	PREC 2D
GEAR TEETH FINISH	32/√

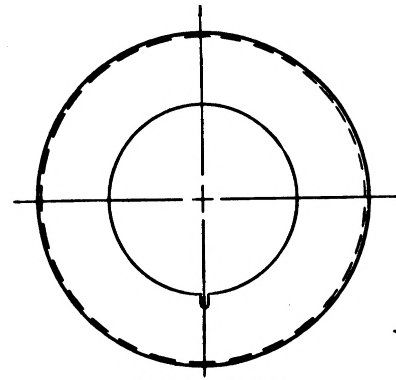
TOTAL COMPOSITE ERROR TO BE CHECKED AGAINST DIAMETER MARKED -A-

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL



⊚ A .003 TIR
2.406±.003
A
1.933 BSC
.644 BSC
1.343
DR NO 41 (.0960) THRU 3 HOLES
⊕ A .004 DIA
IDENTIFICATION MARK (SEE NOTE NO.7)
R
.375 DIA 20 HOLES EQUALLY SPACED ON 3.562 DIA
32/
.0632 +.0005 -.0000
1.116 BSC
2.232 BSC
.140±.002
16/
.078
3.967 DIA
.005 R MAX
2.7500 +.0002 -.0000 DIA
2.906 DIA
2.937 DIA
-A-
.266 REF
-B-
.173 +.002 -.000
⊥ A .0002
∥ B .0001
.093

SECTION A-A



ACTUAL SIZE

7. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURES SYMBOL PER ND 1002019
6. PASSIVATE PER MIL-STD-171 (KPS-1005I.200)
5. HEAT TREAT (STABILIZE & STRESS RELIEVE) PER ND 1002087
4. REMOVE BURRS PER ND 1002079
3. UNLESS OTHERWISE SPECIFIED:- 63/√ FINISH ALL OVER
2. GENERAL MACHINING STANDARDS PER ND 1002078
1. INTERPRET DRAWING PER MIL-D-70327

NOTES:-

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011723	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — ; DECIMALS ±.005 ; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL STAINLESS STEEL AISI 440 FED SPEC QQ-S-763 CLASS 440 COND A
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 33386900580
DRAWN R. BRUNELLE DATE 4-1-63
CHECKED Paul Pappachristos
APPROVAL E. McDonald 5-22-63
APPROVAL E. Thomp 5-22-63
NASA APPROVAL
MIT APPROVAL W Kupfer 24 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
GEAR, TRUNNION DRIVE
(400T-96P)

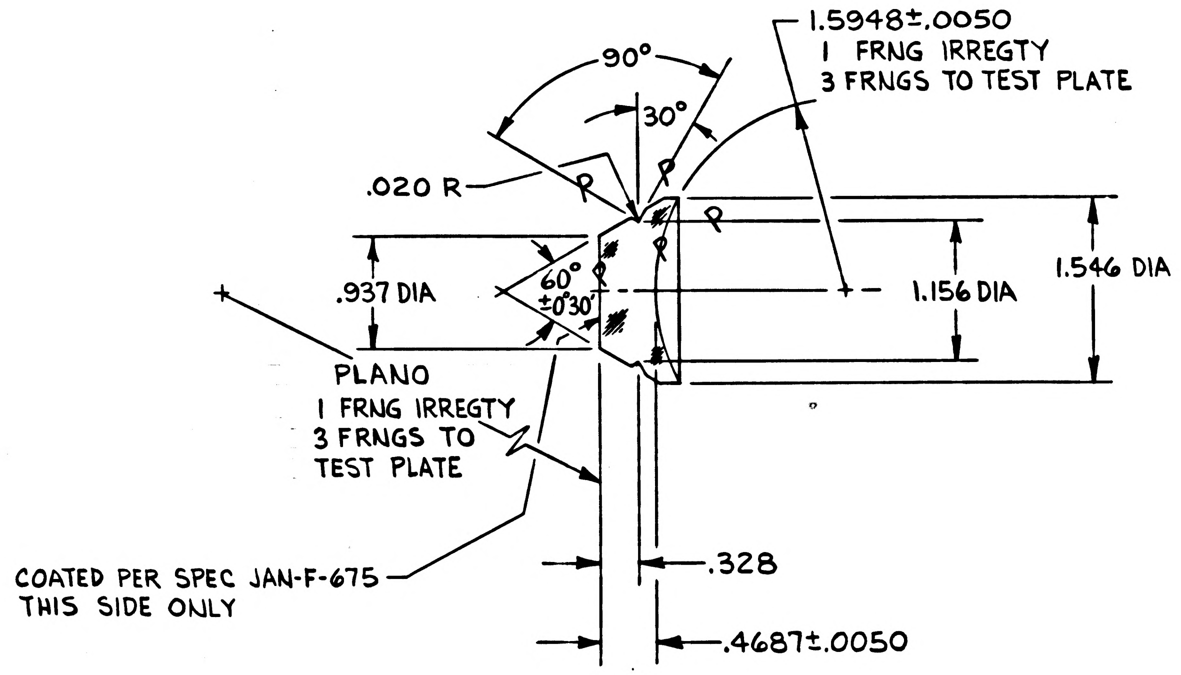
CODE IDENT NO. | SIZE D | NASA NUMBER 1011656
SCALE 2/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

1011657

REVISIONS TDRR 01220				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. ELEMENT IN ACCORDANCE WITH SPEC MIL-O-13830.
3. MATL: GLASS, OPTICAL PER JAN-G-174
GRADE B-FINE ANNEALED
TYPE 648-337
4. CA: ENT= .924 EXIT= 1.302
SURF. QUAL: 60-40
CTRG ERROR 3 MINUTES
5. SURFACE MARKED "P" POL ALL OTHERS GRD.



90°
30°
1.5948±.0050
1 FRNG IRREGTY
3 FRNGS TO TEST PLATE
.020 R
P
.937 DIA
60° ±0°30'
1.156 DIA
1.546 DIA
PLANO
1 FRNG IRREGTY
3 FRNGS TO TEST PLATE
COATED PER SPEC JAN-F-675
THIS SIDE ONLY
.328
.4687±.0050

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011709	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 3

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 28386900460

DRAWN V. AMATO DATE 4-9-63
CHECKED Thornton Stearns 5-6-63
APPROVAL Thornton Stearns 5-6-63
APPROVAL E. Thorup 5-7-63
NASA APPROVAL 5-9-63
MIT APPROVAL 9 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LENS, NEGATIVE
(TELESCOPE OBJECTIVE)

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011657

SCALE 1/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

E-154

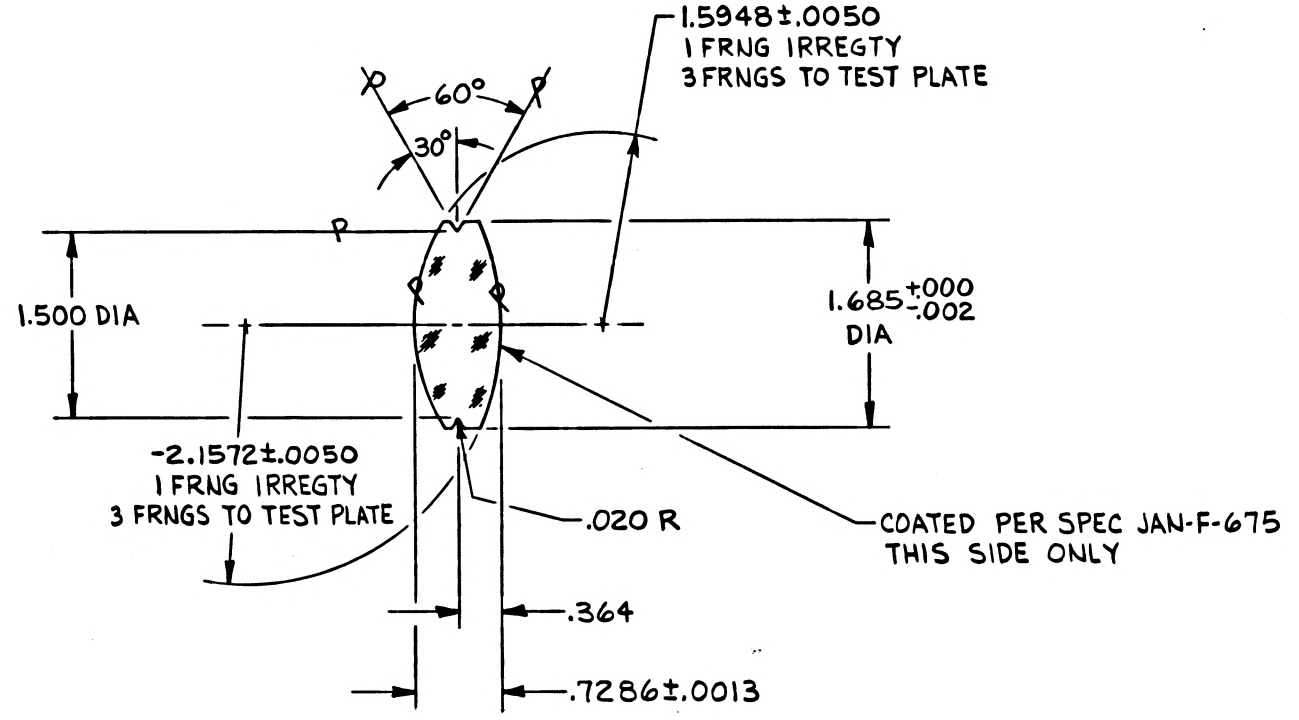
1011657

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011658

REVISIONS TDRR 01220				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. ELEMENT IN ACCORDANCE WITH SPEC MIL-O-13830.
3. MATL: GLASS, OPTICAL PER JAN-G-174
   GRADE B-FINE ANNEALED
   TYPE 620-603
4. CA: ENT= 1.302 EXIT= 1.596
   SURF. QUAL: 60-40
   CTRG ERROR 3 MINUTES.
5. SURFACES MARKED "P" POL ALL OTHERS GRD.



P
60°
P
30°
P
P
1.5948±.0050
1 FRNG IRREGTY
3 FRNGS TO TEST PLATE
1.500 DIA
1.685 +.000 -.002 DIA
-2.1572±.0050
1 FRNG IRREGTY
3 FRNGS TO TEST PLATE
.020 R
COATED PER SPEC JAN-F-675
THIS SIDE ONLY
.364
.7286±.0013

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011709	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 3

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 28386900470

DRAWN V. AMATO DATE 4-9-63
CHECKED Thornton Stearns 5-6-63
APPROVAL Thornton Stearns 5-6-63
APPROVAL E. Dhorup 5-7-63
NASA APPROVAL W J Rhine 5-9-63
MIT APPROVAL W Kupfer 9 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LENS, POSITIVE
(TELESCOPE OBJECTIVE)

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011658

SCALE 1/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

2,3

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

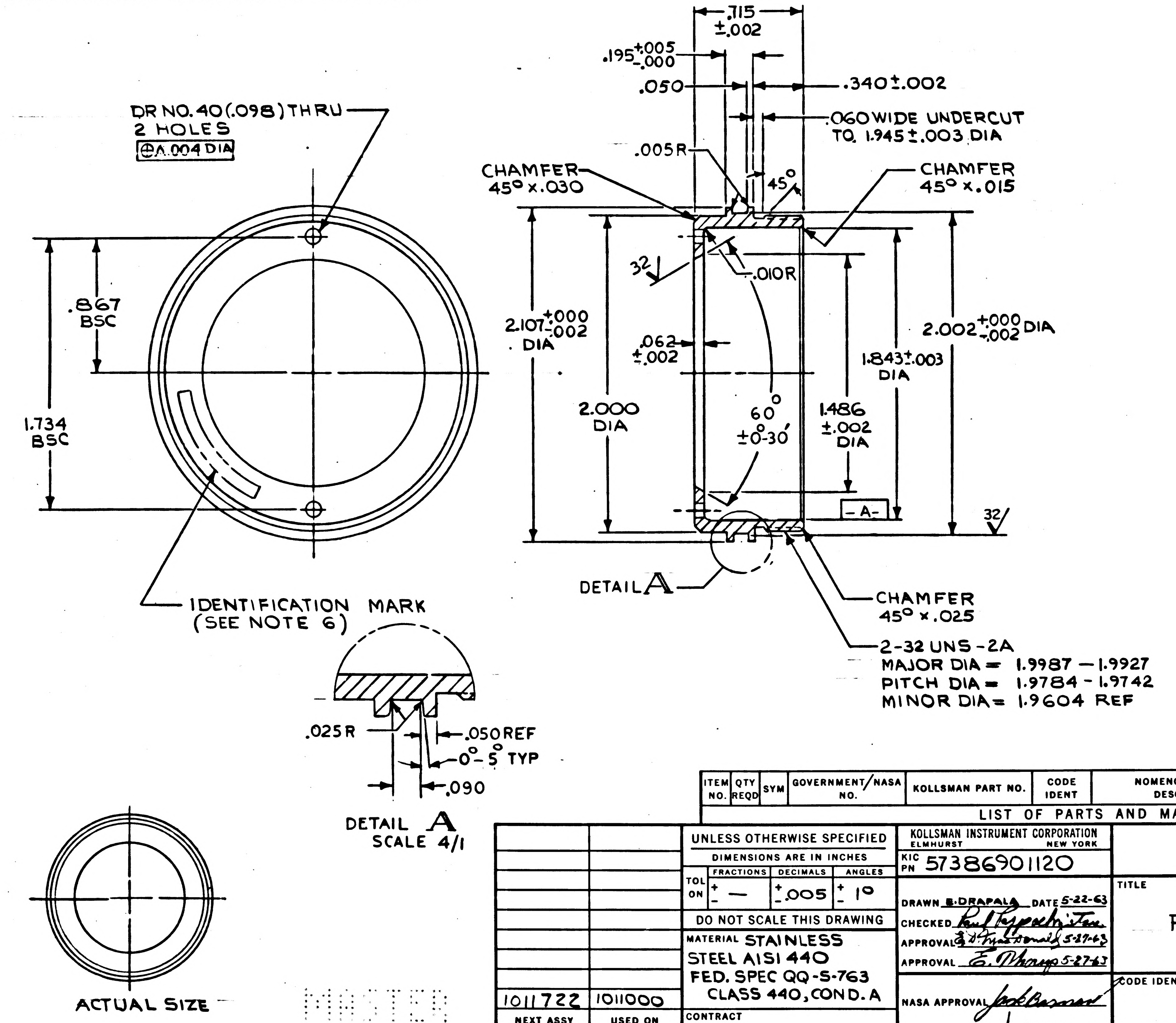
1011658

1011659

REVISIONS TDRR 01424				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   - a. 63√ FINISH ALL OVER
   - b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. BLACKEN PER MIL-C-13924, CLASS 3 (KPS.1005B.100)
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019


.715 ±.002
.195 +.005 −.000
.050
.340±.002
.060 WIDE UNDERCUT TO 1.945±.003 DIA
.005R
45°
CHAMFER 45° x .030
CHAMFER 45° x .015
DR NO. 40 (.098) THRU 2 HOLES
⊕A .004 DIA
.867 BSC
1.734 BSC
32
.010R
2.107 +.000 −.002 DIA
.062 ±.002
2.000 DIA
60° ±0°30'
1.486 ±.002 DIA
1.843±.003 DIA
2.002 +.000 −.002 DIA
-A-
32
IDENTIFICATION MARK (SEE NOTE 6)
DETAIL A
CHAMFER 45° x .025
2-32 UNS-2A
MAJOR DIA = 1.9987 − 1.9927
PITCH DIA = 1.9784 − 1.9742
MINOR DIA = 1.9604 REF
.025R
.050 REF
0°-5° TYP
.090
DETAIL A SCALE 4/1
ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011722	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL STAINLESS STEEL AISI 440
FED. SPEC QQ-S-763
CLASS 440, COND. A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 5738690112O

DRAWN B. DRAPALA DATE 5-22-63
CHECKED Paul Pappalardo
APPROVAL E. D. MacDonald 5-27-63
APPROVAL E. Thorp 5-27-63
NASA APPROVAL Jack Barman
MIT APPROVAL W Wgaffer 31 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RING, LOCKING LENS

CODE IDENT NO. | SIZE C | NASA NUMBER 1011659
SCALE 2/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

MASTER

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

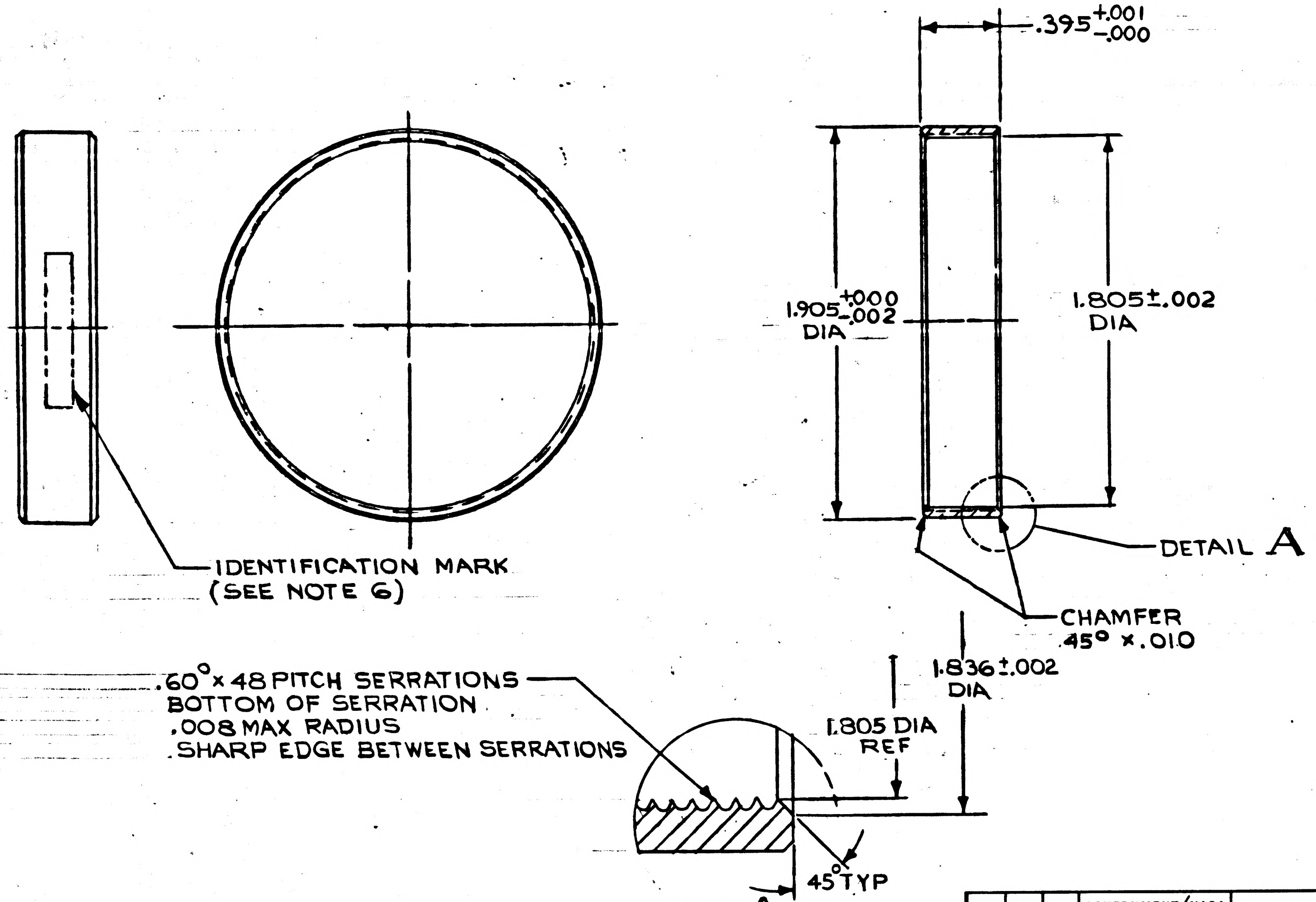
1011659

A 1011660

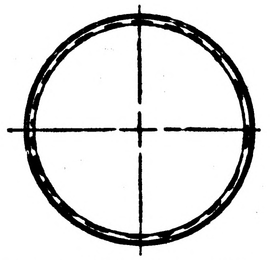
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A1		REVISED PER TDRR NO 03349	9/20/63	9/26

REVISIONS 01370

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. FINISH: ANODIZE (BLACK SULFURIC) PER MIL-A-8625, TYPE II BLACK (KPS.1005A.201). ALL OVER
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019


.395 +.001 -.000
1.905 +.000 -.002 DIA
1.805±.002 DIA
DETAIL A
CHAMFER 45° × .010
IDENTIFICATION MARK (SEE NOTE 6)
1.836±.002 DIA
.60° × 48 PITCH SERRATIONS
BOTTOM OF SERRATION .008 MAX RADIUS
SHARP EDGE BETWEEN SERRATIONS
1.805 DIA REF
45° TYP

DETAIL A
SCALE 10/1



ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011722	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM
ALLOY 6061-T6
FED. SPEC QQ-A-325
TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST N. Y. YORK
KIC PN 57386901130

DRAWN E. DRAPALA DATE 4-10-63
CHECKED Paul Pappashristo
APPROVAL Ed MacDonald 5-22-63
APPROVAL E. Thorup 5-22-63
NASA APPROVAL Jack Barnard
MIT APPROVAL W Kupfer 24 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SPACER LENS

CODE IDENT NO.
SIZE C
NASA NUMBER 1011660
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

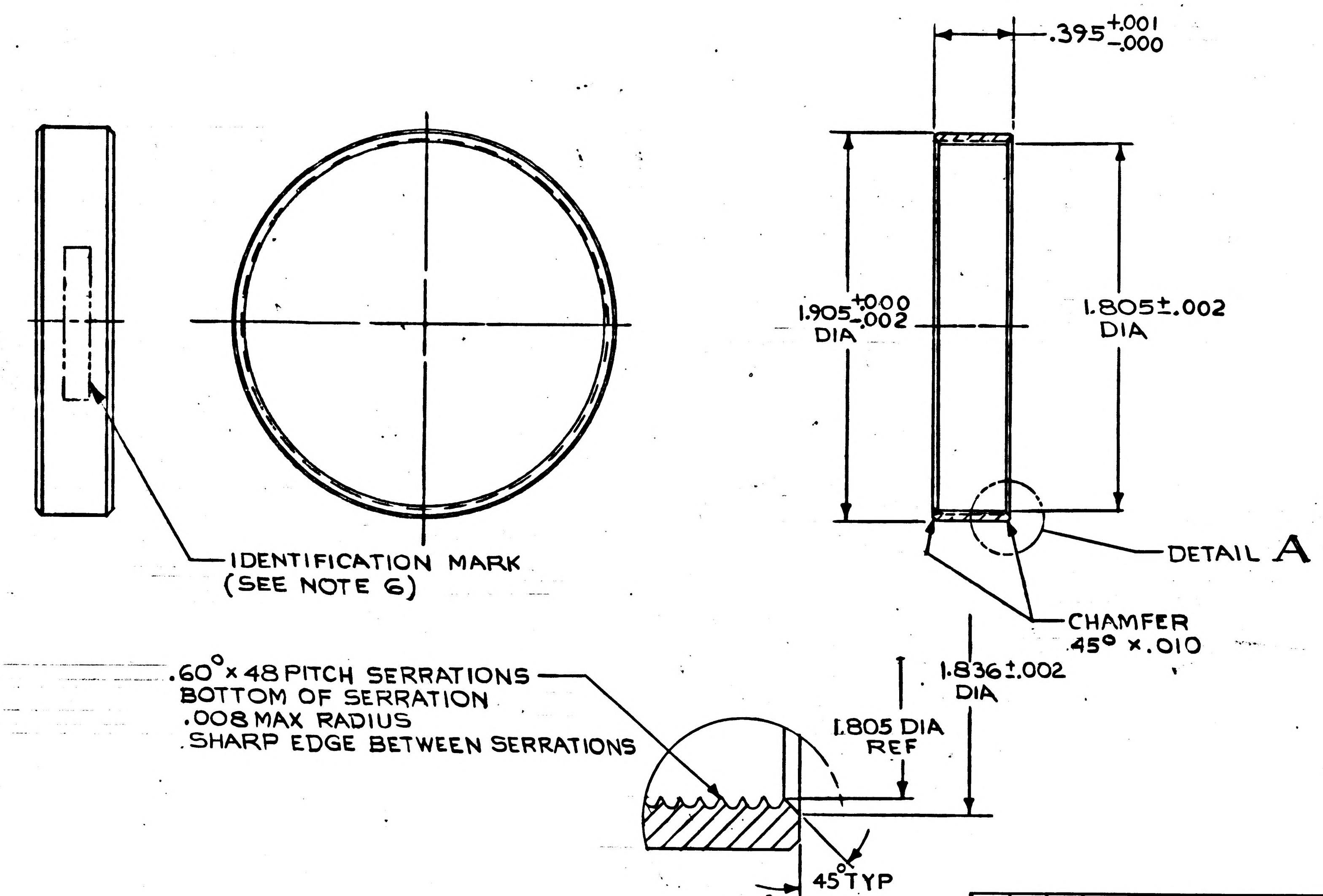
E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

B	0991101

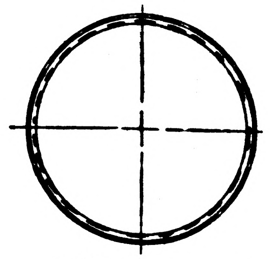
REVISIONS 01370				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A1		REVISED PER TDRR NO 03349	9/20/63	9/26
B		REVISED PER TDRR NO 05496	28 JAN 64	WK

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. FINISH: ANODIZE (BLACK SULFURIC) PER MIL-A-8625, TYPE II BLACK (KPS-1005A.201). ALL OVER
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019



.395 +.001 −.000
1.905 +.000 −.002 DIA
1.805 ±.002 DIA
DETAIL A
CHAMFER 45° × .010
IDENTIFICATION MARK (SEE NOTE 6)
.60° × 48 PITCH SERRATIONS BOTTOM OF SERRATION .008 MAX RADIUS SHARP EDGE BETWEEN SERRATIONS
1.836 ±.002 DIA
1.805 DIA REF
45° TYP

DETAIL A
SCALE 10/1



ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

Ⓑ 1011960	1011000
1011722	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 6061-T6 FED. SPEC QQ-A-325 TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901130

DRAWN E. DRAPALA DATE 4-10-63
CHECKED Paul Poppenbrinston
APPROVAL Ed MacDonald 5-22-63
APPROVAL E. Dhorup 5-22-63
NASA APPROVAL Jack Barnard
MIT APPROVAL W Kupfer 24 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SPACER LENS

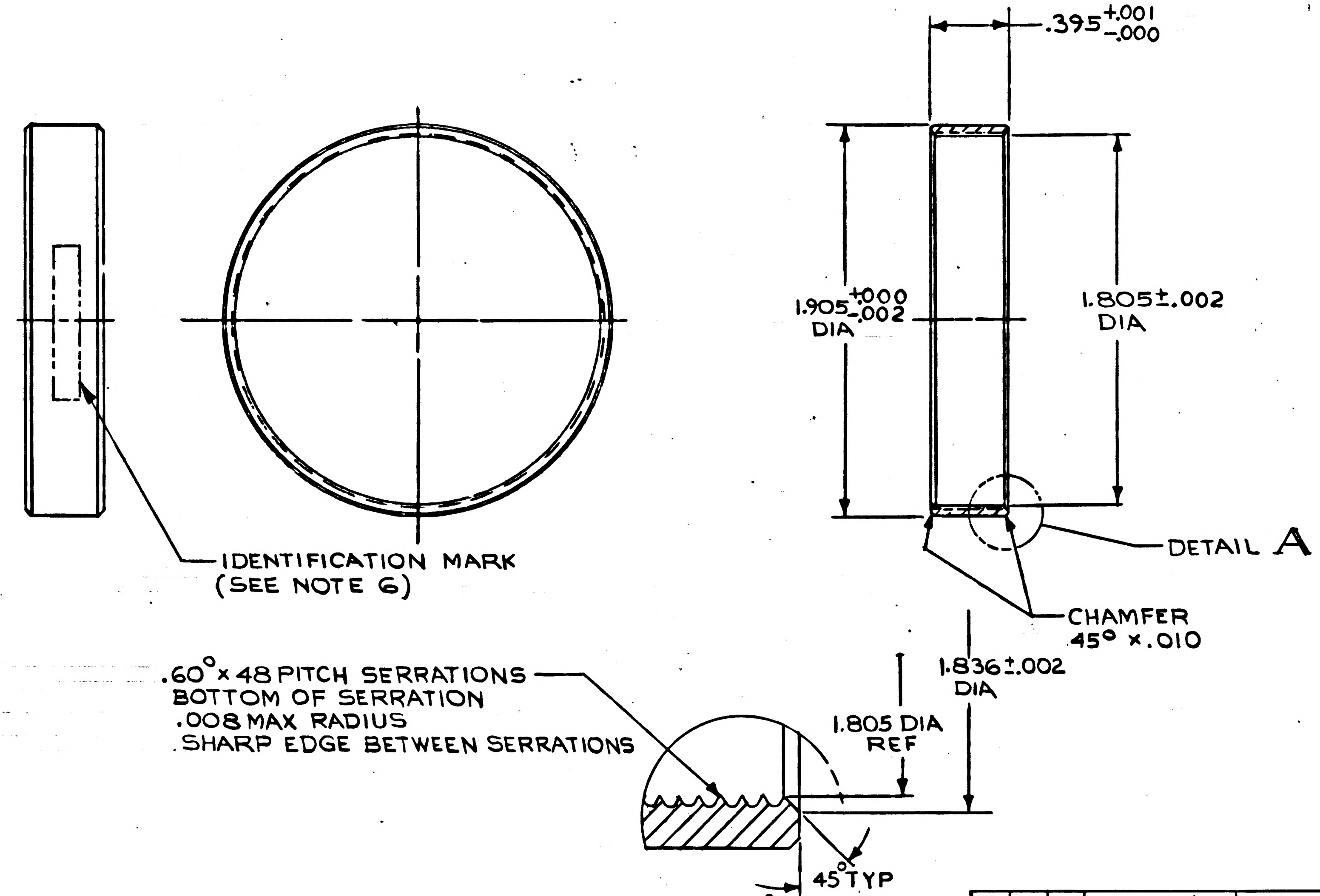
CODE IDENT NO.
SIZE C
NASA NUMBER 1011660
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

	0991101

REVISIONS 0137				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

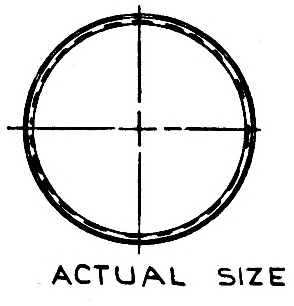
NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. $\sqrt[63]{}$ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. FINISH: ANODIZE (BLACK SULFURIC) PER MIL-A-8625, TYPE II BLACK (KPS-1005A-201).
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019



.395 +.001 −.000
1.905 +.000 −.002 DIA
1.805 ±.002 DIA
DETAIL A
CHAMFER .45° × .010
IDENTIFICATION MARK (SEE NOTE 6)
.60° × 48 PITCH SERRATIONS
BOTTOM OF SERRATION .008 MAX RADIUS
SHARP EDGE BETWEEN SERRATIONS
1.836 ±.002 DIA
1.805 DIA REF
45° TYP

DETAIL A
SCALE 10/1



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011722	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM
ALLOY 6061-T6
FED. SPEC QQ-A-325
TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901130

DRAWN E. DRAPALA DATE 4-10-63
CHECKED Paul Poppenheimer
APPROVAL Ed MacDonald 5-22-63
APPROVAL E. Dhorup 5-22-63
NASA APPROVAL Jack Barnard
MIT APPROVAL W Kupfer 24 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SPACER LENS

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011660

SCALE 2/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

1011660 0991101

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

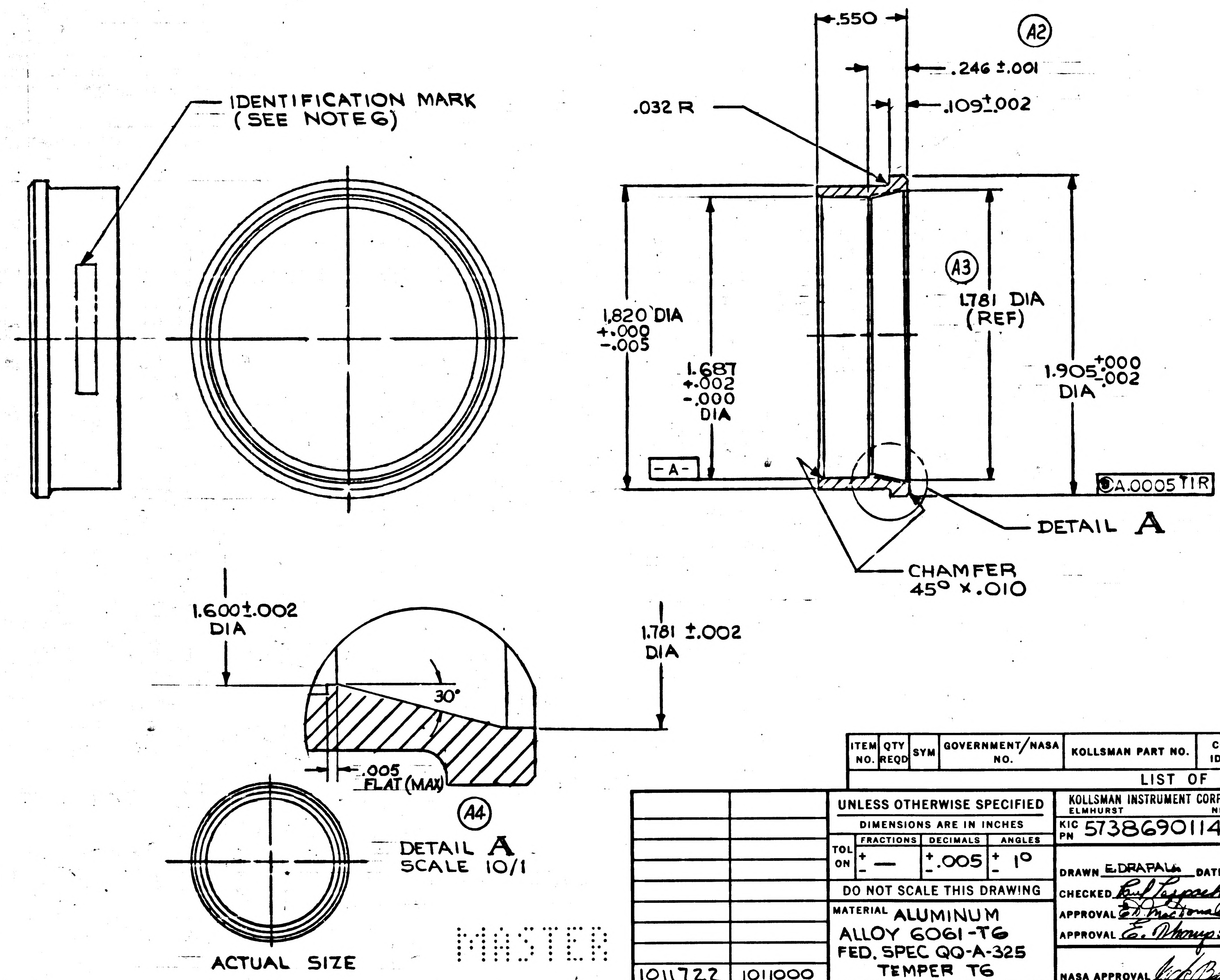
1011661 A

REVISIONS 01370				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO. 03365	9/26/6	

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER.

(A1)

4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. FINISH: ANODIZE (BLACK SULFURIC) PER MIL-A-8625, TYPE II BLACK (KPS.1005A.201).
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.



IDENTIFICATION MARK (SEE NOTE 6)
.550
(A2)
.246 ±.001
.032 R
.109±.002
(A3)
1.820 DIA +.000 -.005
1.687 +.002 -.000 DIA
1.781 DIA (REF)
1.905 +.000 -.002 DIA
-A-
◎ A .0005 TIR
DETAIL A
CHAMFER 45° X .010
1.600±.002 DIA
30°
1.781 ±.002 DIA
.005 FLAT (MAX)
(A4)
DETAIL A SCALE 10/1
ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011722	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM
ALLOY 6061-T6
FED. SPEC QQ-A-325
TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901140

DRAWN E.DRAPALA DATE 4-10-63
CHECKED
APPROVAL Ed MacDonald 5-22-63
APPROVAL E. Thomp 5-22-63
NASA APPROVAL
MIT APPROVAL 24 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SPACER LENS

CODE IDENT NO.
SIZE C
NASA NUMBER 1011661
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

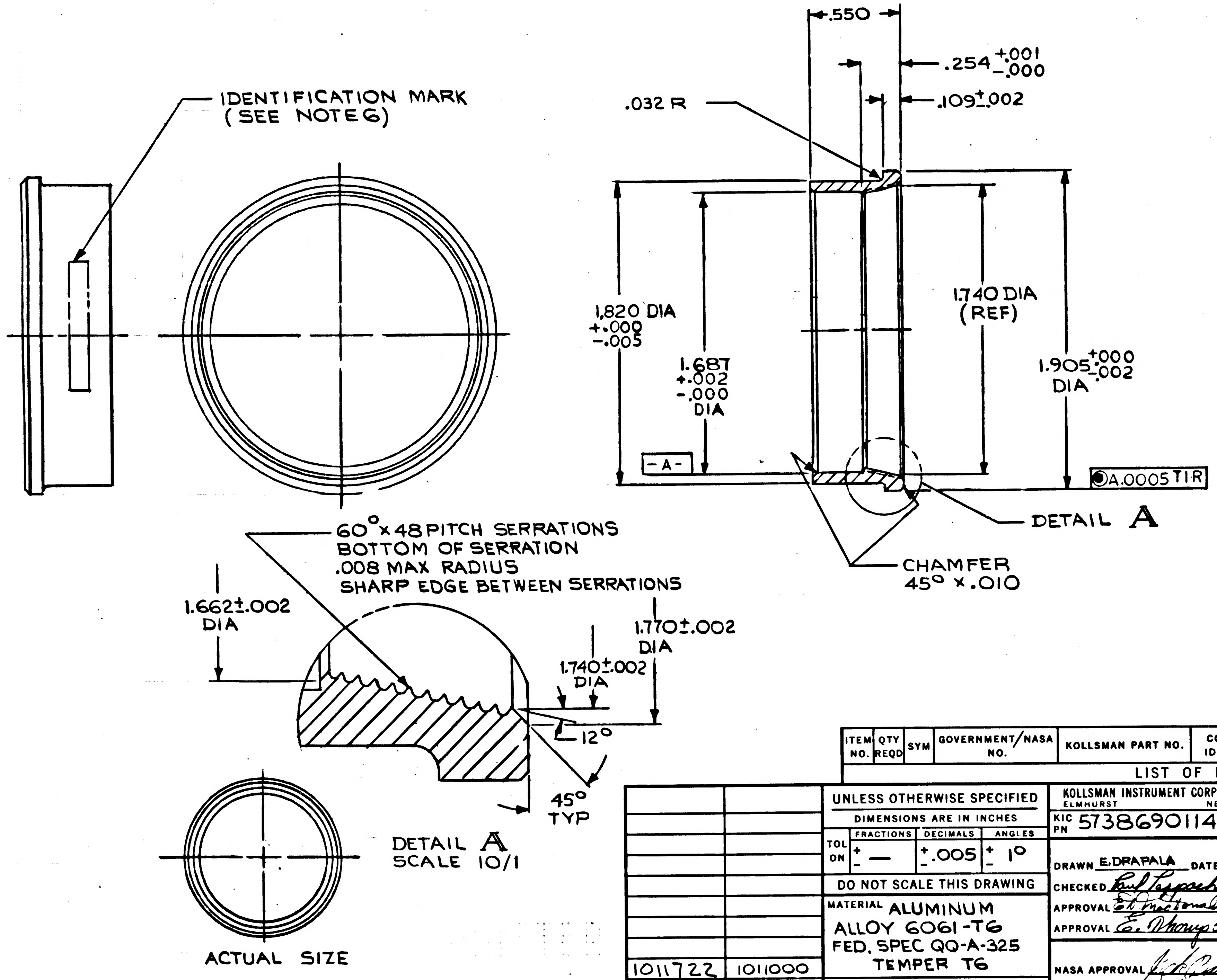
E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1991101

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. FINISH: ANODIZE (BLACK SULFURIC) PER MIL-A-8625, TYPE II BLACK (KPS.1005A.201).
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.



IDENTIFICATION MARK (SEE NOTE 6)
.550
.254 +.001 -.000
.109 ±.002
.032 R
1.820 DIA +.000 -.005
1.687 +.002 -.000 DIA
1.740 DIA (REF)
1.905 +.000 -.002 DIA
-A-
◎A.0005 TIR
DETAIL A
CHAMFER 45° x .010
60° x 48 PITCH SERRATIONS
BOTTOM OF SERRATION
.008 MAX RADIUS
SHARP EDGE BETWEEN SERRATIONS
1.662 ±.002 DIA
1.770 ±.002 DIA
1.740 ±.002 DIA
12°
45° TYP
DETAIL A
SCALE 10/1
ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011722	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 6061-T6 FED. SPEC QQ-A-325 TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901140

DRAWN E. DRAPALA DATE 4-10-63
CHECKED Paul Pappachristou
APPROVAL E. MacDonald 5-22-63
APPROVAL E. Dhoury 5-22-63
NASA APPROVAL
MIT APPROVAL 24 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SPACER LENS

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011661

SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1991101

1011662 A

REVISIONS TDRR 01220				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	A-4	"NEXT ASSY" NO. WAS 1011700 TDRR 02561	7-17-63	WK

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. ELEMENT IN ACCORDANCE WITH SPEC MIL-O-13830 (Ord)
3. MATL: GLASS, OPTICAL PER JAN-G-174 GRADE C TYPE 517-645 N_D=1.517 V=64.5
4. CA: ENT & EXIT 1.875 x 2.625 ELLIPTICAL.
   SURF. QUAL 20-10
   RESOLN 3 SEC OR BETTER AT 45° INCIDENCE BY TRANSMISSION & REFLECTION.
5. SURFACES ① AND ② POLISHED FLAT WITHIN $\frac{1}{4}\lambda$ AT 5461 Å
6. SURFACES ① AND ② PARALLEL WITHIN 0°0'30".
7. THE SUM OF THE REFLECTION PERCENTAGE AND THE TRANSMISSION PERCENTAGE OF THE FINISHED ITEM SHALL BE 95% MIN AVERAGED OVER THE WAVELENGTH RANGE.
8. EDGES FINE GROUND.
9. CHAMFER 45° x .015 ALL EDGES.
10. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019.

BAUSCH & LOMB NO. 45-11

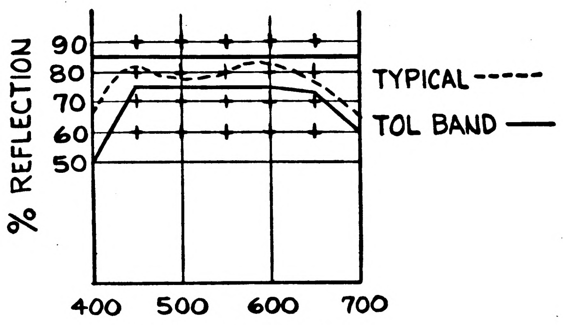
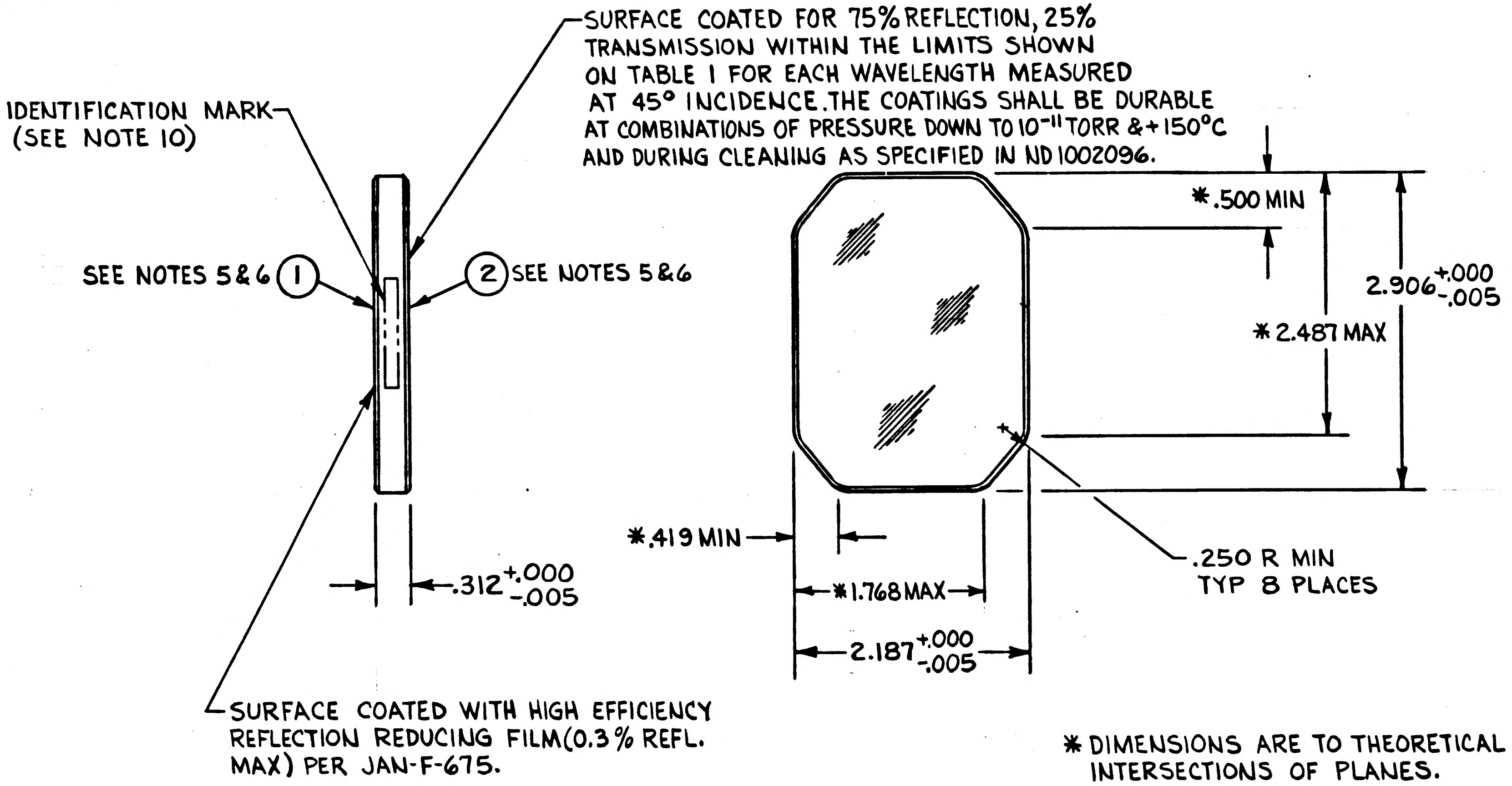


TABLE 1



SURFACE COATED FOR 75% REFLECTION, 25% TRANSMISSION WITHIN THE LIMITS SHOWN ON TABLE 1 FOR EACH WAVELENGTH MEASURED AT 45° INCIDENCE. THE COATINGS SHALL BE DURABLE AT COMBINATIONS OF PRESSURE DOWN TO 10^{-11} TORR & +150°C AND DURING CLEANING AS SPECIFIED IN ND 1002096.

SURFACE COATED WITH HIGH EFFICIENCY REFLECTION REDUCING FILM (0.3% REFL. MAX) PER JAN-F-675.

* DIMENSIONS ARE TO THEORETICAL INTERSECTIONS OF PLANES.

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

Ⓐ	1011701	1011000
	NEXT ASSY	USED ON
	APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 3

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 28386900480

DRAWN V. AMATO DATE 4-10-63
CHECKED J. SULLIVAN 4-24-63
APPROVAL Thornton Stearns 4-26-63
APPROVAL E. [illegible] 4-29-63
NASA APPROVAL W. J. Rhine 5-9-63
MIT APPROVAL W Kupfer 9 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BEAM SPLITTER

CODE IDENT NO.	SIZE	NASA NUMBER	
	C	1011662	
SCALE 1/1	WEIGHT	CALC ACTUAL	SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

MASTER

B	1011662

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. ELEMENT IN ACCORDANCE WITH SPEC MIL-O-13830 (Ord)
3. MATL: GLASS, OPTICAL PER JAN-G-174 GRADE B, FINE ANNEALED TYPE 517-645
4. CA: ENT & EXIT 1.875 x 2.625 ELLIPTICAL. SURF. QUAL 20-10 RESOLN 3 SEC OR BETTER AT 45° INCIDENCE BY TRANSMISSION & REFLECTION.
5. SURFACES ① AND ② POLISHED FLAT WITHIN $\frac{1}{4}\lambda$ AT 5461 Å
6. SURFACES ① AND ② PARALLEL WITHIN 0°0'30".
7. THE SUM OF THE REFLECTION PERCENTAGE AND THE TRANSMISSION PERCENTAGE OF THE FINISHED ITEM SHALL BE 95% MIN AVERAGED OVER THE WAVELENGTH RANGE.
8. EDGES FINE GROUND.
9. CHAMFER 45° x .015 ALL EDGES.
10. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019.

BAUSCH & LOMB NO. 45-11

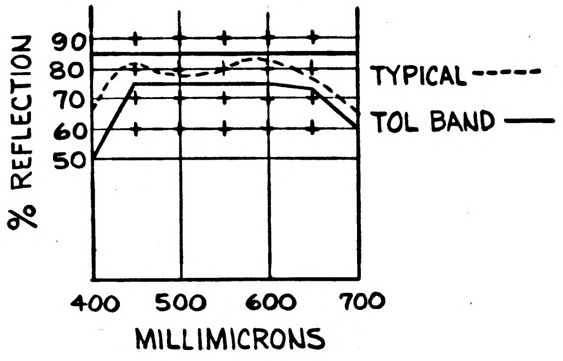
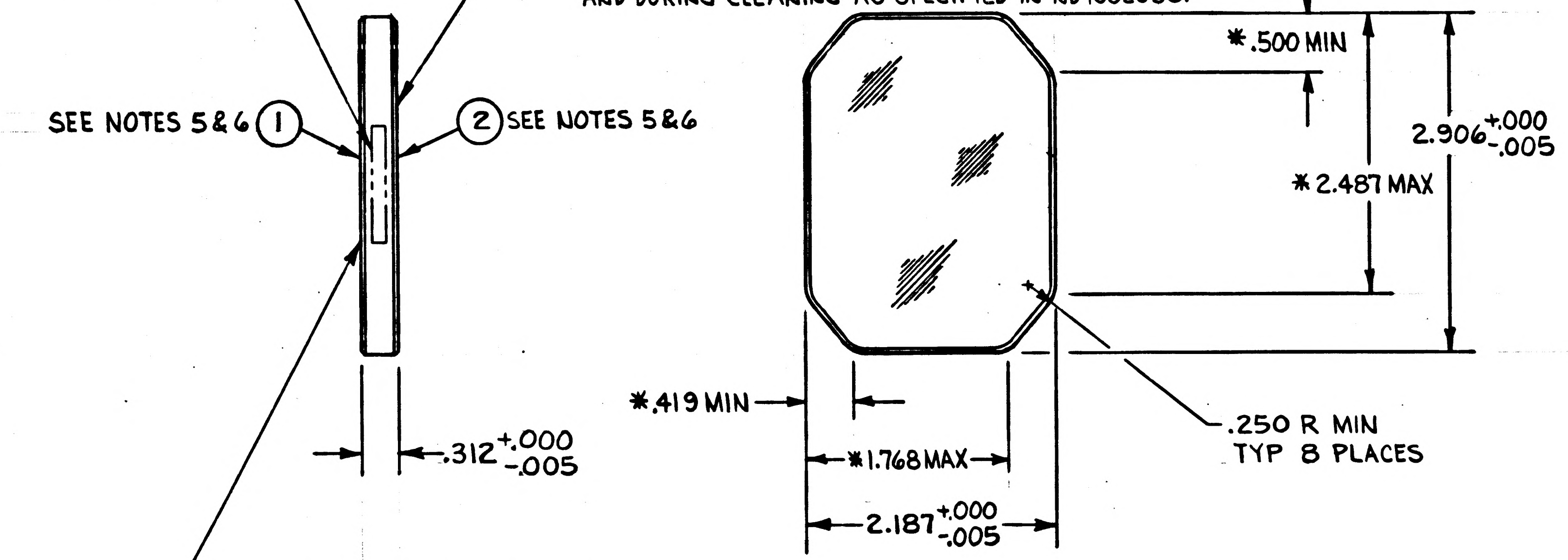


TABLE I

REVISIONS TDRR 01220				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	A-4	"NEXT ASSY" NO. WAS 1011700 TDRR 02561	7-17-63	WK
B	D-5	REVISED PER TDRR NO. 03055	10 Aug 63	WK

SURFACE COATED FOR 75% REFLECTION, 25% TRANSMISSION WITHIN THE LIMITS SHOWN ON TABLE I FOR EACH WAVELENGTH MEASURED AT 45° INCIDENCE. THE COATINGS SHALL BE DURABLE AT COMBINATIONS OF PRESSURE DOWN TO 10^{-11} TORR & +150°C AND DURING CLEANING AS SPECIFIED IN ND 1002096.

IDENTIFICATION MARK (SEE NOTE 10)



SURFACE COATED WITH HIGH EFFICIENCY REFLECTION REDUCING FILM (0.3% REFL. MAX) PER JAN-F-675.

* DIMENSIONS ARE TO THEORETICAL INTERSECTIONS OF PLANES.

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011701	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 3

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 28386900480

DRAWN V. AMATO DATE 4-10-63
CHECKED J. SULLIVAN 4-24-63
APPROVAL Thornton Stearns 4-26-63
APPROVAL E. Olsen 4-29-63
NASA APPROVAL W. J. Rhine 5-9-63
MIT APPROVAL W. Kupfer 9 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE BEAM SPLITTER

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011662

SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

1011662 B

MASTER

K+E

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011662

REVISIONS TDRR 01220				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. ELEMENT IN ACCORDANCE WITH SPEC MIL-O-13830 (Ord)
3. MATL: GLASS, OPTICAL PER JAN-G-174 GRADE C
   TYPE 517-645 N_D=1.517 V=64.5
4. CA: ENT & EXIT 1.875 x 2.625 ELLIPTICAL.
   SURF. QUAL 20-10
   RESOLN 3 SEC OR BETTER AT 45° INCIDENCE BY TRANSMISSION & REFLECTION.
5. SURFACES ① AND ② POLISHED FLAT WITHIN $\frac{1}{4}\lambda$ AT 5461 Å
6. SURFACES ① AND ② PARALLEL WITHIN 0°0'30".
7. THE SUM OF THE REFLECTION PERCENTAGE AND THE TRANSMISSION PERCENTAGE OF THE FINISHED ITEM SHALL BE 95% MIN AVERAGED OVER THE WAVELENGTH RANGE.
8. EDGES FINE GROUND.
9. CHAMFER 45° x .015 ALL EDGES.
10. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019.

BAUSCH & LOMB NO. 45-11

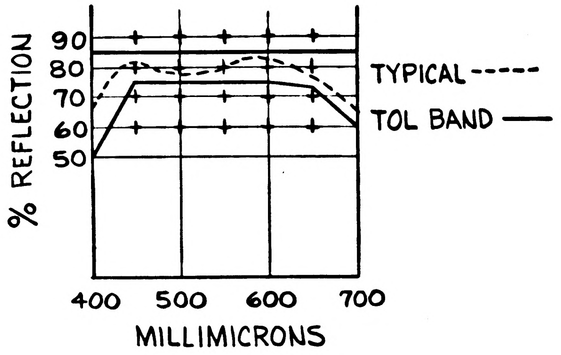
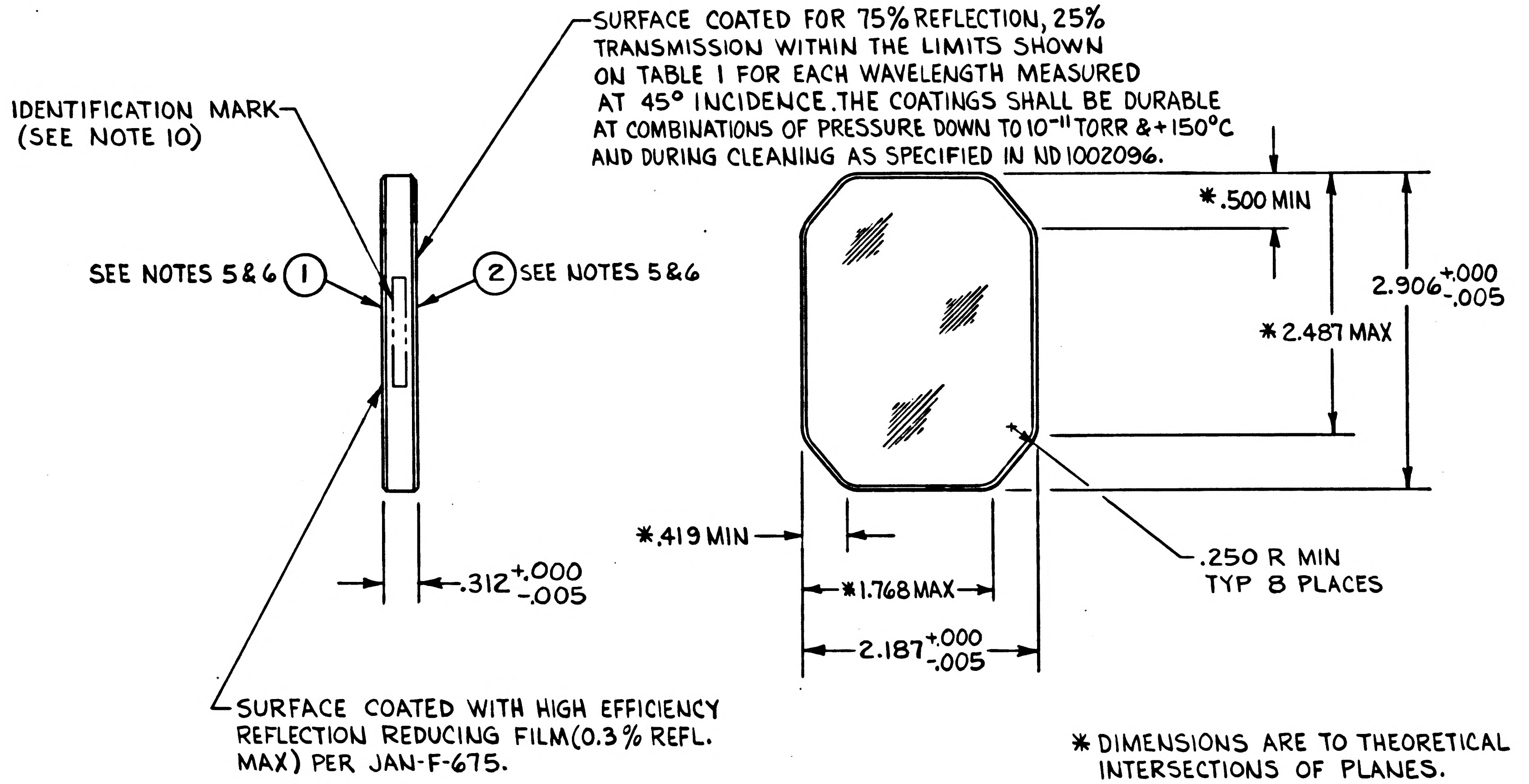


TABLE I



SURFACE COATED FOR 75% REFLECTION, 25% TRANSMISSION WITHIN THE LIMITS SHOWN ON TABLE I FOR EACH WAVELENGTH MEASURED AT 45° INCIDENCE. THE COATINGS SHALL BE DURABLE AT COMBINATIONS OF PRESSURE DOWN TO 10^{-11} TORR & +150°C AND DURING CLEANING AS SPECIFIED IN ND 1002096.

SURFACE COATED WITH HIGH EFFICIENCY REFLECTION REDUCING FILM (0.3% REFL. MAX) PER JAN-F-675.

* DIMENSIONS ARE TO THEORETICAL INTERSECTIONS OF PLANES.

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011700	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 3

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 28386900480

DRAWN V. AMATO DATE 4-10-63
CHECKED J. SULLIVAN 4-24-63
APPROVAL Thornton Stearns 4-26-63
APPROVAL E. Thorney 4-29-63
NASA APPROVAL W. J. Rhine 5-9-63
MIT APPROVAL W Kupfer 9 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE BEAM SPLITTER

CODE IDENT NO.
SIZE C
NASA NUMBER 1011662
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

K+E
E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

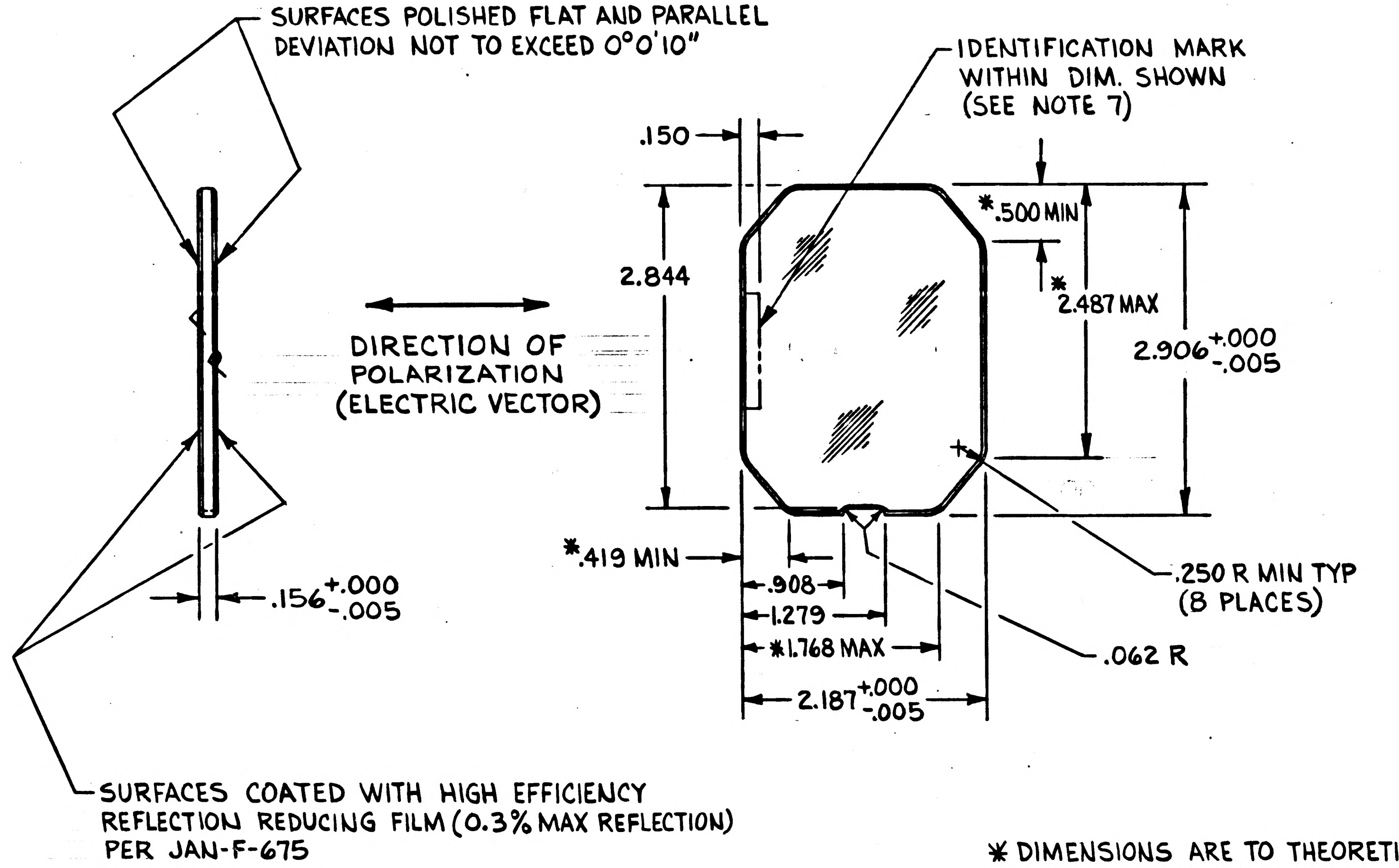
1011662

A 1011663

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	A-4	"NEXT ASSY" NO. WAS 1011700 TDRR 02561	7-17-63	WK

REVISIONS TDRR 01220

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. ELEMENT IN ACCORDANCE WITH SPEC MIL-O-13830 (Ord)
3. MATL: POLAROID FILM HN22 LAMINATED IN CROWN GLASS AS SHOWN QUALITY PER JAN-G-174 GRADE C.
4. CA: ENT & EXIT 1.875 x 2.625 ELLIPTICAL.
   SURF. QUAL: 60-40
   RESOLN 3 SEC OR BETTER AT 45° INCIDENCE BY TRANSMISSION.
   ASTIG ½ MILLIDIOPT MAX AT 45° INCIDENCE
   SPHER PWR 1 MILLIDIOPT MAX.
   LT DEV NOT TO EXCEED ½ MINUTE OF ARC.
5. SURF MARKED "P" POL, ALL OTHERS GRD.
6. CHAMFER 45° x .015 ALL EDGES.
7. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019.


SURFACES POLISHED FLAT AND PARALLEL
DEVIATION NOT TO EXCEED 0°0'10"
IDENTIFICATION MARK
WITHIN DIM. SHOWN
(SEE NOTE 7)
.150
*.500 MIN
2.844
*2.487 MAX
2.906 +.000 -.005
DIRECTION OF
POLARIZATION
(ELECTRIC VECTOR)
*.419 MIN
.908
1.279
*1.768 MAX
2.187 +.000 -.005
.250 R MIN TYP
(8 PLACES)
.062 R
.156 +.000 -.005
SURFACES COATED WITH HIGH EFFICIENCY
REFLECTION REDUCING FILM (0.3% MAX REFLECTION)
PER JAN-F-675

* DIMENSIONS ARE TO THEORETICAL INTERSECTIONS OF PLANES.

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
Ⓐ 1011701	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ~ ; DECIMALS ± .005 ; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE 3
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 28386900490
DRAWN V. AMATO DATE 4-10-63
CHECKED T. SULLIVAN 4-24-63
APPROVAL Thornton Hearn 4-26-63
APPROVAL E. Thoop 4-29-63
NASA APPROVAL W J Rhie 5-9-63
MIT APPROVAL 9 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
FILTER, BEAM SPLITTER

CODE IDENT NO.
SIZE C
NASA NUMBER 1011663
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

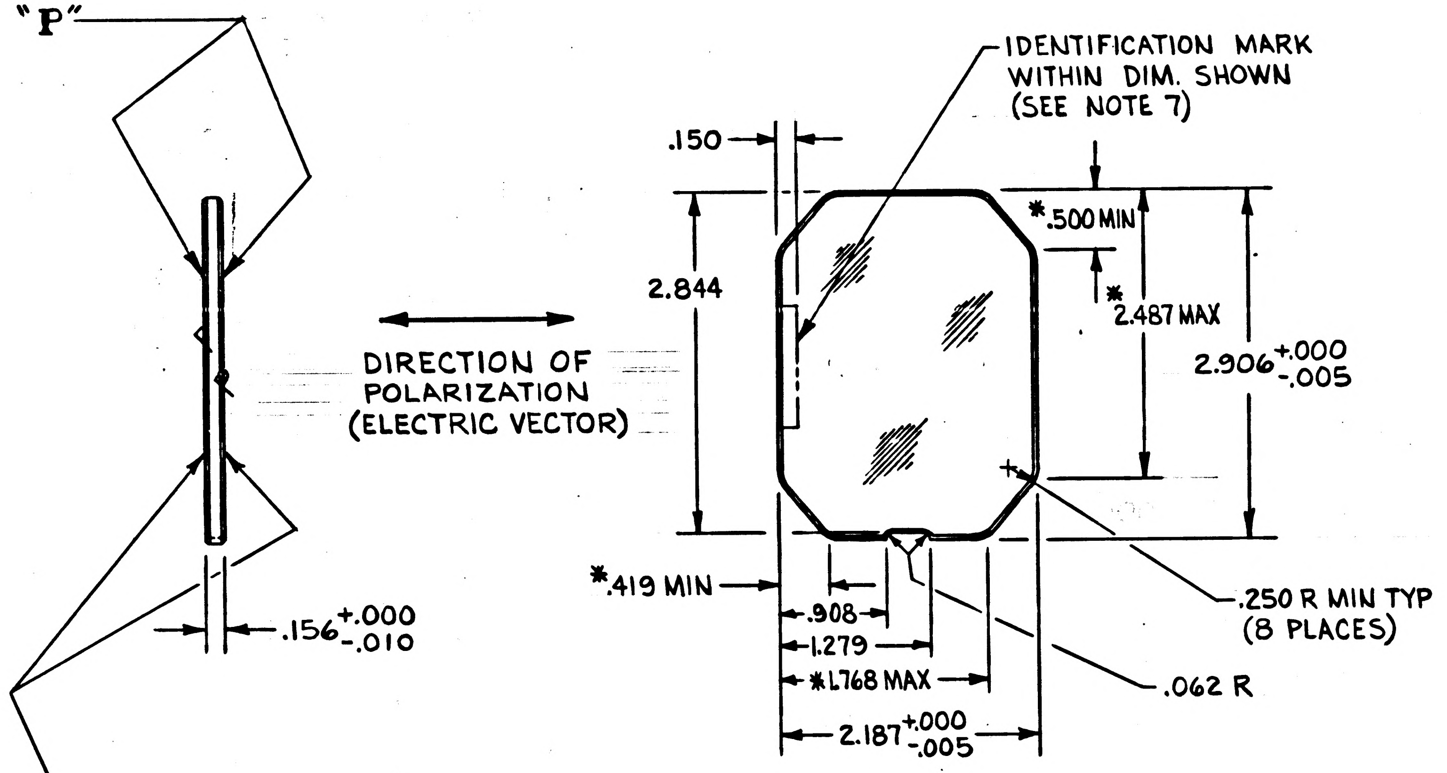
B 1011663

REVISIONS TDRR 01220

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	A-4	"NEXT ASSY" NO. WAS 1011700 TDRR 02561	7-17-63	WK
B5		REVISED PER TDRR NO. 03153	9/16/63	9/17

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. ELEMENT IN ACCORDANCE WITH SPEC MIL-O-13830(Ord)
3. MATL: POLAROID FILM HN22 LAMINATED IN CROWN GLASS AS SHOWN. QUALITY PER JAN-G-174 GRADE C.
4. CA: ENT & EXIT 1.875 x 2.625 ELLIPTICAL.
   SURF. QUAL: 60-40
   RESOLN 5 SEC OF ARC. AT 45° INCIDENCE BY TRANSMISSION.
   ASTIG ½ MILLIDIOPT MAX AT 45° INCIDENCE
   SPHER PWR 1 MILLIDIOPT MAX.
   LT DEV TO BE 30" OF ARC (MAX.)
5. SURF MARKED "P" POL, ALL OTHERS GRD.
6. CHAMFER 45° x .015 ALL EDGES.
7. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019.



"P"
DIRECTION OF POLARIZATION (ELECTRIC VECTOR)
.156 +.000 -.010
IDENTIFICATION MARK WITHIN DIM. SHOWN (SEE NOTE 7)
.150
2.844
*.500 MIN
*2.487 MAX
2.906 +.000 -.005
*.419 MIN
.908
1.279
*1.768 MAX
2.187 +.000 -.005
.250 R MIN TYP (8 PLACES)
.062 R

SURFACES COATED WITH HIGH EFFICIENCY REFLECTION REDUCING FILM. THE AVERAGE REFLECTANCE VALUE OVER THE SPECTRAL RANGE 450-650 mμ NOT TO EXCEED 6% AT 45° INCIDENCE.
PHYSICAL AND ENVIRONMENTAL REQUIREMENTS PER JAN-F-675.

* DIMENSIONS ARE TO THEORETICAL INTERSECTIONS OF PLANES.

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
Ⓐ 1011701	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCE ON FRACTIONS ± ~ DECIMALS ±.005 ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 3
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 28386900490
DRAWN V. AMATO DATE 4-10-63
CHECKED T. SULLIVAN 4-24-63
APPROVAL 4-26-63
APPROVAL E. 4-29-63
NASA APPROVAL W J 5-9-63
MIT APPROVAL 9 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE FILTER, BEAM SPLITTER

CODE IDENT NO.
SIZE C
NASA NUMBER 1011663
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

E-184

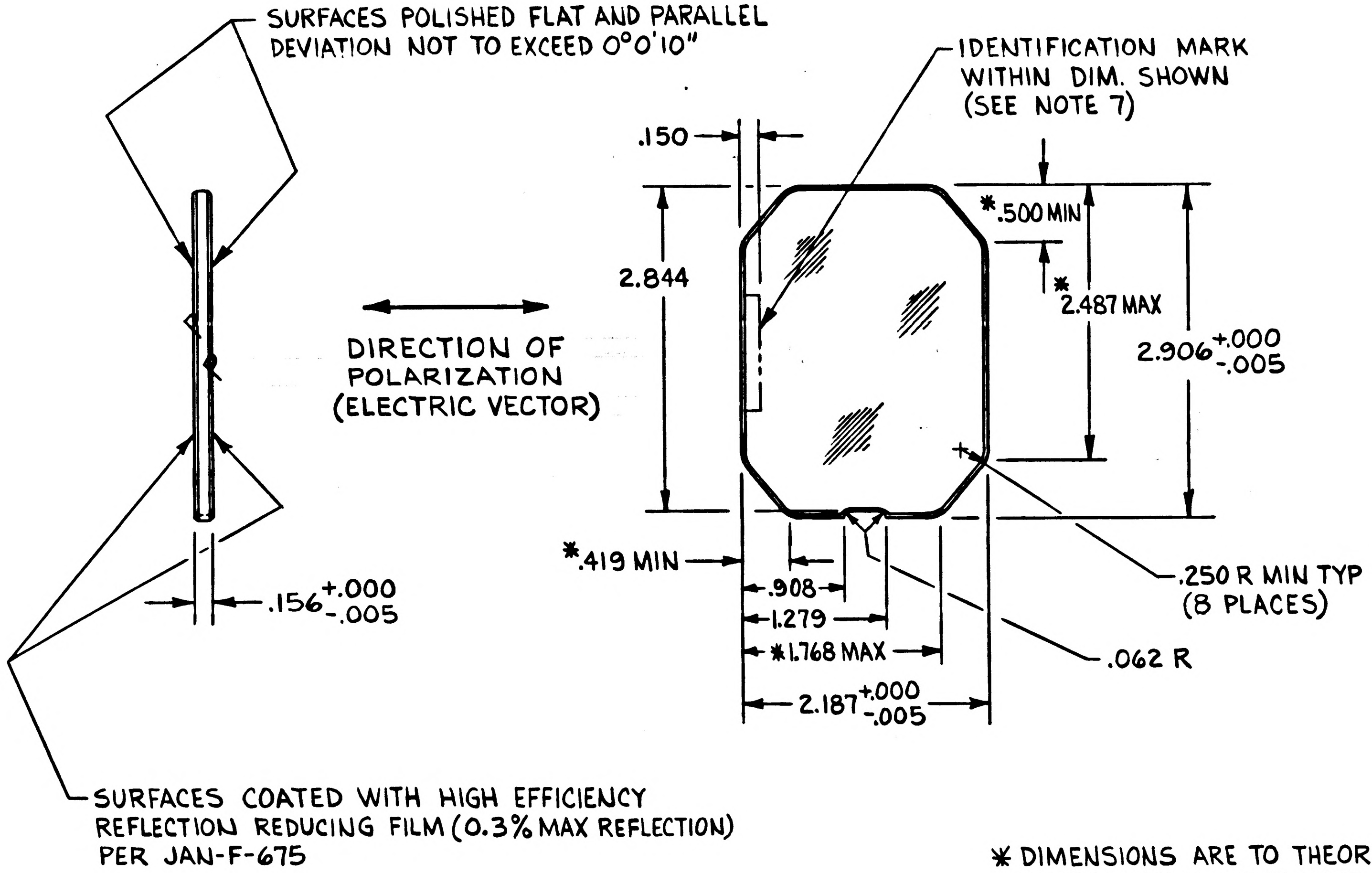
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011663

REVISIONS TDRR 01220				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. ELEMENT IN ACCORDANCE WITH SPEC MIL-O-13830(Ord)
3. MATL: POLAROID FILM HN22 LAMINATED IN CROWN GLASS AS SHOWN QUALITY PER JAN-G-174 GRADE C.
4. CA: ENT & EXIT 1.875 x 2.625 ELLIPTICAL.
   SURF. QUAL: 60-40
   RESOLN 3 SEC OR BETTER AT 45° INCIDENCE BY TRANSMISSION.
   ASTIG ½ MILLIDIOPT MAX AT 45° INCIDENCE
   SPHER PWR 1 MILLIDIOPT MAX.
   LT DEV NOT TO EXCEED ½ MINUTE OF ARC.
5. SURF MARKED "P" POL, ALL OTHERS GRD.
6. CHAMFER 45° x .015 ALL EDGES.
7. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019.


SURFACES POLISHED FLAT AND PARALLEL
DEVIATION NOT TO EXCEED 0°0'10"
IDENTIFICATION MARK
WITHIN DIM. SHOWN
(SEE NOTE 7)
.150
*.500 MIN
2.844
*2.487 MAX
2.906 +.000 -.005
DIRECTION OF
POLARIZATION
(ELECTRIC VECTOR)
*.419 MIN
.908
1.279
*1.768 MAX
2.187 +.000 -.005
.250 R MIN TYP
(8 PLACES)
.062 R
.156 +.000 -.005
SURFACES COATED WITH HIGH EFFICIENCY
REFLECTION REDUCING FILM (0.3% MAX REFLECTION)
PER JAN-F-675

* DIMENSIONS ARE TO THEORETICAL INTERSECTIONS OF PLANES.

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011700	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 3

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 28386900490

DRAWN V. AMATO DATE 4-10-63
CHECKED T. SULLIVAN 4-24-63
APPROVAL Thornton Vicam 4-26-63
APPROVAL E. Dhoup 4-29-63
NASA APPROVAL W J Rhie 5-9-63
MIT APPROVAL W Wyfor 9 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
FILTER, BEAM SPLITTER

CODE IDENT NO.
SIZE C
NASA NUMBER 1011663
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

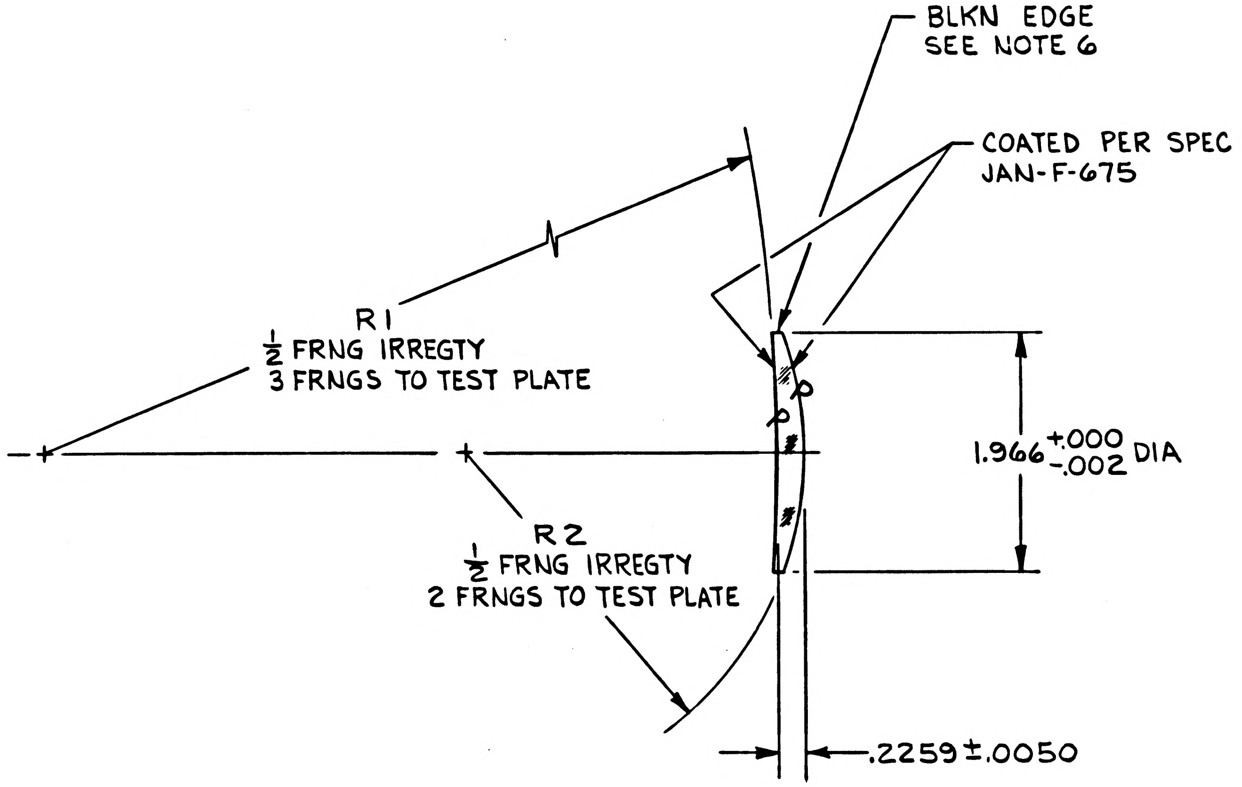
0L91101

Nd	R1	R2
1.69133	-14.588±.061	-2.8708±.0011

REVISIONS TDRR 01220

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. ELEMENT IN ACCORDANCE WITH SPEC MIL-O-13830.
3. MATL: GLASS, OPTICAL PER JAN-G-174
GRADE B- FINE ANNEALED
TYPE 691-548
4. CA: ENT= 1.831 EXIT= 1.845
SURF. QUAL: 60-40
CTRG ERROR ½ MINUTE.
5. SURFACES MARKED "P" POL ALL OTHERS GRD.
6. BLACKEN IN ACCORDANCE WITH SPEC MIL-O-13830 PAR 3.5.12
BLKING MATL: BLACK INK PER FED. SPEC TT-1-528.


BLKN EDGE
SEE NOTE 6
COATED PER SPEC
JAN-F-675
R1
½ FRNG IRREGTY
3 FRNGS TO TEST PLATE
P
P
1.966 +.000 -.002 DIA
R2
½ FRNG IRREGTY
2 FRNGS TO TEST PLATE
.2259±.0050

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011732	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	±.005	± 1°

DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 3
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 28386900520

DRAWN V. AMATO DATE 4-11-63
CHECKED Thornton Stearns 5-6-63
APPROVAL Thornton Stearns 5-6-63
APPROVAL E. Dhomp 5-7-63
NASA APPROVAL W J Rhine 5-9-63
MIT APPROVAL W Hoffer 9 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LENS, POSITIVE
(TELESCOPE RELAY)

CODE IDENT NO.
SIZE C
NASA NUMBER 1011670
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-184

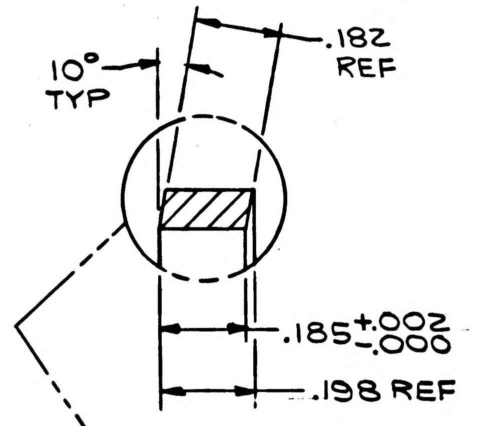
9-10

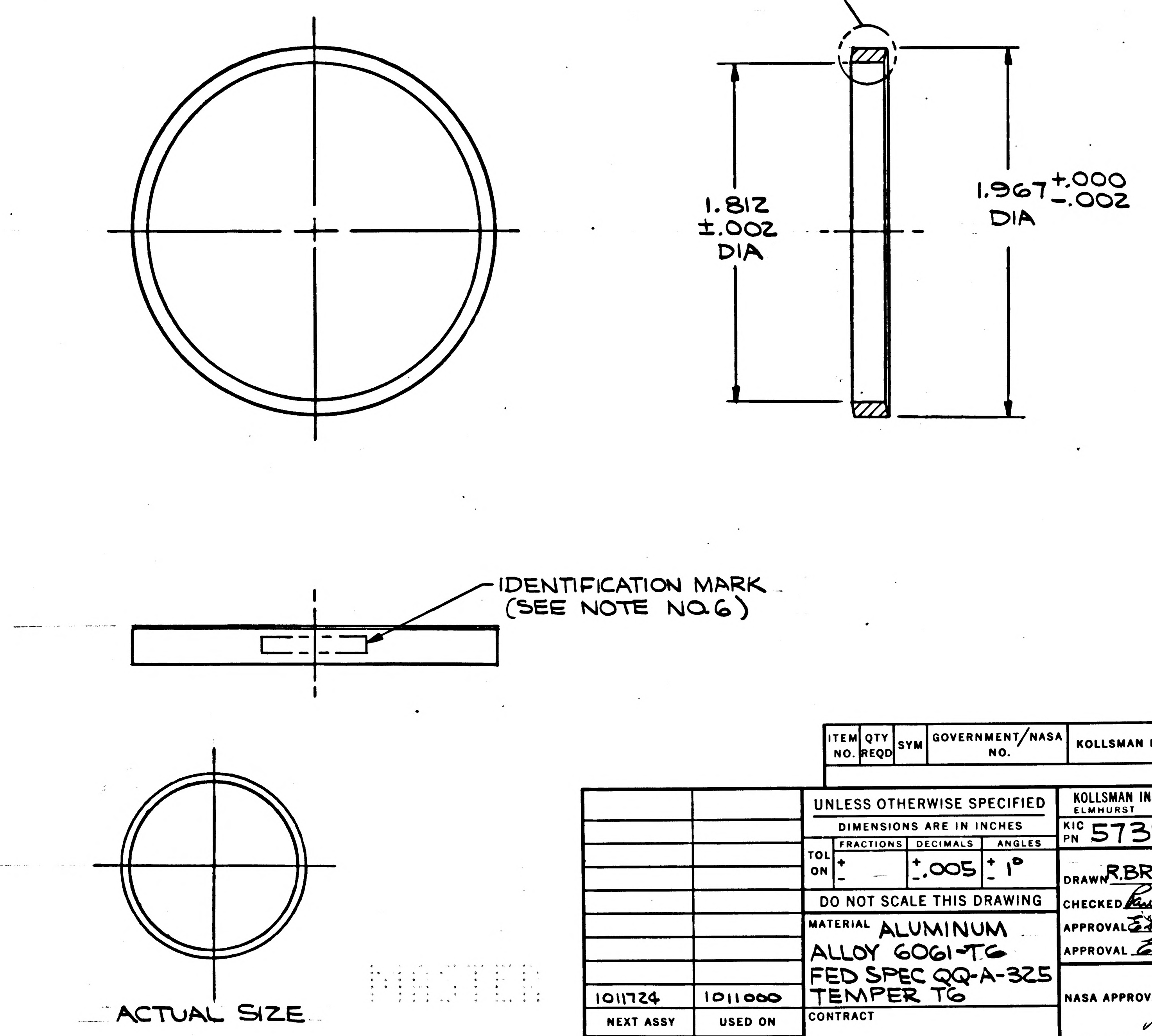
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011676

REVISIONS 01370				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:-
   - a) $\overset{63}{\checkmark}$ FINISH ALL OVER
   - b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. BLACK ANODIZE IN ACCORDANCE WITH MIL-A-8625 TYPE II BLACK (KPS-1005A.201)
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019





ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011724	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	±	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 6061-T6 FED SPEC QQ-A-325 TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901200

DRAWN R.BRUNELLE DATE 4-11-63
CHECKED Paul Pappachristou
APPROVAL E.J. MacDonald 5-22-63
APPROVAL E. Thorup 5-22-63
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE SPACER, LENS

CODE IDENT NO. | SIZE C | NASA NUMBER 1011676

SCALE 2/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

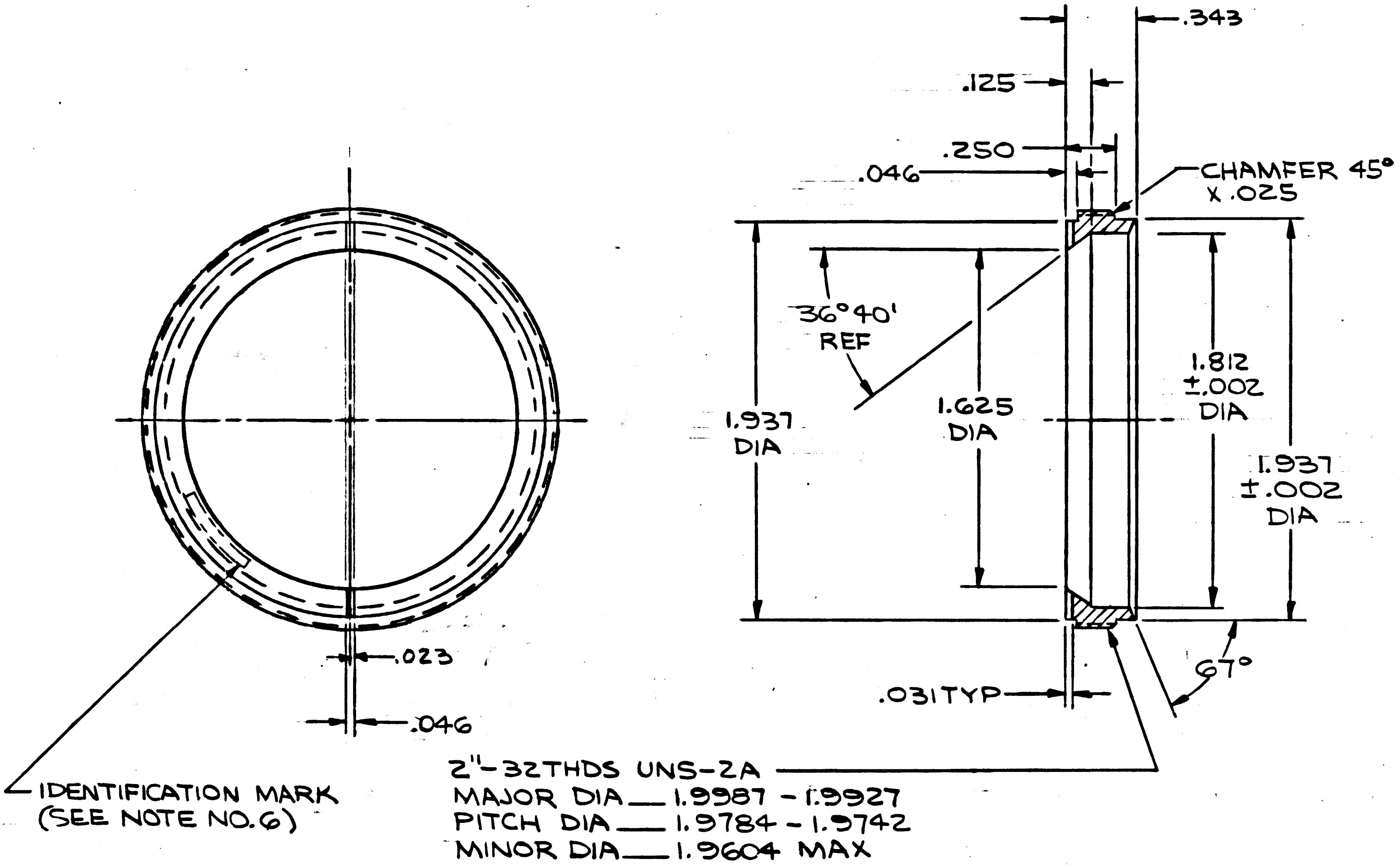
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011676

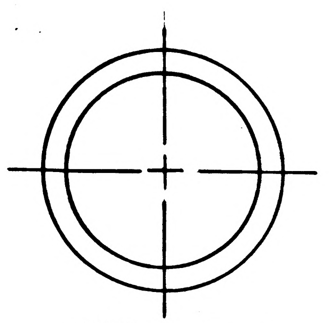
A 1011677

REVISIONS 01370				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	A-4	"NEXT ASSY" NO. WAS 1011724 TDRR 02240	7-17-63	WK 7-24-63

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:-
   a) 63√ FINISH ALL OVER
   b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
4. REMOVE BURRS IN ACCORDANCE WITH 1002079
5. BLACKEN IN ACCORDANCE WITH MIL-C-13924 CLASS 3 (KPS-1005B.100)
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019



.343
.125
.250
.046
CHAMFER 45° X .025
36°40' REF
1.937 DIA
1.625 DIA
1.812 ±.002 DIA
1.937 ±.002 DIA
.023
.046
.031 TYP
67°
IDENTIFICATION MARK (SEE NOTE NO. 6)
2"-32THDS UNS-2A
MAJOR DIA — 1.9987 - 1.9927
PITCH DIA — 1.9784 - 1.9742
MINOR DIA — 1.9604 MAX



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

Ⓐ	1011792	1011000
	NEXT ASSY	USED ON
	APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	±1°

DO NOT SCALE THIS DRAWING

MATERIAL STAINLESS STEEL AISI 440 FED SPEC QQ-S-763 CLASS 440 COND A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901210

DRAWN R. BRUNELLE DATE 4-12-63
CHECKED Paul Pappachristou
APPROVAL E. MacDonald 5-22-63
APPROVAL E. Thomp 5-22-63
NASA APPROVAL
MIT APPROVAL 24 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE RING, LOCKING

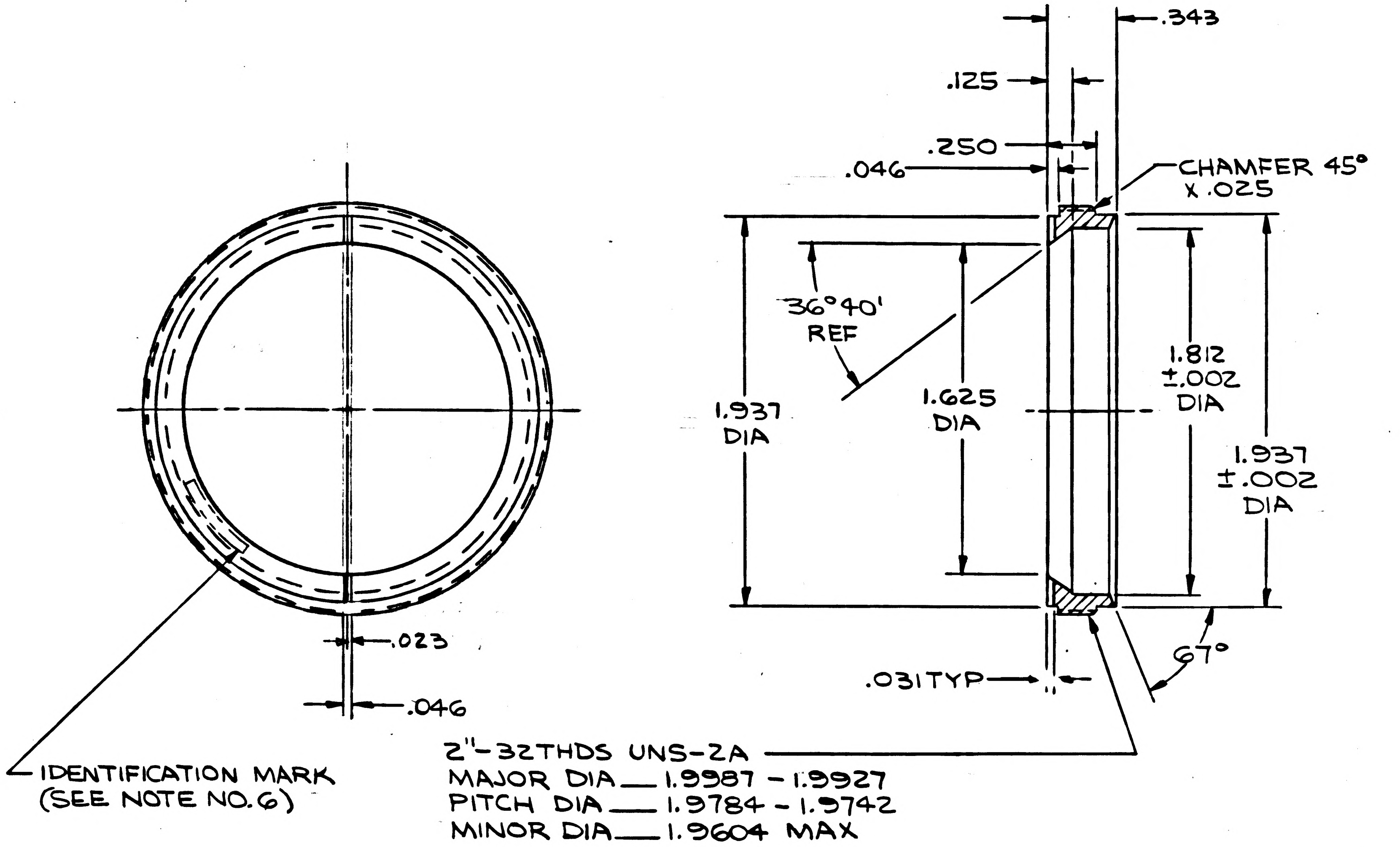
CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011677
SCALE 2/1	WEIGHT CALC ACTUAL	SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

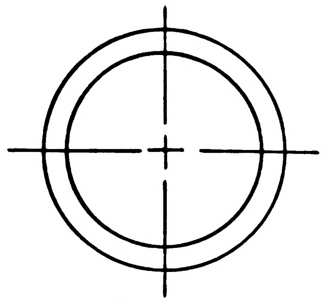
1011677

REVISIONS 0137				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:-
   - a) 63/√ FINISH ALL OVER
   - b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
4. REMOVE BURRS IN ACCORDANCE WITH 1002079
5. BLACKEN IN ACCORDANCE WITH MIL-C-13924 CLASS 3 (KPS-1005B.100)
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019



2"-32THDS UNS-2A
MAJOR DIA — 1.9987 - 1.9927
PITCH DIA — 1.9784 - 1.9742
MINOR DIA — 1.9604 MAX



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011724	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	±1°

DO NOT SCALE THIS DRAWING

MATERIAL STAINLESS STEEL AISI 440 FED SPEC QQ-S-763 CLASS 440 COND A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901210

DRAWN R.BRUNELLE DATE 4-12-63
CHECKED
APPROVAL 5-22-63
APPROVAL 5-22-63
NASA APPROVAL
MIT APPROVAL 24 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RING, LOCKING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011677
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

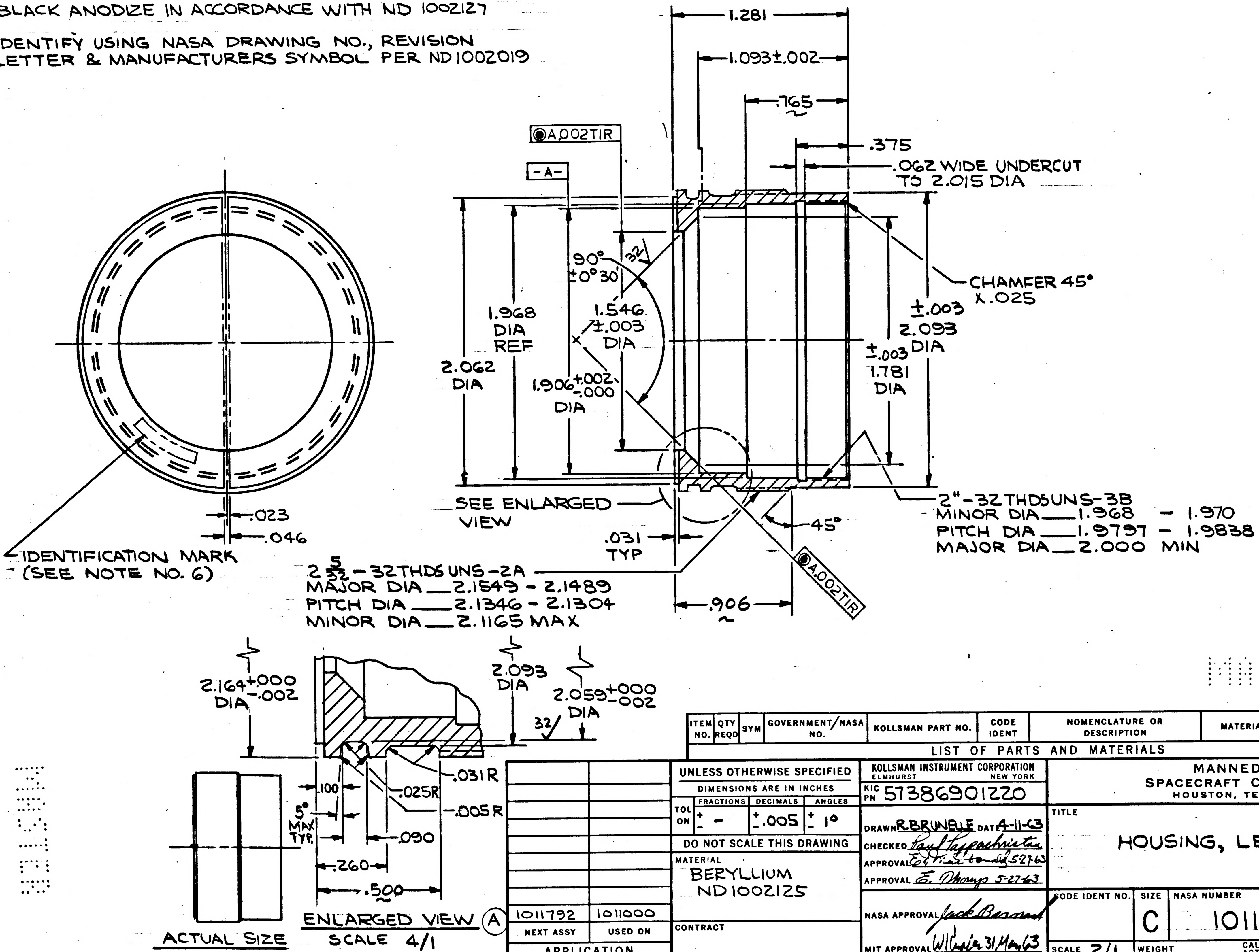
1011678 A

REVISIONS TDRR 01424

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	A-4	"NEXT ASSY" NO. WAS 1011724 TDRR 02240	7-17-63	WK 7-24-63

Ⓜ

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:-
   a) 63√ FINISH ALL OVER
   b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. BLACK ANODIZE IN ACCORDANCE WITH ND 1002127
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019



1.281
1.093±.002
.765
.375
.062 WIDE UNDERCUT TO 2.015 DIA
Ⓜ A .002 TIR
-A-
90° ±0°30'
32
1.968 DIA REF
1.546 ±.003 DIA
2.062 DIA
1.906 +.002 -.000 DIA
CHAMFER 45° X .025
±.003 2.093 DIA
±.003 1.781 DIA
SEE ENLARGED VIEW
.031 TYP
45°
Ⓜ A .002 TIR
.906
2"-32 THDS UNS-3B
MINOR DIA 1.968 - 1.970
PITCH DIA 1.9797 - 1.9838
MAJOR DIA 2.000 MIN
2 5/32 - 32 THDS UNS-2A
MAJOR DIA 2.1549 - 2.1489
PITCH DIA 2.1346 - 2.1304
MINOR DIA 2.1165 MAX
.023
.046
IDENTIFICATION MARK (SEE NOTE NO. 6)
2.164 +.000 -.002 DIA
2.093 DIA
2.059 +.000 -.002 DIA
32
.031 R
.025 R
.005 R
.100
5° MAX TYP.
.090
.260
.500
ACTUAL SIZE
ENLARGED VIEW Ⓐ
SCALE 4/1

MASTER

1011792	1011000
NEXT ASSY	USED ON
APPLICATION	

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± -	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
BERYLLIUM
ND 1002125

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901220

DRAWN R. BRUNELLE DATE 4-11-63
CHECKED Paul Pappachristou
APPROVAL Ed MacDonald 5-27-63
APPROVAL E. Dhorup 5-27-63
NASA APPROVAL Jack Barnard
MIT APPROVAL W Cooper 31 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, LENS

CODE IDENT NO.
SIZE C
NASA NUMBER 1011678
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

K-E
E-154

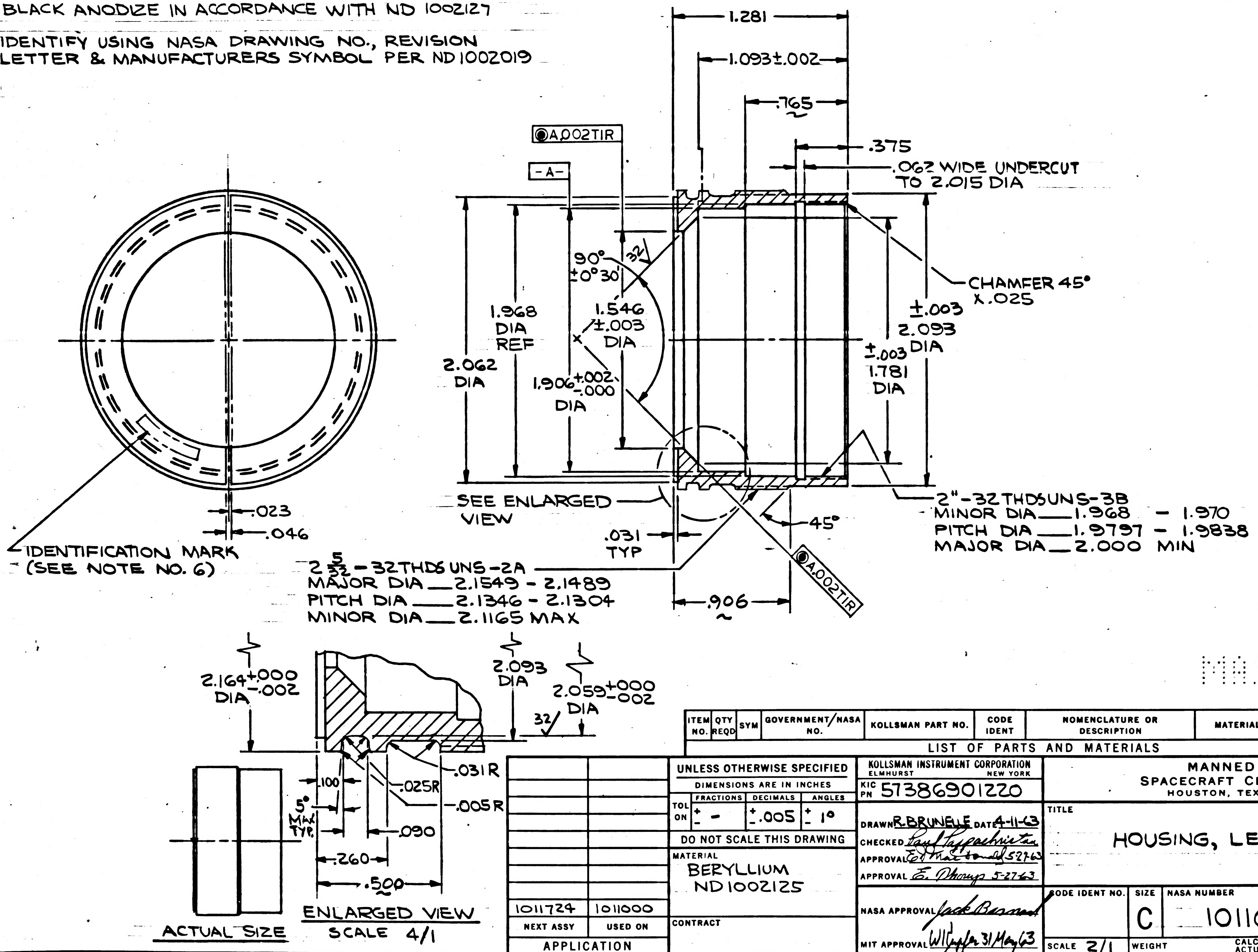
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011678 A

1011678

REVISIONS TDRR 01424				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:-
   a) 63/ FINISH ALL OVER
   b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. BLACK ANODIZE IN ACCORDANCE WITH ND 1002127
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019


1.281
1.093±.002
.765
.375
.062 WIDE UNDERCUT TO 2.015 DIA
A .002 TIR
-A-
90° ±0°30'
32
1.968 DIA REF
1.546 ±.003 DIA
2.062 DIA
1.906 +.002 -.000 DIA
CHAMFER 45° X.025
±.003 2.093 DIA
±.003 1.781 DIA
SEE ENLARGED VIEW
.031 TYP
45°
A .002 TIR
2"-32 THDS UNS-3B
MINOR DIA 1.968 - 1.970
PITCH DIA 1.9797 - 1.9838
MAJOR DIA 2.000 MIN
2 5/32 - 32 THDS UNS-2A
MAJOR DIA 2.1549 - 2.1489
PITCH DIA 2.1346 - 2.1304
MINOR DIA 2.1165 MAX
.906
.023
.046
IDENTIFICATION MARK (SEE NOTE NO. 6)
2.164 +.000 -.002 DIA
2.093 DIA
2.059 +.000 -.002 DIA
32
.031R
.025R
.005R
.100
5° MAX TYP.
.090
.260
.500
ENLARGED VIEW SCALE 4/1
ACTUAL SIZE
MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011724	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± -	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
BERYLLIUM
ND 1002125

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901220

DRAWN R. BRUNELLE DATE 4-11-63
CHECKED Paul Pappachristou
APPROVAL Ed MacDonald 5-27-63
APPROVAL E. Dhoruys 5-27-63
NASA APPROVAL Jack Barnard
MIT APPROVAL W Kupfer 31 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, LENS

CODE IDENT NO.
SIZE C
NASA NUMBER 1011678
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

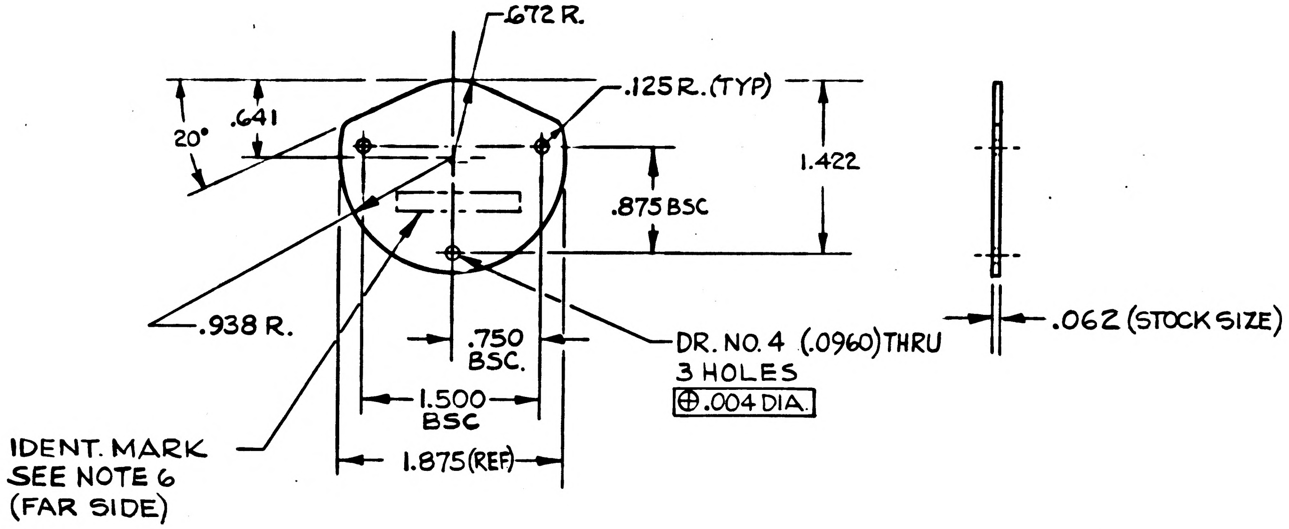
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011678

REVISIONS IDRR 01565				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG. IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. BLACK ANODIZE PER MIL-A-8625 TYPE II BLACK (KPS-1005A.201)
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURER'S SYMBOL IN ACCORDANCE WITH ND 1002019



1011680

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011793	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ¼	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
ALUMINUM ALLOY 5052-H34
FED. SPEC. QQ-A-318b
TEMPER H34

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900810

DRAWN H. Borenstein DATE 4-15-63
CHECKED M. Fauvell
APPROVAL [illegible] 6-11-63
APPROVAL E. [illegible] 6-11-63
NASA APPROVAL Jack Barnard
MIT APPROVAL [illegible]

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PLATE, COVER, MIRROR

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011680
SCALE 1/1	WEIGHT CALC ACTUAL	SHEET 1 OF 1

K+E E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

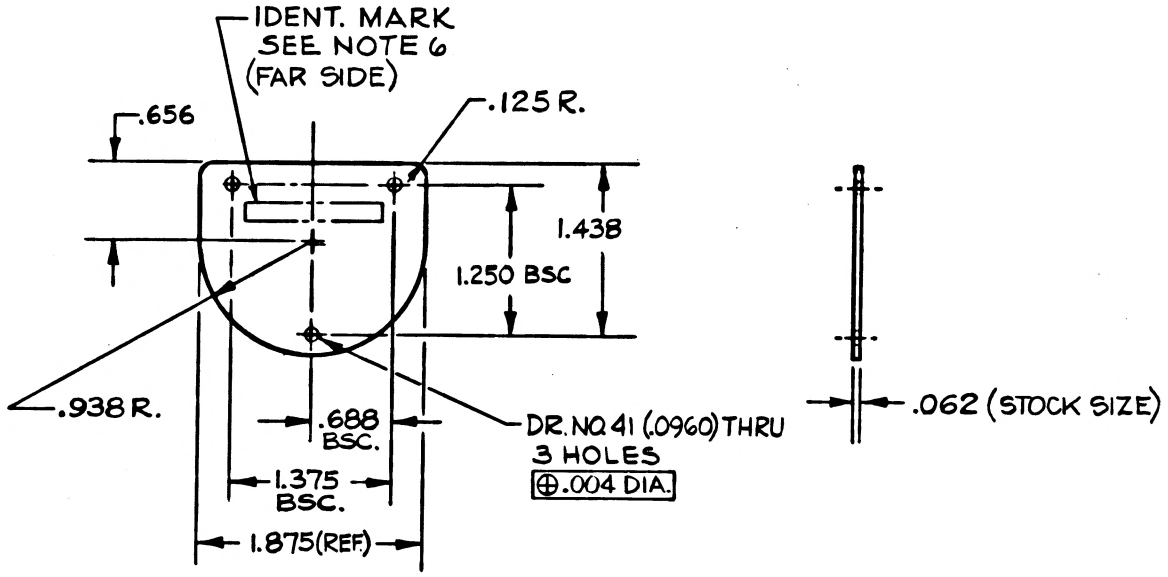
1891101

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REVISIONS TDRR 01565

NOTES:

1. INTERPRET DWG. IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63✓ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. BLACK ANODIZE PER MIL-A-8625 TYPE II BLACK (KPS-1005A.201)
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURER'S SYMBOL IN ACCORDANCE WITH ND 1002019



MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011786	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64 | DECIMALS ± .005 | ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL
ALUM. ALLOY 5052-H34
FED. SPEC. QQ-A-318b
TEMPER-H34
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52 386900820
DRAWN DATE 4-15-63
CHECKED M. Fauvell
APPROVAL Thornton Stearns 6-11-63
APPROVAL E. Thomp 5-28-63
NASA APPROVAL Jack Barnard
MIT APPROVAL Perry K Bryant

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PLATE, COVER, MIRROR

CODE IDENT NO.
SIZE C
NASA NUMBER 1011681
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011681

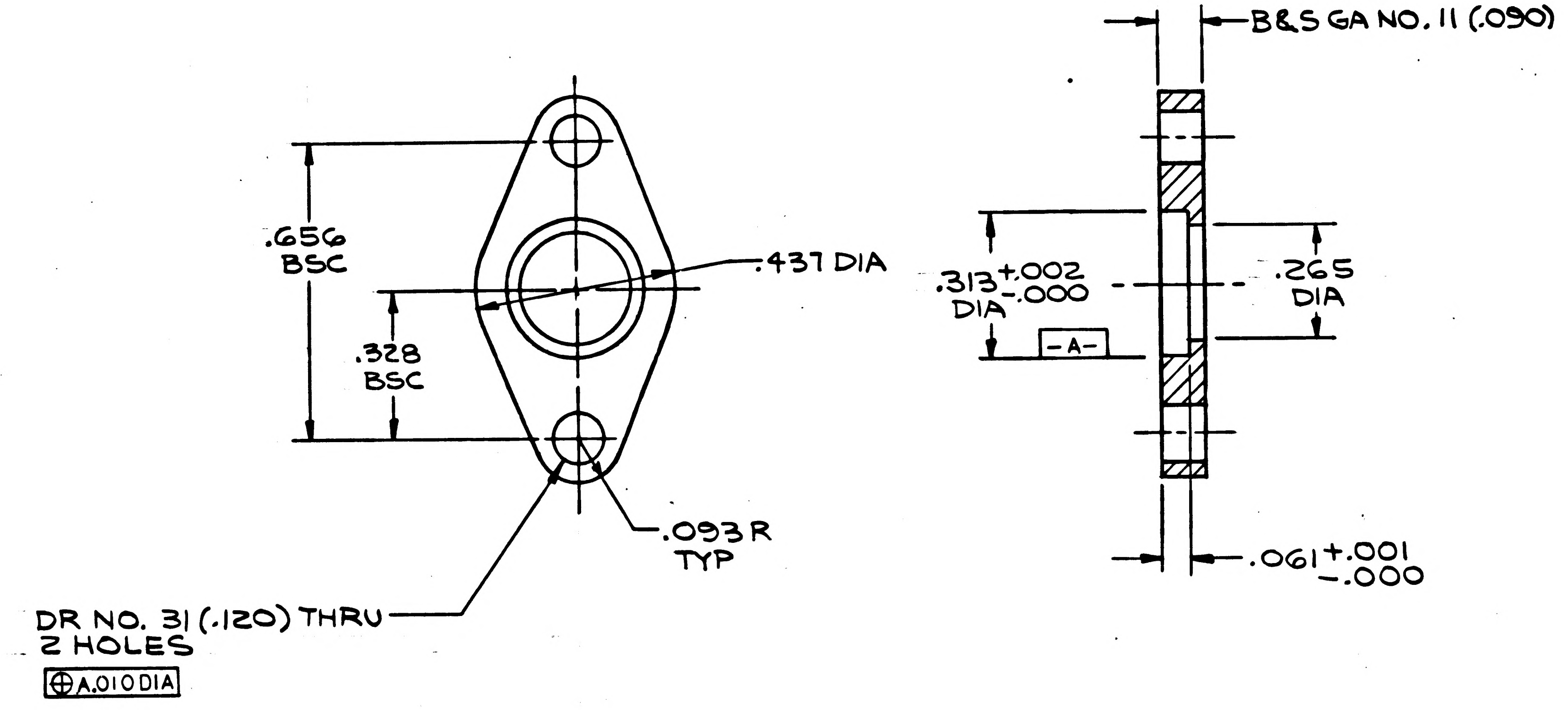
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

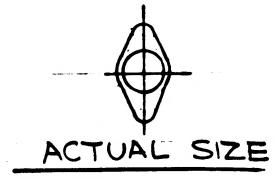
E-154

2891101

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:-
 a) 63/√ FINISH ALL OVER
 b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079




ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011722	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± —

DO NOT SCALE THIS DRAWING
MATERIAL ALUMINUM ALLOY 6061-T4 FED SPEC QQ-A-327 TEMPER T4
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900830
DRAWN R. BRUNELLE DATE 4-16-63
CHECKED Paul Papachristou
APPROVAL Ed MacDonald 5-22-63
APPROVAL E. [illegible] 5-22-63
NASA APPROVAL
MIT APPROVAL 24 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PLATE, BEARING RETAINER

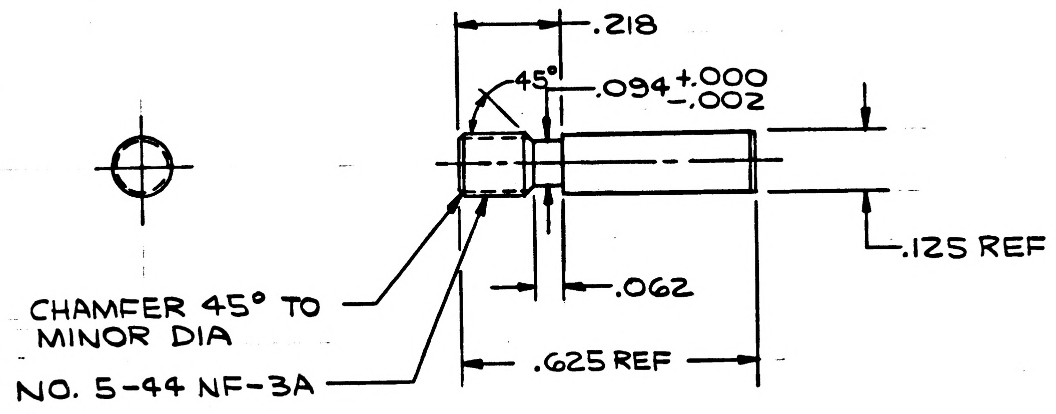
CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011682
SCALE 4/1	WEIGHT CALC ACTUAL	SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

	1011684

TDR 01015	REVISIONS		
SYM	DESCRIPTION	DATE	APPROVAL

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. 63/√ FINISH ON ALL MACHINED SURFACES
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. IMMUNIZE IN ACCORDANCE WITH MIL-STD-171 (KPS-1005I.200)



MASTER

ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL AN122694

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 48386900010

DRAWN R.BRUNELLE DATE 4-16-63
CHECKED 4-17-63
APPROVAL 4-17-63
APPROVAL E. Thomas 4-17-63
NASA APPROVAL
MIT APPROVAL 25 Apr 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE PIN, THREADED

CODE IDENT NO. | SIZE B | NASA NUMBER 1011684

SCALE 4/1 | WEIGHT CALC ACTUAL | SHEET OF

E-153

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

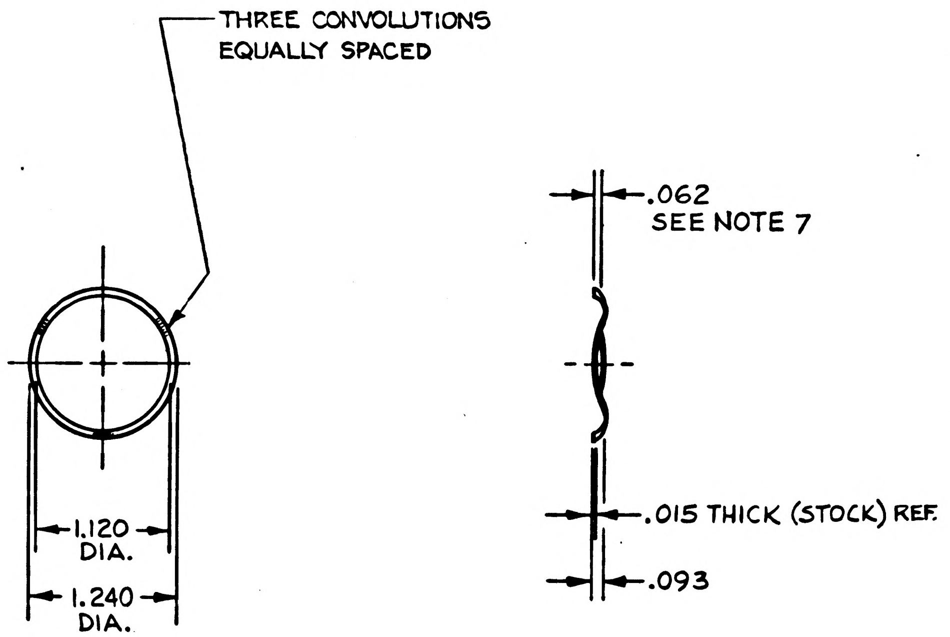
1011685

SYM	ZONE	DESCR'PTION	DATE	APPROVAL

REVISIONS TDRR 01565

NOTES:

1. INTERPRET DWG. IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63/ FINISH ALL OVER
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. HEAT TREATMENT IN ACCORDANCE WITH MIL-STD-7199 (KPS-1001C.105)
6. CLEANING PROCEDURE IN ACCORDANCE WITH ND1002102.
7. LOAD AT .031 IN. DEFLECTION TO BE 3 LB. ± 10%.



MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011786	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± —

DO NOT SCALE THIS DRAWING

MATERIAL
BERYLLIUM COPPER (BERYLCO 25), ASTM B194 ½H FED. SPEC. QQ-C-533, COND. HALF HARD

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 56386900380

DRAWN H Borenstein DATE 4-16-63
CHECKED M Fauvell
APPROVAL Thornton Stearns 6-11-63
APPROVAL E. Thomp 6-11-63
NASA APPROVAL Jack E. Barnard
MIT APPROVAL Perry K Byatt

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
WASHER, WAVE

CODE IDENT NO. | SIZE C | NASA NUMBER 1011685
SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

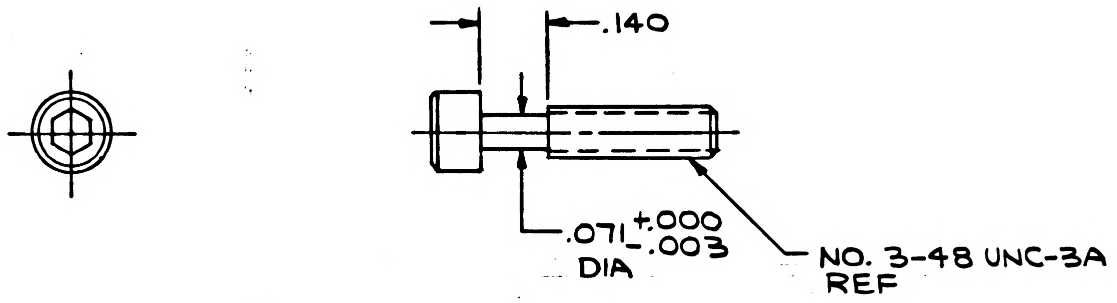
1011685

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

8891101

REVISIONS 01370			
SYM	DESCRIPTION	DATE	APPROVAL

NOTE:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. 63/ FINISH ON ALL MACHINED SURFACES
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. PASSIVATE IN ACCORDANCE WITH MIL-STD-171 (KPS-1005I.200



ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011722	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± —

DO NOT SCALE THIS DRAWING

MATERIAL
NAS1352C03LL8

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 48386900020

DRAWN R. BRUNELLE DATE 4-18-63
CHECKED Paul Pappachristou
APPROVAL 5-22-63
APPROVAL E. Thomp 5-22-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCREW, CAP, SOCKET HEAD, CAPTIVE

CODE IDENT NO.	SIZE	NASA NUMBER
	B	1011688

SCALE 4/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

E-153

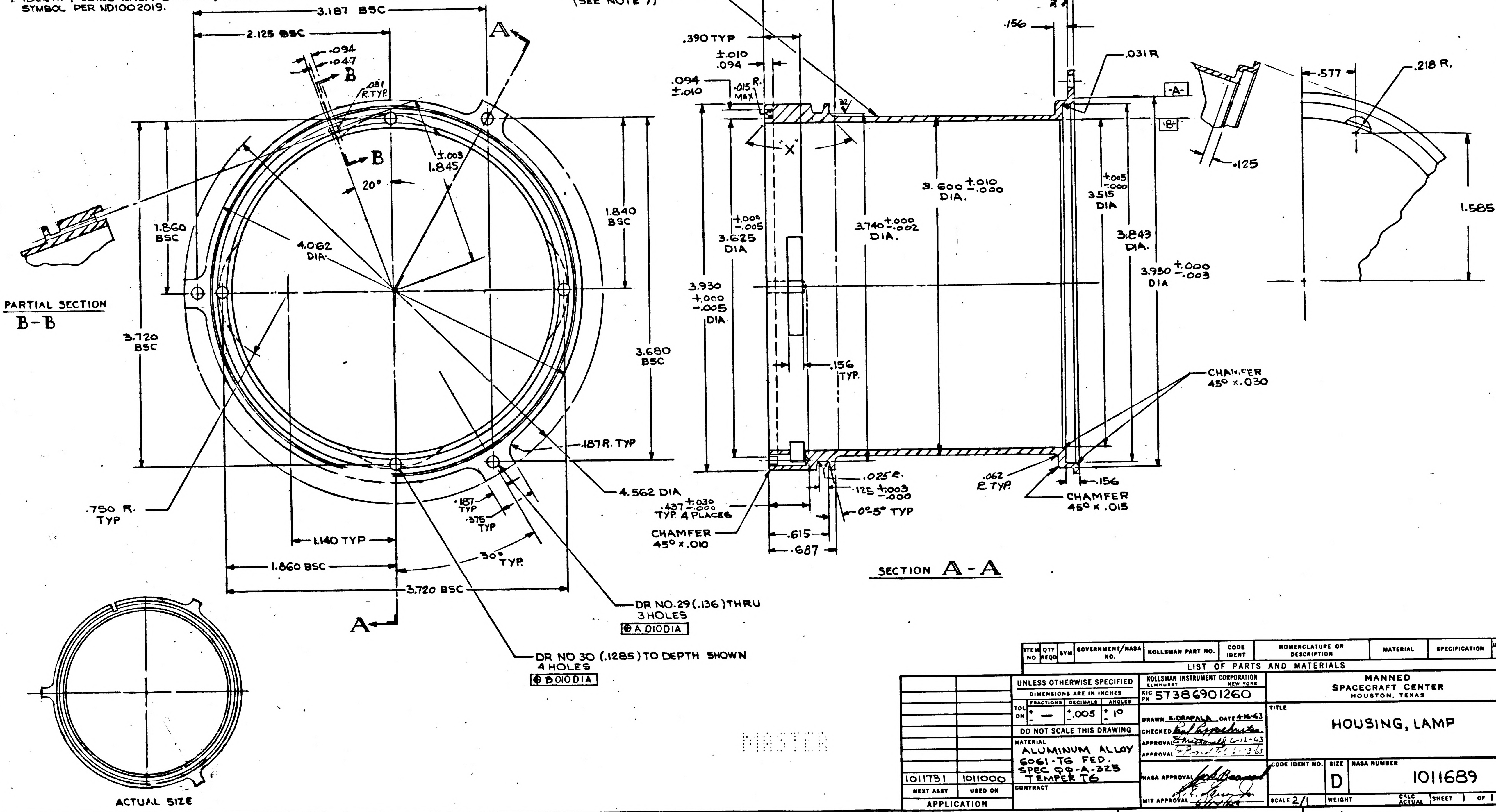
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

A	6891101

REVISIONS TDRR 01594				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR NO. 02803	8/28/63	

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. ANODIZE (SURFURIC) PER MIL-A-8625, TYPE II (KPS-1005A.200) ALL OVER
6. PAINT INSIDE AREA MARKED "X" WITH PRIMER PER MIL-P-8585. APPLY SEMI-GLOSS WHITE ENAMEL PER FED SPEC TT-E-529, COLOR NUMBER 27875, PER FED-STD-595
7. IDENTIFY USING NASA DWG. NO., REVISION LETTER AND MANUFACTURERS' SYMBOL PER ND1002019.


3.187 BSC
2.125 BSC
.094
.047
B
.051 R TYP.
A
.003
1.845
20°
1.840 BSC
1.860 BSC
4.062 DIA
PARTIAL SECTION B-B
3.720 BSC
3.680 BSC
.187 R. TYP
4.562 DIA
.750 R. TYP
.187 TYP
.375 TYP
1.140 TYP
30° TYP
1.860 BSC
3.720 BSC
DR NO.29 (.136) THRU 3 HOLES
⊕ A .010 DIA
DR NO 30 (.1285) TO DEPTH SHOWN 4 HOLES
⊕ B .010 DIA
ACTUAL SIZE
⊥ B .002
3/4 SEE NOTE 6
3.327 REF.
3.265
.062
IDENTIFICATION MARK (SEE NOTE 7)
.156
.031 R
.390 TYP
±.010 .094
.094 ±.010
.015 R. MAX.
32
"X"
-A-
-B-
.125
.577
.218 R.
1.585
3.600 +.010 -.000 DIA.
3.740 +.000 -.002 DIA.
3.625 +.000 -.005 DIA
3.930 +.000 -.005 DIA
3.515 +.005 -.000 DIA
3.849 DIA.
3.930 +.000 -.003 DIA
.156 TYP.
CHAMFER 45° x .030
.025 R.
.125 +.003 -.000
0°-5° TYP
.437 +.030 -.000 TYP. 4 PLACES
CHAMFER 45° x .010
.615
.687
.062 R. TYP.
.156
CHAMFER 45° x .015
SECTION A-A

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011731	1011000
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
ALUMINUM ALLOY 6061-T6 FED. SPEC QQ-A-325 TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901260

DRAWN E. DRAPALA DATE 4-16-63
CHECKED Paul Pappachristo
APPROVAL E. McDonald 6-12-63
APPROVAL 6-13-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, LAMP

CODE IDENT NO.
SIZE D
NASA NUMBER 1011689
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011689

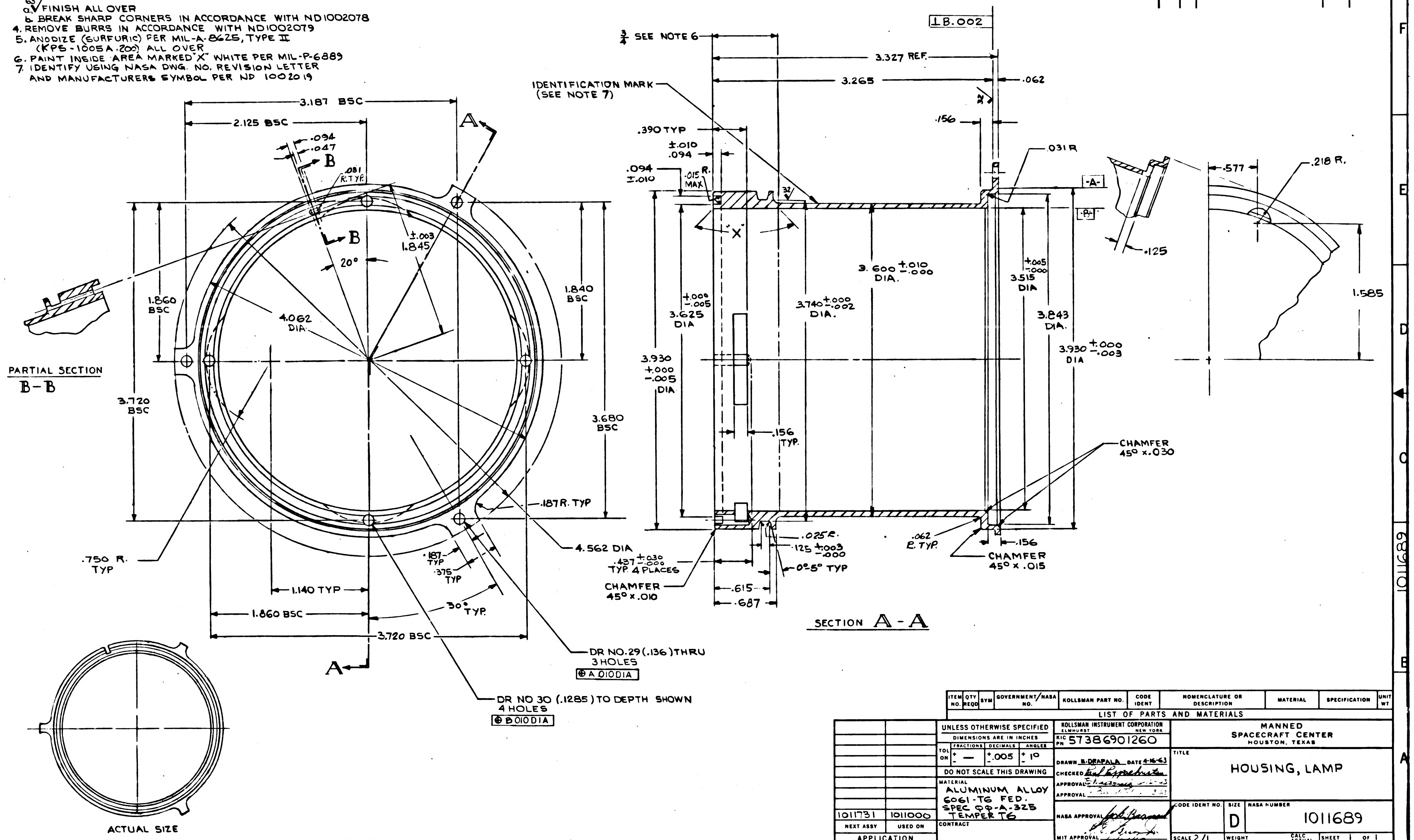
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

6891101

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REVISIONS

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078
3. UNLESS OTHERWISE SPECIFIED:
   - a. 63√ FINISH ALL OVER
   - b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. ANODIZE (SURFURIC) PER MIL-A-8625, TYPE II (KPS-1005A.200) ALL OVER
6. PAINT INSIDE AREA MARKED "X" WHITE PER MIL-P-6889
7. IDENTIFY USING NASA DWG. NO. REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019


3.187 BSC
2.125 BSC
.094
.047
B
.031 R. TYP.
A
±.003 1.845
20°
B
4.062 DIA.
1.860 BSC
1.840 BSC
PARTIAL SECTION B-B
3.720 BSC
3.680 BSC
.187 R. TYP
4.562 DIA
.750 R. TYP
.187 TYP
.375 TYP
1.140 TYP
30° TYP.
1.860 BSC
3.720 BSC
A
DR NO. 29 (.136) THRU 3 HOLES
⊕ A .010 DIA
DR NO 30 (.1285) TO DEPTH SHOWN 4 HOLES
⊕ B .010 DIA
ACTUAL SIZE
3/4 SEE NOTE 6
⊥ B .002
3.327 REF.
3.265
.062
IDENTIFICATION MARK (SEE NOTE 7)
.390 TYP
±.010 .094
.094 ±.010
.015 R. MAX
32
.156
.031 R
-A-
-B-
"X"
3.600 +.010 -.000 DIA.
3.740 +.000 -.002 DIA.
+.000 -.005 3.625 DIA
3.930 +.000 -.005 DIA
+.005 -.000 3.515 DIA
3.843 DIA.
3.930 +.000 -.003 DIA
.156 TYP.
CHAMFER 45° x .030
.025 R.
.125 +.003 -.000
.437 +.030 -.000 TYP 4 PLACES
0°5° TYP
.062 R. TYP.
.156
CHAMFER 45° x .015
CHAMFER 45° x .010
.615
.687
SECTION A-A
.577
.218 R.
.125
1.585

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011731	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
ALUMINUM ALLOY 6061-T6 FED. SPEC QQ-A-325 TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901260

DRAWN E. DRAPALA DATE 4-16-63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, LAMP

CODE IDENT NO.
SIZE D
NASA NUMBER 1011689
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

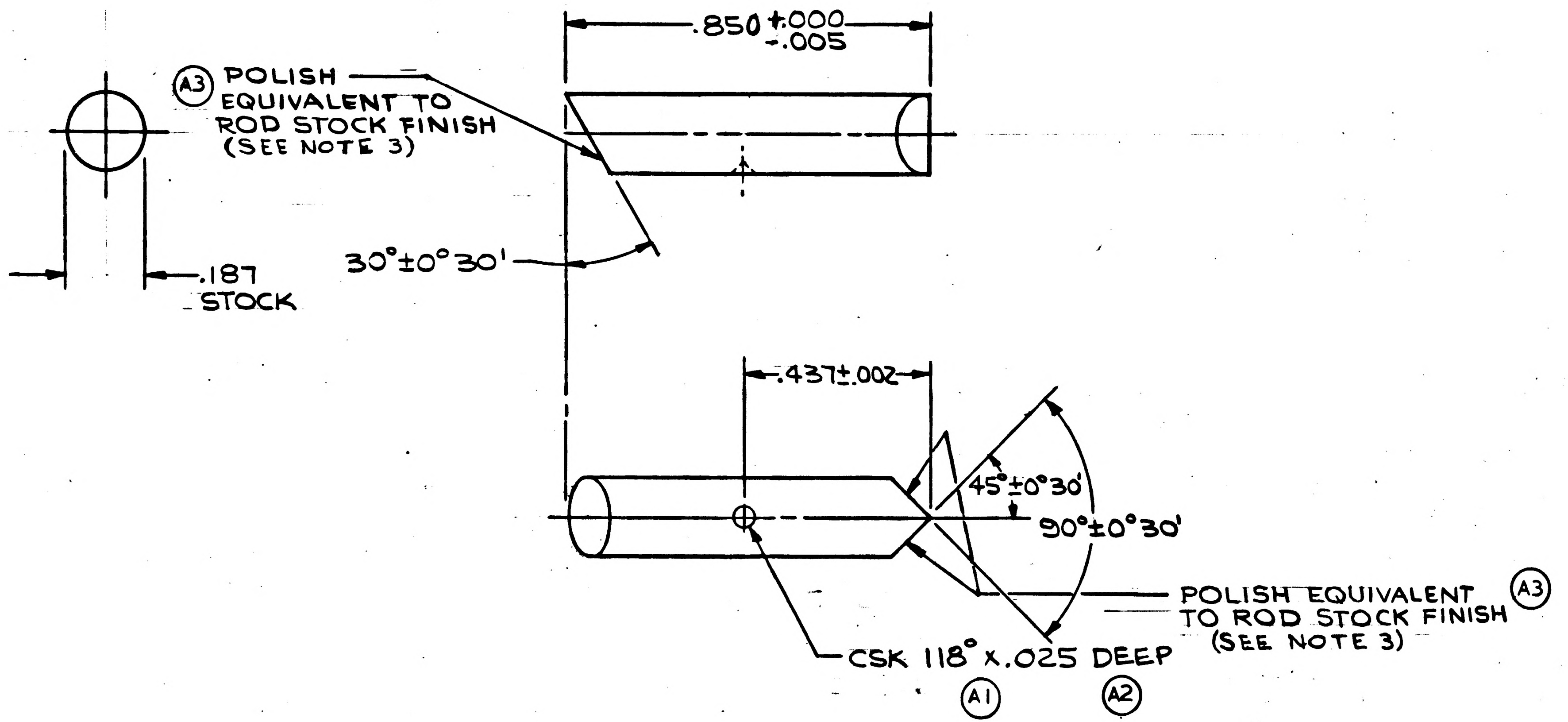
1011689

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011693 A

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. MATERIAL: PLASTIC, METHACRYLATE, SUPERIOR GLAZING, SMOOTH SURFACED ROD IN CONFORMANCE WITH FEDERAL SPECIFICATION L-P-391 TYPE 3, FINISH A (A5)
4. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER MIL-STD-130 (KPS-1003 P.100)

REVISIONS 01370				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A5	B-3	1) WAS CSC 90°		
	B-3	2) ADDED DEEP TO .025 DIM		
	C4	3) ADDED EQUIVALENT TO ROD STOCK FINISH		
	A3	4) MATERIAL WAS ACRYLIC RESIN ROD PER MIL-P-10421		
	D6	5) ADDED NOTE NO. 4	7-12-63	
		TDRR 02014	7/17/63	



.850 +.000 -.005
(A3) POLISH EQUIVALENT TO ROD STOCK FINISH (SEE NOTE 3)
30°±0°30'
.187 STOCK
.437±.002
45°±0°30'
90°±0°30'
POLISH EQUIVALENT TO ROD STOCK FINISH (SEE NOTE 3) (A3)
CSK 118° X .025 DEEP
(A1) (A2)

ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011722	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
±	—	±.005	±1°

DO NOT SCALE THIS DRAWING

MATERIAL: SEE NOTE 3 (A4)

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 25386900020

DRAWN R. BRUNELLE DATE 4-18-63
CHECKED Paul Pappachristou
APPROVAL E. F. MacDonald 5-22-63
APPROVAL E. Thorup 5-22-63
NASA APPROVAL Jack Barnard
MIT APPROVAL 24 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
ROD, LIGHT TRANSMITTING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011693
SCALE 4/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

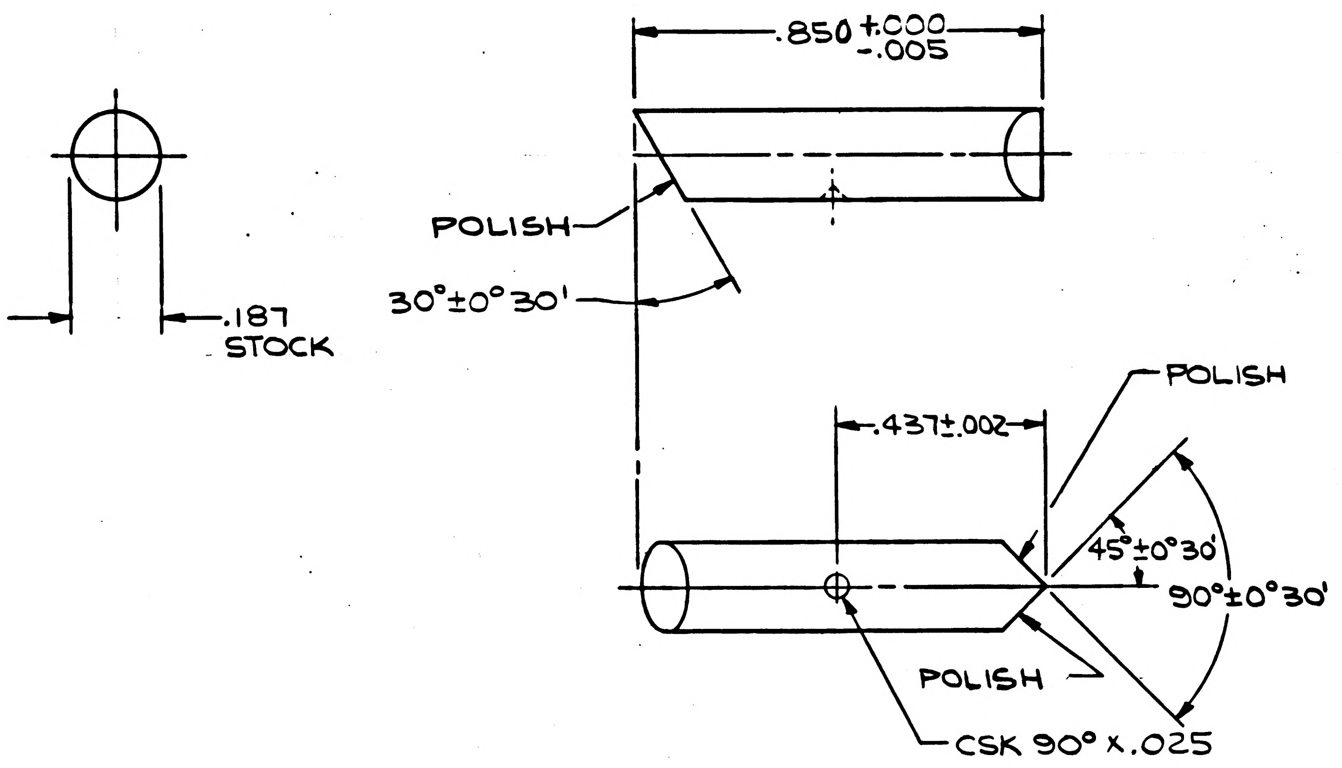
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011693 A

E691101

REVISIONS 01370				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011722	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL: ACRYLIC RESIN ROD PER MIL-P-10421

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 25386900020

DRAWN R. BRUNELLE DATE 4-18-63
CHECKED
APPROVAL E. F. MacDonald 5-22-63
APPROVAL E. 5-22-63
NASA APPROVAL
MIT APPROVAL 24 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE: ROD, LIGHT TRANSMITTING

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011693

SCALE 4/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

1011693

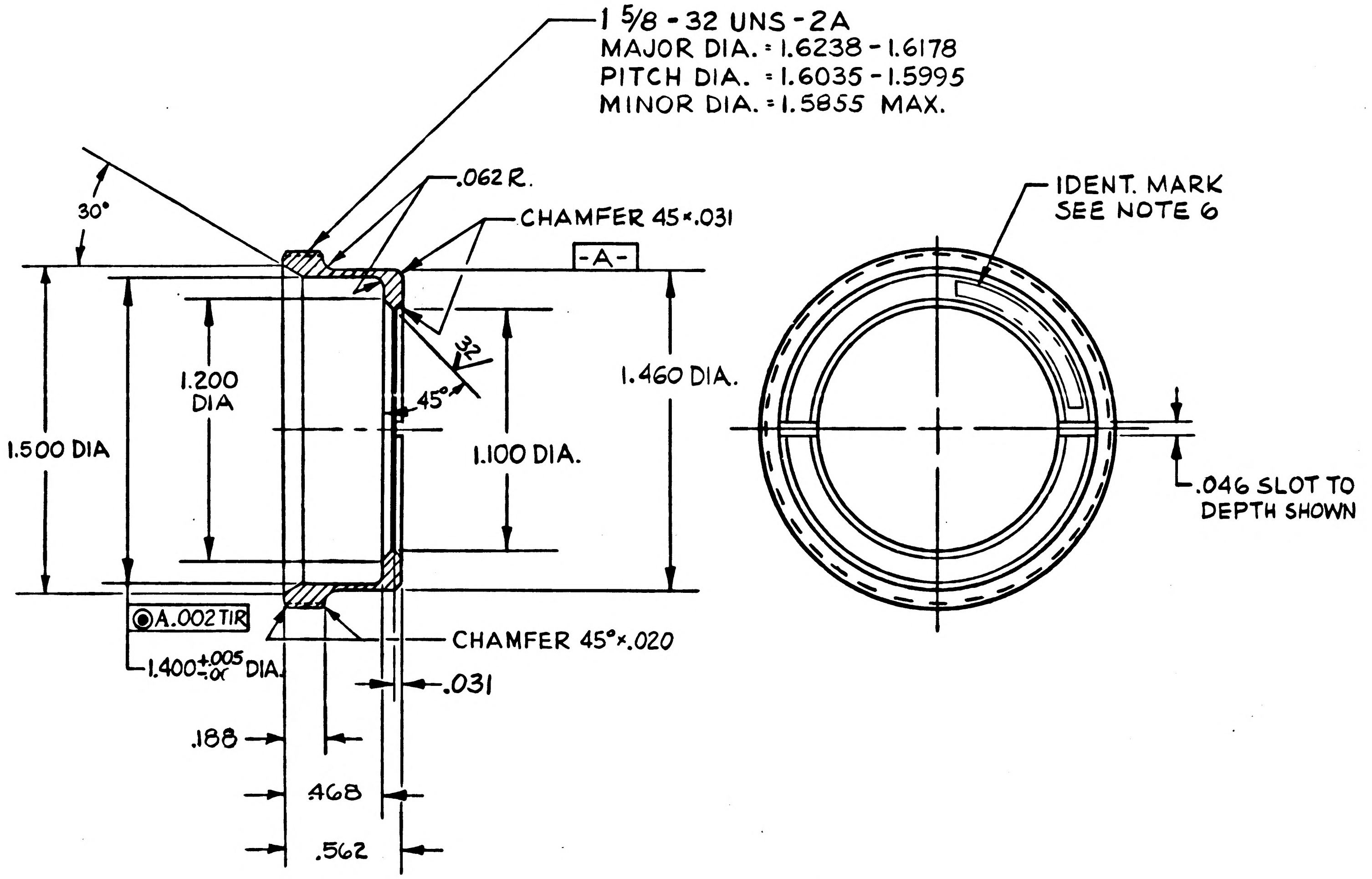
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

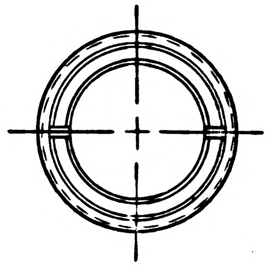
1011694

REVISIONS TDRR 01565				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG. IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLES OTHERWISE SPECIFIED:
   a. 63✓ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. FINISH: BLACK ANODIZE (SULFURIC) PER MIL-A-8625, TYPE II BLACK (KPS-1005A.201)
6. IDENTIFY USING NASA DWG. NO., REVISION LETTER AND MANUFACTURER'S SYMBOL IN ACCORDANCE WITH ND 1002019.


1 5/8 - 32 UNS - 2A
MAJOR DIA. = 1.6238 - 1.6178
PITCH DIA. = 1.6035 - 1.5995
MINOR DIA. = 1.5855 MAX.
30°
.062 R.
CHAMFER 45 × .031
-A-
32
45°
1.200 DIA
1.500 DIA
1.100 DIA.
1.460 DIA.
◎ A .002 TIR
1.400 +.005 -.00 DIA.
CHAMFER 45° × .020
.031
.188
.468
.562
IDENT. MARK SEE NOTE 6
.046 SLOT TO DEPTH SHOWN


ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011793	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
ALUMINUM ALLOY 6061-T6
FED. SPEC. QQ-A-325
TEMPER - T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901270

DRAWN Bernstein DATE 4-18-63
CHECKED M Farrell
APPROVAL Thornton Means 6-11-63
APPROVAL E. Thomp 6-10-63
NASA APPROVAL Jack Barnard
MIT APPROVAL Perry K Bryant

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RETAINER, RING, LOCKING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011694
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

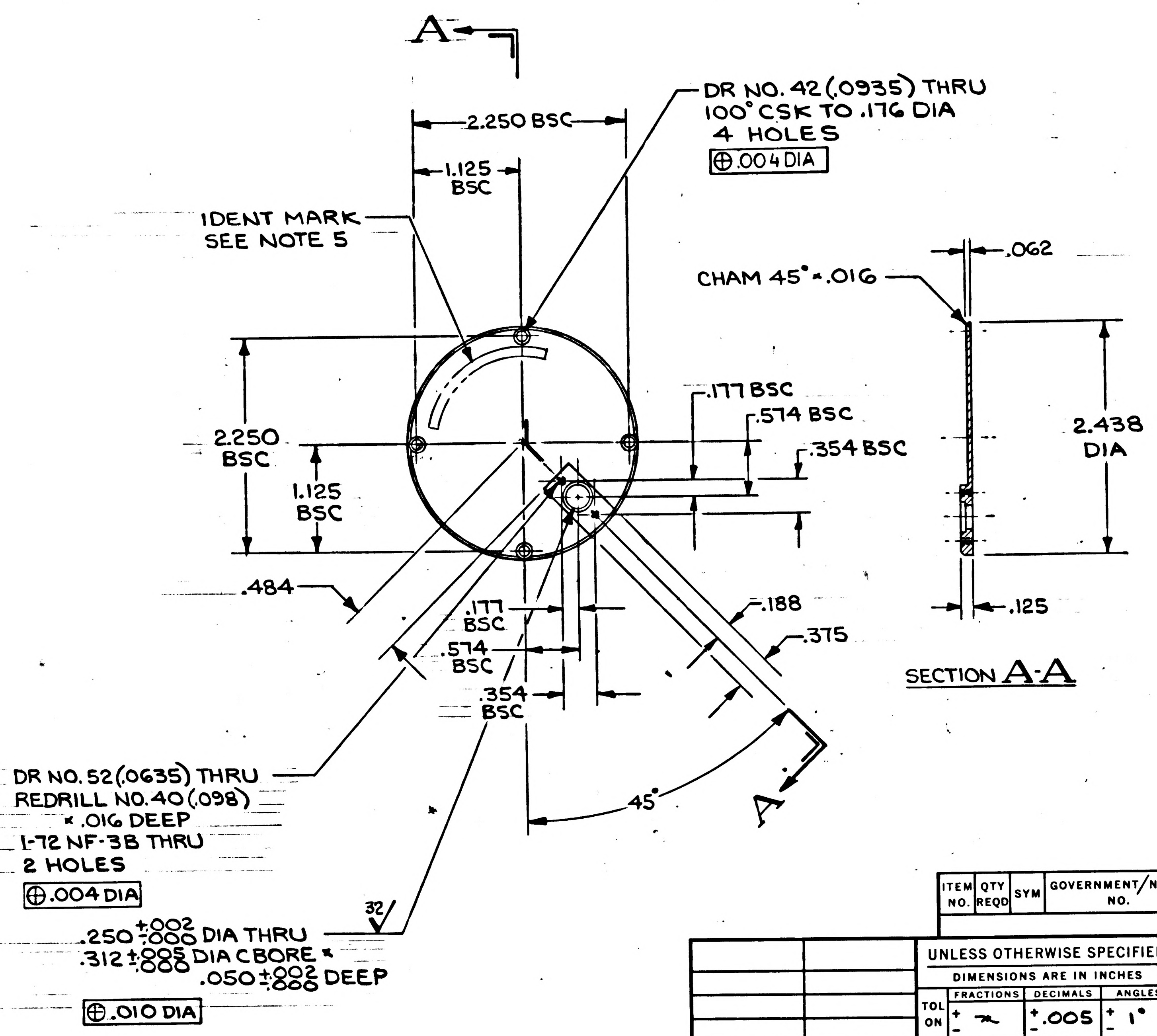
K+E E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011695

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORD WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63/ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORD WITH ND1002078.
4. REMOVE BURRS IN ACCORD WITH ND1002079.
5. IDENTIFY USING NASA DWG NO. REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORD WITH ND1002019.
6. HEAT TREAT (STABILIZE AND STRESS RELIEVE IN ACCORD WITH ND1002092.


A
A
2.250 BSC
1.125 BSC
IDENT MARK SEE NOTE 5
DR NO. 42 (.0935) THRU 100° CSK TO .176 DIA 4 HOLES
⊕ .004 DIA
2.250 BSC
1.125 BSC
.177 BSC
.574 BSC
.354 BSC
.484
.177 BSC
.574 BSC
.354 BSC
.188
.375
45°
DR NO. 52 (.0635) THRU REDRILL NO. 40 (.098) × .016 DEEP 1-72 NF-3B THRU 2 HOLES
⊕ .004 DIA
32
.250 +.002 -.000 DIA THRU
.312 +.005 -.000 DIA C BORE × .050 +.002 -.000 DEEP
⊕ .010 DIA
CHAM 45° × .016
.062
2.438 DIA
.125
SECTION A-A

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01138 DATE 2 May 63

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011294	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
BERYLLIUM
ND1002125
SEE NOTE 6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901280

DRAWN F. Schiller DATE 4-19-63
CHECKED [illegible] 5-2-63
APPROVAL [illegible] 5-2-63
APPROVAL E. Thomas 5-2-63
NASA APPROVAL W. J. [illegible] 5/2/63
MIT APPROVAL W Kupfer 2 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PLATE, RETAINER, STATOR (1 SPEED)

CODE IDENT NO.
SIZE C
NASA NUMBER 1011695
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011695

MASTER

E-184

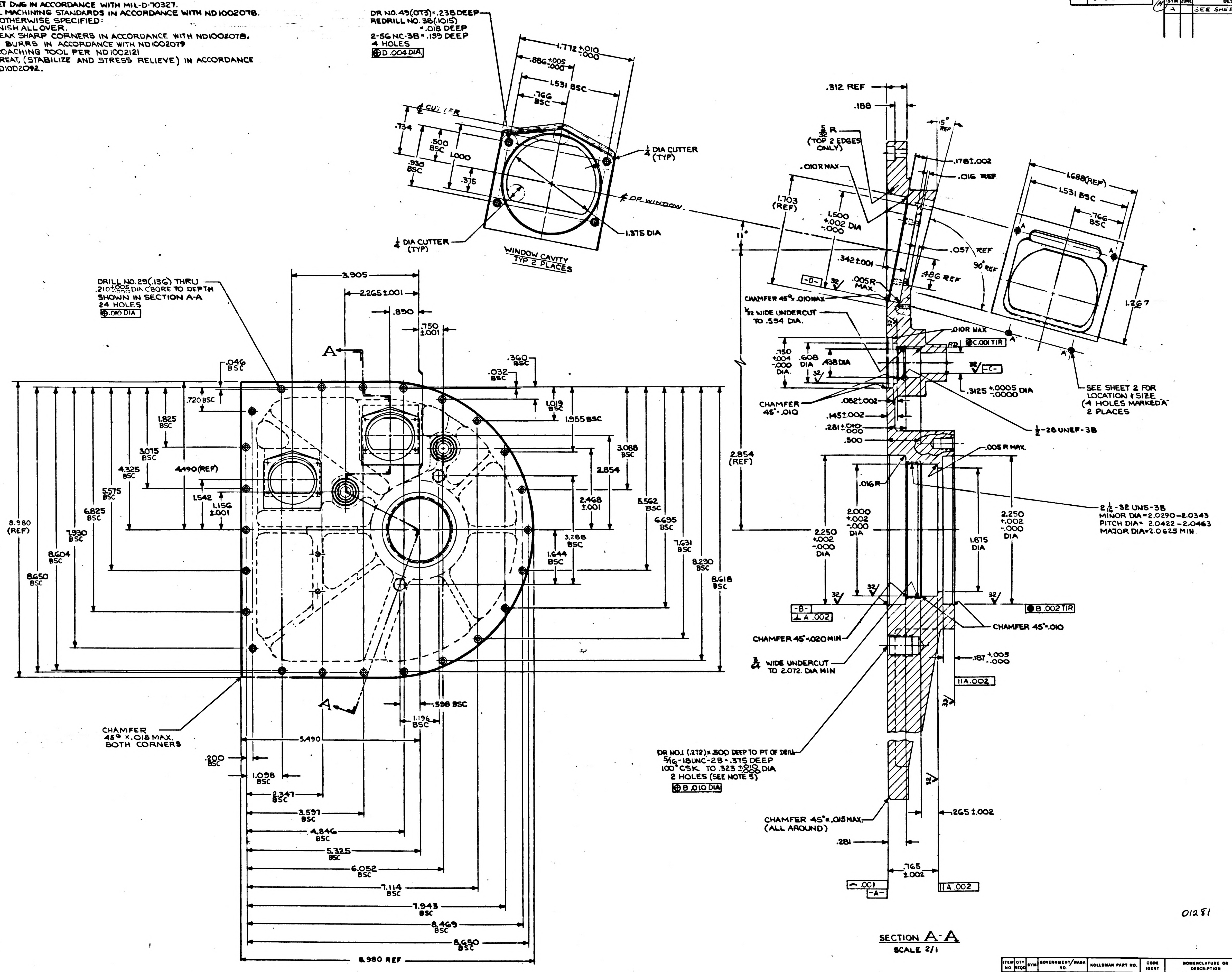
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011696 A

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		SEE SHEET 1	5-28-63	wK

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. USE BROACHING TOOL PER ND1002121
6. HEAT TREAT, (STABILIZE AND STRESS RELIEVE) IN ACCORDANCE WITH ND1002092.



DR NO. 49(.073) × .238 DEEP
REDRILL NO. 38(.1015) × .018 DEEP
2-56 NC-3B × .139 DEEP
4 HOLES
⊕ D .004 DIA
1.772 +.010 -.000
.886 +.005 -.000
1.531 BSC
.766 BSC
℄ CUTTER
.734
.500 BSC
1.000
.938 BSC
.375
1/4 DIA CUTTER (TYP)
℄ OF WINDOW
1.375 DIA
1/4 DIA CUTTER (TYP)
WINDOW CAVITY TYP 2 PLACES
DRILL NO. 29(.136) THRU
.210 +.005 -.000 DIA CBORE TO DEPTH SHOWN IN SECTION A-A
24 HOLES
⊕ .010 DIA
3.905
2.265 ±.001
.890
.750 ±.001
A
.046 BSC
.360 BSC
.032 BSC
.720 BSC
1.825 BSC
1.019 BSC
1.955 BSC
3.075 BSC
4.325 BSC
4.490 (REF)
3.088 BSC
2.854
5.575 BSC
1.542
1.156 ±.001
2.468 ±.001
5.562 BSC
6.825 BSC
8.980 (REF)
7.930 BSC
3.288 BSC
6.695 BSC
1.644 BSC
7.631 BSC
8.604 BSC
8.290 BSC
8.650 BSC
8.618 BSC
A
.598 BSC
1.196 BSC
CHAMFER 45° × .015 MAX. BOTH CORNERS
5.490
.200 BSC
1.098 BSC
2.347 BSC
3.597 BSC
4.846 BSC
5.325 BSC
6.052 BSC
7.114 BSC
7.943 BSC
8.469 BSC
8.650 BSC
8.980 REF
.312 REF
.188
5/32 R (TOP 2 EDGES ONLY)
15° REF
.178 ±.002
.016 REF
.010 R MAX
1.703 (REF)
1.500 +.002 -.000 DIA
11°
.057 REF
90° REF
.342 ±.001
.486 REF
-D-
32
.005 R MAX.
CHAMFER 45° × .010 MAX
1/32 WIDE UNDERCUT TO .554 DIA.
.010 R MAX
P.D.
◎ C .001 TIR
.750 +.004 -.000 DIA.
.608 DIA
.438 DIA
32
-C-
.3125 +.0005 -.0000 DIA
CHAMFER 45° × .010
.062 ±.002
.145 ±.002
.281 +.010 -.000
.500
1/2-28 UNEF-3B
1.688 (REF)
1.531 BSC
.766 BSC
A
1.267
SEE SHEET 2 FOR LOCATION & SIZE (4 HOLES MARKED "A" 2 PLACES
2.854 (REF)
.005 R MAX.
.016 R
2 1/16-32 UNS-3B
MINOR DIA = 2.0290-2.0343
PITCH DIA = 2.0422-2.0463
MAJOR DIA = 2.0625 MIN
2.250 +.002 -.000 DIA
2.000 +.002 -.000 DIA
1.875 DIA
2.250 +.002 -.000 DIA
-B-
⊥ A .002
● B .002 TIR
CHAMFER 45° × .020 MIN
CHAMFER 45° × .010
3/64 WIDE UNDERCUT TO 2.072 DIA MIN
.187 +.005 -.000
∥ A .002
DR NO.1 (.272) × .500 DEEP TO PT OF DRILL
5/16-18UNC-2B × .375 DEEP
100° CSK TO .323 +.010 -.000 DIA
2 HOLES (SEE NOTE 5)
⊕ B .010 DIA
.265 ±.002
CHAMFER 45° × .015 MAX. (ALL AROUND)
.281
.765 ±.002
⌒ .001
-A-
∥ A .002
SECTION A-A
SCALE 2/1

01281 17 Aug 63

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UN WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011717	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ± .005; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL: BERYLLIUM ND1002125 SEE NOTE 6
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900840
DRAWN J. Ravioli DATE 4-22-63
CHECKED T. Sullivan 5-17-63
APPROVAL 5-29-63
APPROVAL
NASA APPROVAL 5/17/63
MIT APPROVAL W Kupfer 17 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE: PANEL, TELESCOPE

CODE IDENT NO.
SIZE: E
NASA NUMBER: 1011696
SCALE 1/1
WEIGHT
CALC ACTUAL
SHEET 1 OF 2

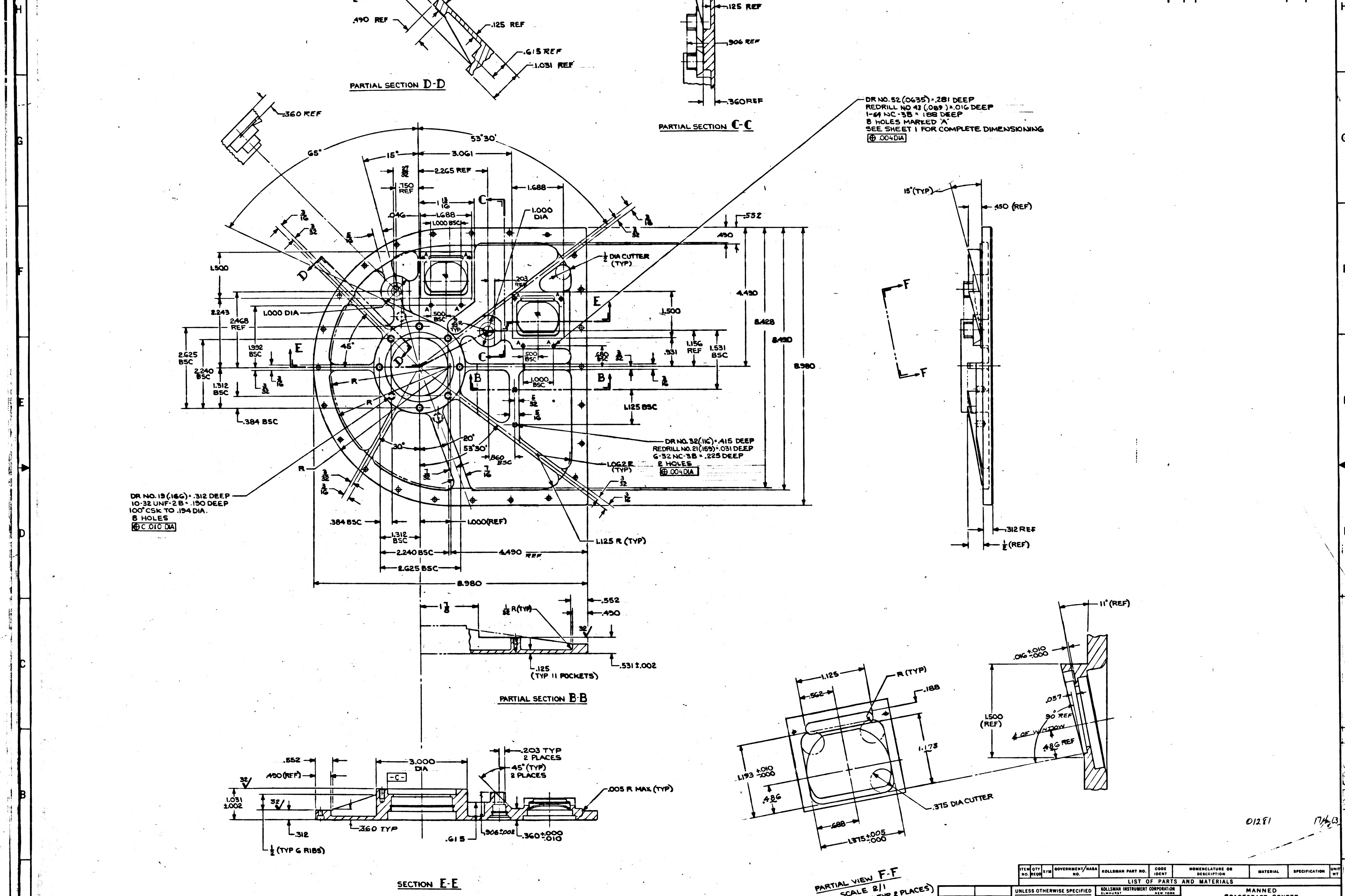
MASTER

A	1011696

REVISIONS

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED & UPGRADED FROM CLASS 'B' TO CLASS A SEE TDR NO. 01922	7/3/63	WK

NOTES: (SEE SHEET 1 OF 2)



PARTIAL SECTION D-D
.312 REF
.360 REF
½ REF
.490 REF
.125 REF
.615 REF
1.031 REF
PARTIAL SECTION C-C
.125 REF
.906 REF
.360 REF
DR NO. 52 (.0635) × .281 DEEP
REDRILL NO 43 (.089) × .016 DEEP
1-64 NC-3B × .188 DEEP
8 HOLES MARKED 'A'
SEE SHEET 1 FOR COMPLETE DIMENSIONING
⊕ .004 DIA
.360 REF
65°
53°30'
15°
3.061
2.265 REF
.150 REF
1.688
1.000 DIA
1 13/16
1.688
1.000 BSC
.046
½ DIA CUTTER (TYP)
.203 REF
.552
.490
4.490
8.428
8.490
8.980
1.500
2.243
2.468 REF
1.000 DIA
1.932 BSC
2.625 BSC
2.240 BSC
1.312 BSC
.500 BSC
45°
.500 BSC
1.000 BSC
.680 BSC
.931
1.156 REF
1.531 BSC
1.125 BSC
.384 BSC
R
DR NO. 32 (.116) × .415 DEEP
REDRILL NO. 21 (.159) × .031 DEEP
6-32 NC-3B × .225 DEEP
2 HOLES
⊕ .004 DIA
1.062 R (TYP)
20°
53°30'
30°
.860 BSC
DR NO. 19 (.166) × .312 DEEP
10-32 UNF-2B × .190 DEEP
100° CSK TO .194 DIA.
8 HOLES
⊕ C .010 DIA
.384 BSC
1.000 (REF)
1.312 BSC
2.240 BSC
4.490 REF
2.625 BSC
8.980
1.125 R (TYP)
15° (TYP)
.450 (REF)
.312 REF
½ (REF)
1 7/8
1/32 R (TYP)
.552
.490
.125 (TYP 11 POCKETS)
.531 ±.002
PARTIAL SECTION B-B
11° (REF)
.016 +.010 −.000
1.500 (REF)
.057
.90 REF
℄ OF WINDOW
.486 REF
1.125
.562
R (TYP)
.188
1.175
1.193 +.010 −.000
.486
.688
1.375 ±.005 −.000
.375 DIA CUTTER
PARTIAL VIEW F-F
SCALE 2/1
(WINDOW-TYP 2 PLACES)
.552
.490 (REF)
3.000 DIA
-C-
.203 TYP 2 PLACES
45° (TYP) 2 PLACES
.005 R MAX (TYP)
1.031 ±.002
.312
½ (TYP 6 RIBS)
.360 TYP
.615
.906 ±.002
.360 +.000 −.010
SECTION E-E

01281 17 May 63

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011717	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ± .005; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL: SEE SHEET 1
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900840
DRAWN J. S. Colon DATE 4-30-63
CHECKED T. Sullivan 5-17-63
APPROVAL E. MacDonald 5-17-63
APPROVAL E. Oberg 5-17-63
NASA APPROVAL 5/1/63
MIT APPROVAL W. Kupfer 17 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE: PANEL, TELESCOPE

CODE IDENT NO. | SIZE E | NASA NUMBER 1011696
SCALE 1/1 | WEIGHT | CALC ACTUAL | SHEET 2 OF 2

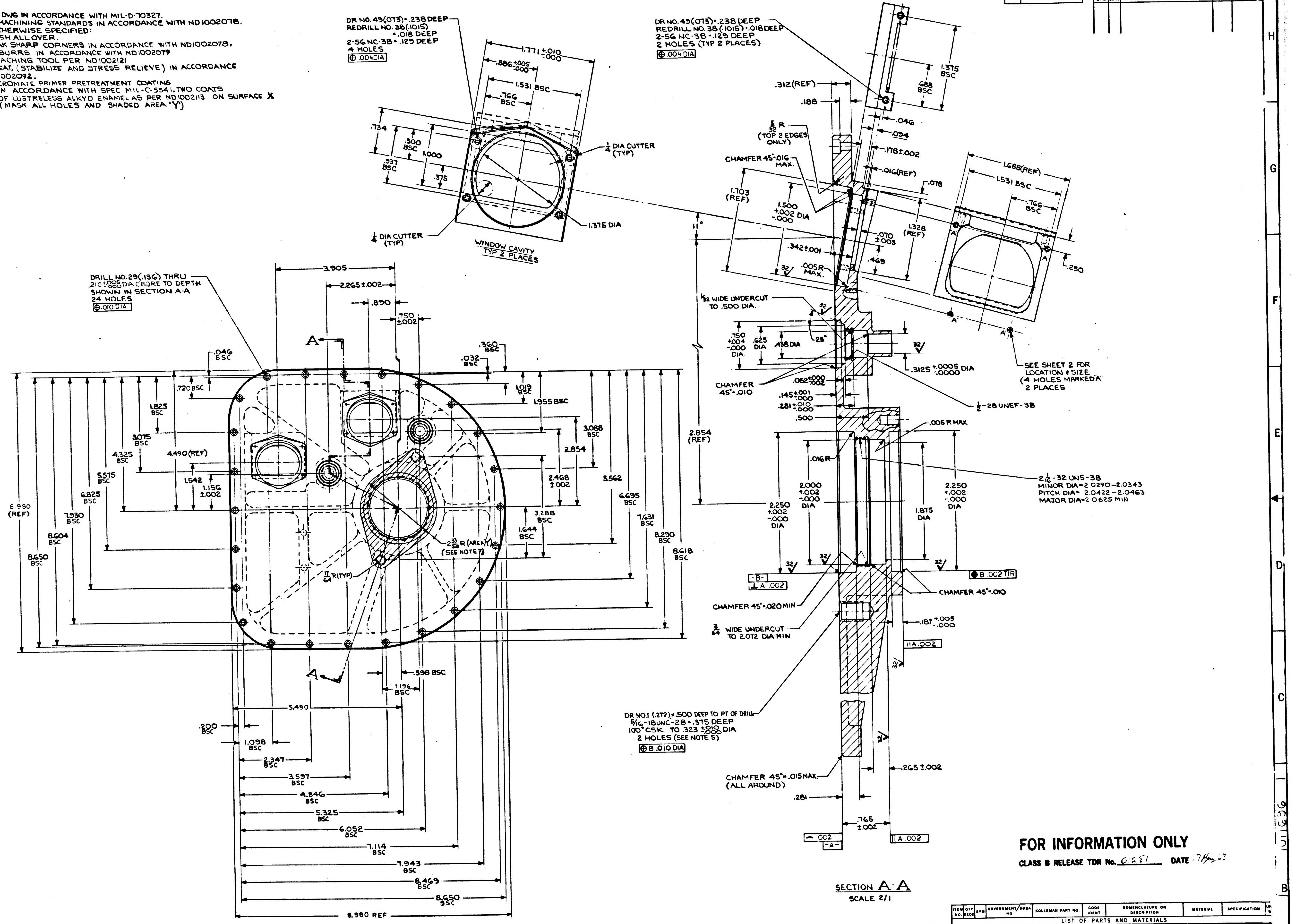
MASTER

INCHES
PHOTOGRAPHIC SCALE ONLY

9691101

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES
1. INTI PRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GE RAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UN ESS OTHERWISE SPECIFIED:
   a. 32/ FINISH ALL OVER.
   b. √ BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. F OVE BURRS IN ACCORDANCE WITH ND1002079
5. E BROACHING TOOL PER ND1002121
6. AT TREAT, (STABILIZE AND STRESS RELIEVE) IN ACCORDANCE TH ND1002092.
7. ISH: CROMATE PRIMER PRETREATMENT COATING IN ACCORDANCE WITH SPEC MIL-C-5541, TWO COATS OF LUSTRELESS ALKYD ENAMEL AS PER ND1002113 ON SURFACE X (MASK ALL HOLES AND SHADED AREA "Y")


DR NO.43(.073) × .238 DEEP
REDRILL NO.38(.1015) × .018 DEEP
2-56 NC-3B × .125 DEEP
4 HOLES
⊕ .004 DIA
1.771 ±.010 -.000
.886 +.005 -.000
1.531 BSC
.766 BSC
.734
.500 BSC
1.000
.937 BSC
.375
1/4 DIA CUTTER (TYP)
1.375 DIA
WINDOW CAVITY TYP 2 PLACES
DR NO.43(.073) × .238 DEEP
REDRILL NO.38(.1015) × .018 DEEP
2-56 NC-3B × .125 DEEP
2 HOLES (TYP 2 PLACES)
⊕ .004 DIA
.312(REF)
.188
1.375 BSC
.688 BSC
.046
.094
.118±.002
5/32 R (TOP 2 EDGES ONLY)
CHAMFER 45° × .016 MAX.
.016(REF)
.078
1.703 (REF)
1.500 +.002 -.000 DIA
11°
1.328 (REF)
.070 ±.003
.342±.001
.469
.005 R MAX.
1.688(REF)
1.531 BSC
.766 BSC
.250
1/32 WIDE UNDERCUT TO .500 DIA.
25°
.750 +.004 -.000 DIA
.625 DIA
.438 DIA
.3125 +.0005 -.0000 DIA
SEE SHEET 2 FOR LOCATION & SIZE (4 HOLES MARKED A' 2 PLACES)
CHAMFER 45° × .010
.052 +.002 -.000
.145 ±.001 -.000
.281 ±.010 -.000
.500
1/2-28 UNEF-3B
.005 R MAX.
2.854 (REF)
.016R
2 1/16-32 UNS-3B
MINOR DIA = 2.0290-2.0343
PITCH DIA = 2.0422-2.0463
MAJOR DIA = 2.0625 MIN
2.000 +.002 -.000 DIA
2.250 +.002 -.000 DIA
1.875 DIA
2.250 +.002 -.000 DIA
-B-
⊥ A .002
● B .002 TIR
CHAMFER 45° × .020 MIN
CHAMFER 45° × .010
3/64 WIDE UNDERCUT TO 2.072 DIA MIN
.187 +.005 -.000
// A .002
DR NO.1 (.272) × .500 DEEP TO PT OF DRILL
5/16-18UNC-2B × .375 DEEP
100° CSK TO .323 +.010 -.000 DIA
2 HOLES (SEE NOTE 5)
⊕ B .010 DIA
CHAMFER 45° × .015 MAX. (ALL AROUND)
.265±.002
.281
.765 ±.002
— .002 -A-
// A .002
DRILL NO.29(.136) THRU
.210 +.005 -.000 DIA CBORE TO DEPTH SHOWN IN SECTION A-A
24 HOLES
⊕ .010 DIA
3.905
2.265±.002
.850
.750 ±.002
A
.046 BSC
.360 BSC
.032 BSC
.720 BSC
1.019 BSC
1.955 BSC
1.825 BSC
3.075 BSC
4.325 BSC
4.490(REF)
5.575 BSC
1.542
1.156 ±.002
6.825 BSC
7.930 BSC
8.604 BSC
8.650 BSC
8.980 (REF)
3.088 BSC
2.854
2.468 ±.002
5.562
3.288 BSC
1.644 BSC
6.695 BSC
7.631 BSC
8.290 BSC
8.618 BSC
2 33/64 R (AREA Y) (SEE NOTE 7)
17/64 R (TYP)
A
.598 BSC
1.196 BSC
5.490
.200 BSC
1.098 BSC
2.347 BSC
3.597 BSC
4.846 BSC
5.325 BSC
6.052 BSC
7.114 BSC
7.943 BSC
8.469 BSC
8.650 BSC
8.980 REF

SECTION A-A
SCALE 2/1

FOR INFORMATION ONLY
CLASS B RELEASE TDR No. 01281 DATE 17 May 63

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011717	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ± .005; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL
BERYLLIUM
ND1002125
SEE NOTE 6
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900840
DRAWN J. R. Calo DATE 4-22-63
CHECKED T. Sullivan 5-17-63
APPROVAL
APPROVAL
NASA APPROVAL 5/17/63
MIT APPROVAL 17 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PANEL, TELESCOPE

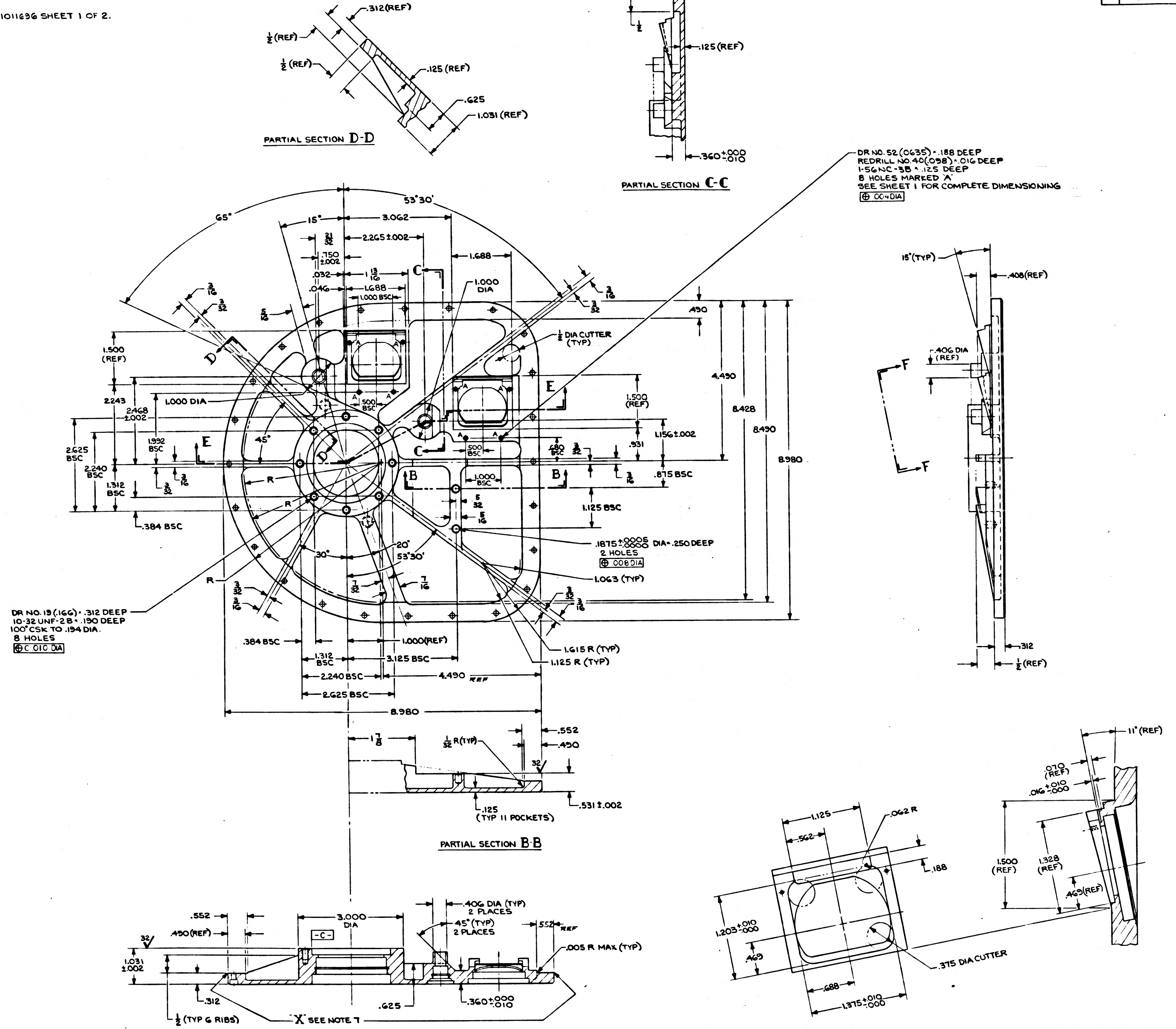
CODE IDENT NO.
SIZE E
NASA NUMBER 1011696
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTES·
SEE NASA DWG NO. 1011696 SHEET 1 OF 2.

	1011696

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL



.312(REF)
½(REF)
½(REF)
.125(REF)
.625
1.031(REF)
½
.125(REF)
.360+.000 -.010
DR NO. 52 (.0635) × .188 DEEP
REDRILL NO. 40 (.098) × .016 DEEP
1-56NC-3B × .125 DEEP
8 HOLES MARKED 'A'
SEE SHEET 1 FOR COMPLETE DIMENSIONING
⊕ .004 DIA
65°
53°30'
15°
3.062
21/32
2.265±.002
.750 ±.002
1.688
.032
1 13/16
.046
1.688
1.000 BSC
C
C
1.000 DIA
3/16
3/32
5/16
D
D
½ DIA CUTTER (TYP)
.490
4.490
8.428
8.490
8.980
1.500 (REF)
2.243
2.468 ±.002
1.000 DIA
1.992 BSC
2.625 BSC
2.240 BSC
1.312 BSC
.384 BSC
E
E
45°
.500 BSC
.500 BSC
1.500 (REF)
1.156±.002
.931
.680 BSC
.875 BSC
B
B
1.000 BSC
5/32
5/16
1.125 BSC
.1875+.0005 -.0000 DIA × .250 DEEP
2 HOLES
⊕ .008 DIA
1.063 (TYP)
R
R
R
30°
20°
53°30'
7/32
7/16
A
DR NO. 19 (.166) × .312 DEEP
10-32 UNF-2B × .190 DEEP
100° CSK TO .194 DIA.
8 HOLES
⊕ C .010 DIA
.384 BSC
1.312 BSC
1.000(REF)
3.125 BSC
2.240 BSC
4.490 REF
2.625 BSC
8.980
1.615 R (TYP)
1.125 R (TYP)
15°(TYP)
.408(REF)
.406 DIA (REF)
F
F
.312
½(REF)
1 7/8
1/32 R(TYP)
.552
.490
32
.125 (TYP 11 POCKETS)
.531±.002
.552
.490(REF)
3.000 DIA
-C-
.406 DIA (TYP) 2 PLACES
45°(TYP) 2 PLACES
.552 REF
.005 R MAX (TYP)
32
1.031 ±.002
.312
½ (TYP 6 RIBS)
"X" SEE NOTE 7
.625
.360+.000 -.010
1.125
.562
.062 R
.188
1.203+.010 -.000
.469
.375 DIA CUTTER
.688
1.375+.010 -.000
11°(REF)
.070 (REF)
.016+.010 -.000
1.500 (REF)
1.328 (REF)
.469(REF)

PARTIAL SECTION D-D

PARTIAL SECTION C-C

PARTIAL SECTION B-B

SECTION E-E

PARTIAL VIEW F-F
SCALE 2/1
(WINDOW-TYP 2 PLACES)

FOR INFORMATION ONLY
CLASS B RELEASE TDR No. 0128 DATE 7/4/3

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011717	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ±.005; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL
SEE SHEET 1
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900840
DRAWN [illegible] DATE 4-28-63
CHECKED J. Sullivan 5-17-63
APPROVAL E. MacDonald 5-17-63
APPROVAL [illegible] 5-17-63
NASA APPROVAL [illegible] 5/14/63
MIT APPROVAL [illegible] 17 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PANEL, TELESCOPE

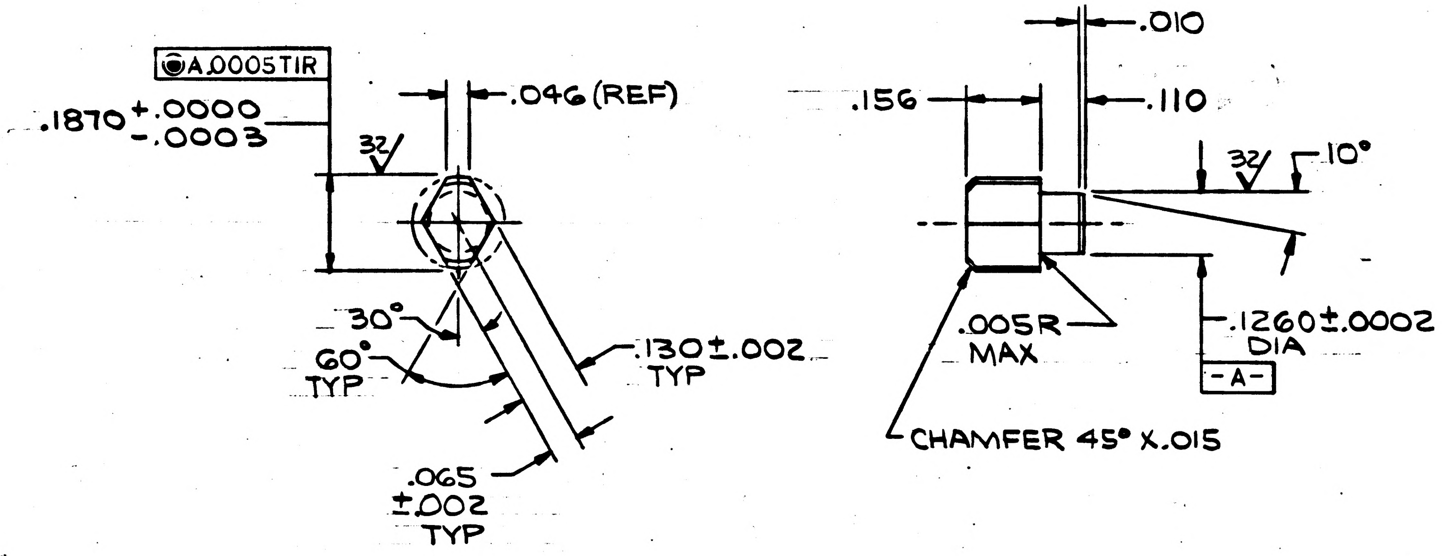
CODE IDENT NO.
SIZE E
NASA NUMBER 1011696
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 2 OF 2

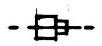
∀	8691101

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A2	D6 A3	1) ~~NOTE 6 WAS HEAT TREAT IN ACCORDANCE WITH ND1002087~~ 2) MATERIAL WAS AISI 440 TDRR NO 02034	7/17/63	

REVISIONS 01370

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:- 63√ FINISH ALL OVER
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. PASSIVATE IN ACCORDANCE WITH MIL-STD-171 (KPS-1005I.200)
6. HEAT TREAT (HARDEN AND TEMPER TO RC55-59) IN ACCORDANCE WITH 1002087. (A1)




ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011718	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL STAINLESS STEEL AISI 440C (A2)
FED SPEC QQ-S-763
CLASS 440C COND A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901300

DRAWN R.BRUNELLE DATE 4-22-63
CHECKED Paul Pappachristou
APPROVAL E.D. MacDonald 5-22-63
APPROVAL E. Thomp 5-22-63
NASA APPROVAL
MIT APPROVAL 24 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PIN, DIAMOND

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011698

SCALE 4/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

1011698-A

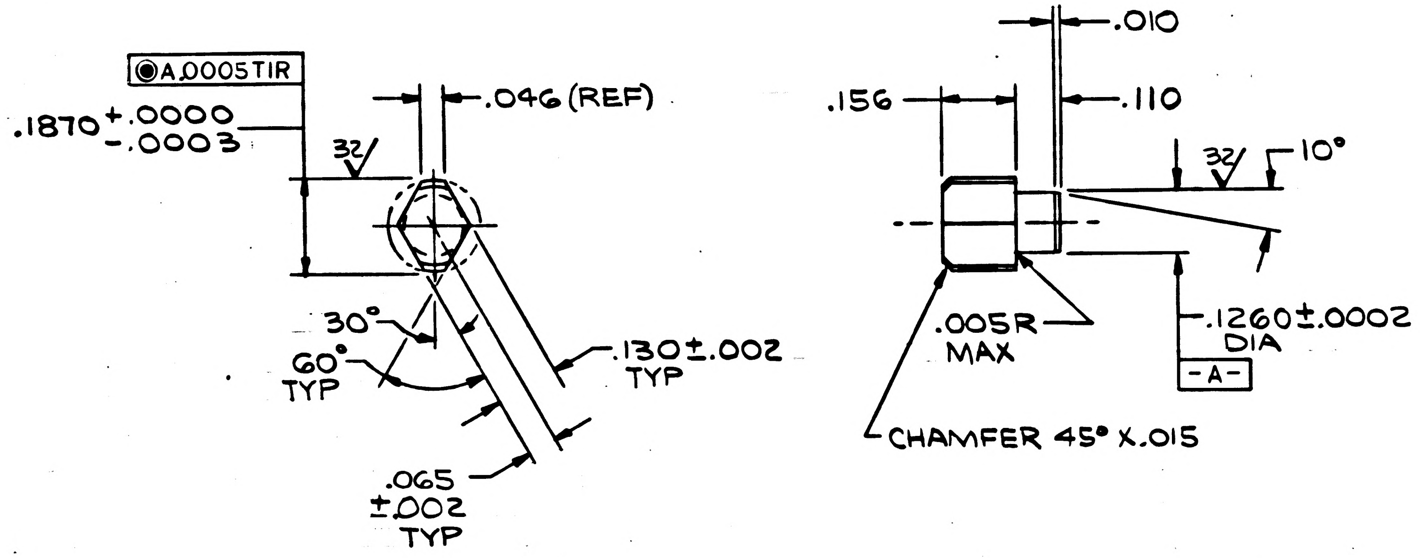
E-184

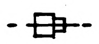
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

8691101

SYM	ZONE	REVISIONS DESCRIPTION	DATE	APPROVAL

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:-
   63/√ FINISH ALL OVER
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. PASSIVATE IN ACCORDANCE WITH MIL-STD-171 (KPS-1005I.200)
6. HEAT TREAT IN ACCORDANCE WITH ND 1002087





ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011718	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL STAINLESS STEEL AISI 440
FED SPEC QQ-S-763
CLASS 440 COND A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901300

DRAWN R.BRUNELLE DATE 4-22-63
CHECKED Paul Pappachristou
APPROVAL E.D. MacDonald 5-22-63
APPROVAL E. Thomp 5-22-63

NASA APPROVAL

MIT APPROVAL 24 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PIN, DIAMOND

CODE IDENT NO.
SIZE C
NASA NUMBER 1011698

SCALE 4/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011698

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

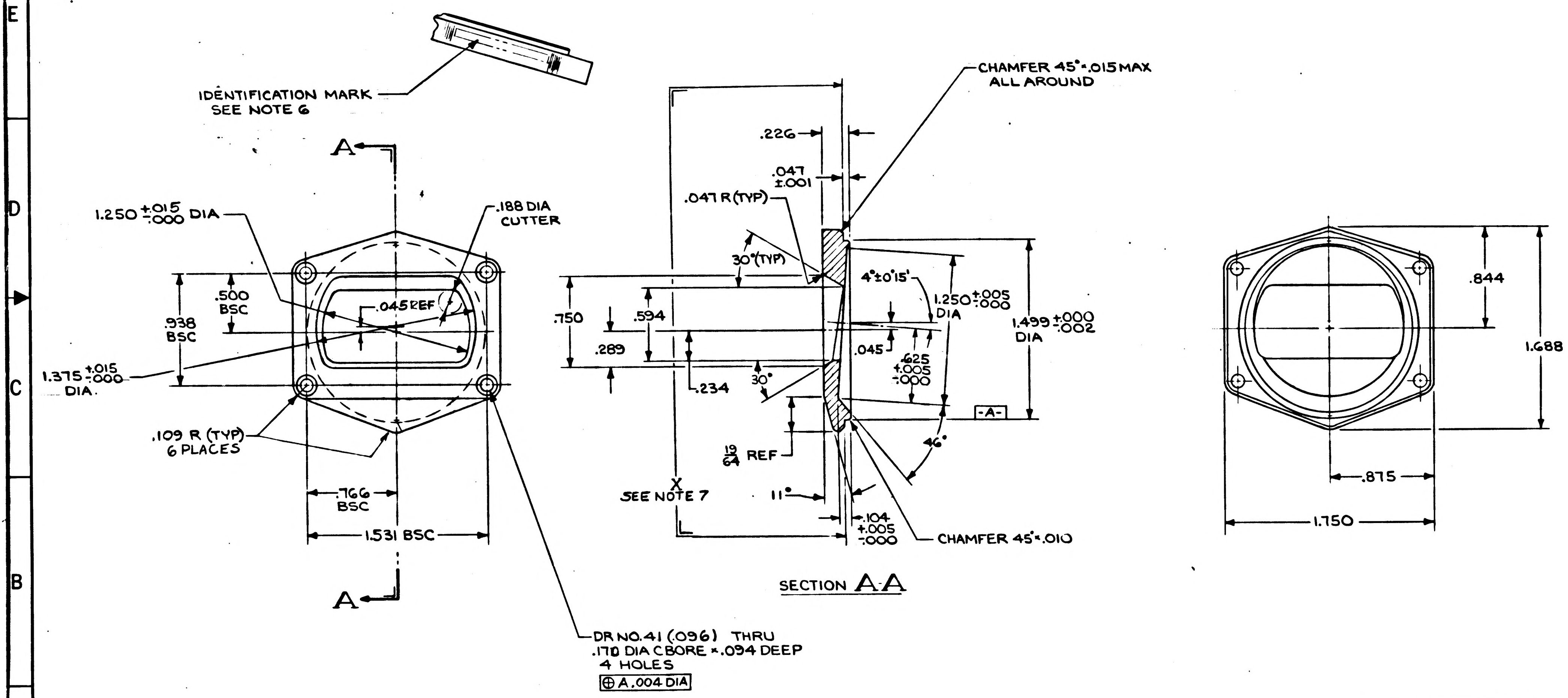
6691101

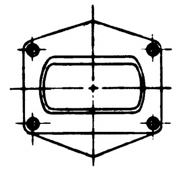
REVISIONS TDRR 01489

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORD WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63/ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORD WITH ND1002078.
4. REMOVE BURRS IN ACCORD WITH ND1002079.
5. FINISH: ANODIZE IN ACCORD WITH MIL-A-8625, TYPE II (KPS-1005A.200)
6. IDENTIFY USING NASA DWG NO. REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORD WITH ND1002019.
7. ZINC CHROMATE PRIMER PRETREATMENT COATING IN ACCORDANCE WITH SPEC. MIL-C-5541 TWO COATS OF LUSTRELESS ALKYD ENAMEL AS PER ND 1002113 ON SURFACE X (MASK .170 DIA C'BR HOLES)


IDENTIFICATION MARK SEE NOTE 6
A
A
1.250 +.015 -.000 DIA
.188 DIA CUTTER
.500 BSC
.045 REF
.938 BSC
1.375 +.015 -.000 DIA.
.109 R (TYP) 6 PLACES
.766 BSC
1.531 BSC
DR NO.41 (.096) THRU
.170 DIA C BORE × .094 DEEP
4 HOLES
⊕ A .004 DIA
CHAMFER 45° × .015 MAX ALL AROUND
.226
.047 ±.001
.047 R (TYP)
30° (TYP)
4° ±0°15'
1.250 +.005 -.000 DIA
1.499 +.000 -.002 DIA
.750
.594
.289
.045
.625 +.005 -.000
.234
30°
-A-
46°
19/64 REF
X
SEE NOTE 7
11°
.104 +.005 -.000
CHAMFER 45° × .010
SECTION A-A
.844
1.688
.875
1.750



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011784	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 6061-T6 FED. SPEC QQ-A-327 TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900850

DRAWN S. Aikden DATE 4-24-63
CHECKED T. SULLIVAN 5-28-63
APPROVAL Ed Macdonald 5-29-63
APPROVAL E. Therry 6-5-63
NASA APPROVAL W.J. Rhine 6-7-63
MIT APPROVAL W Kupfer 7/15

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BEZEL,
SCT

CODE IDENT NO.
SIZE D
NASA NUMBER 1011699
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

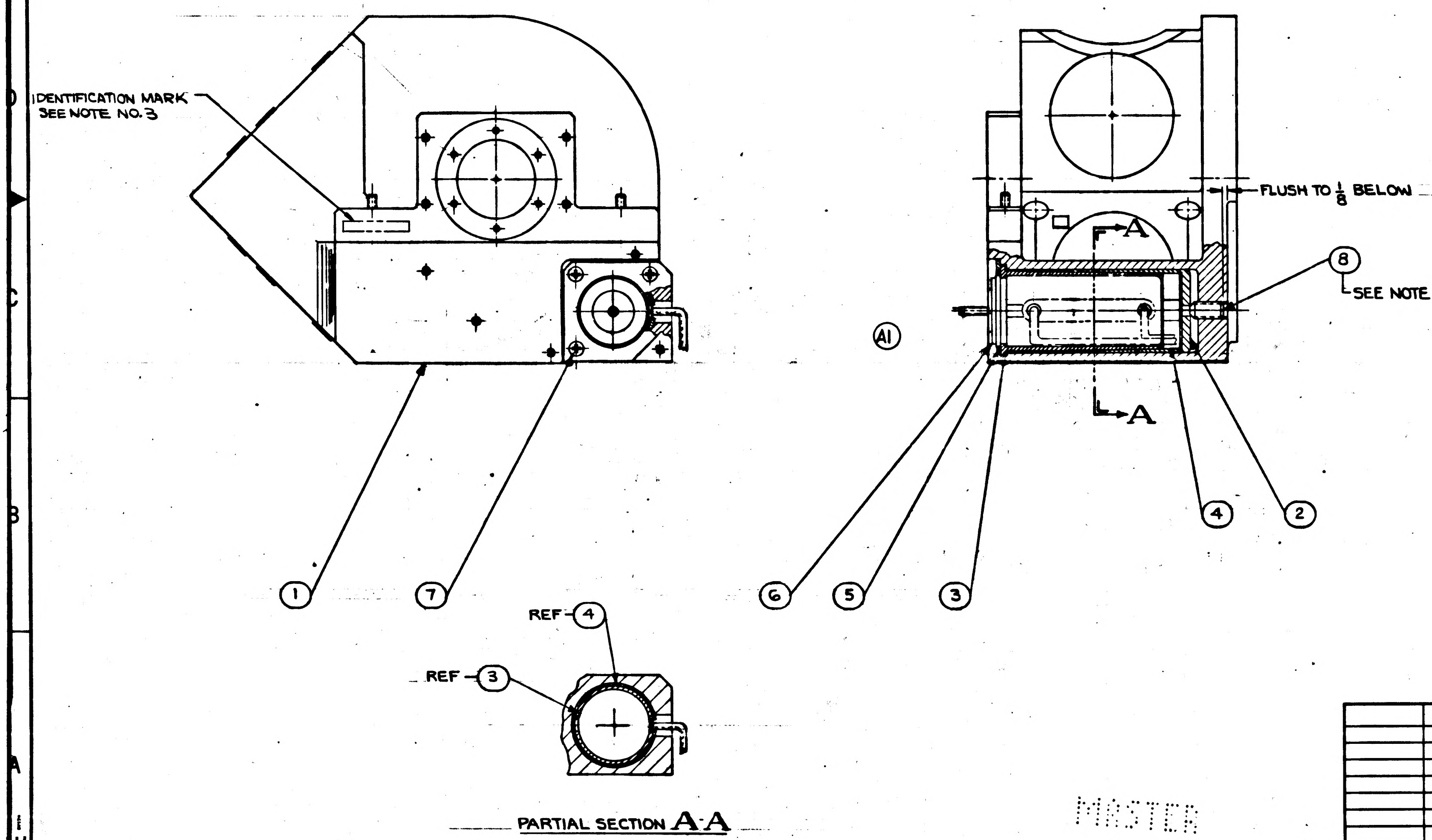
1011699

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ITEM NO. 8 (SCREW, SELF LOCKING, SET) TO BE SELECTED AT ASSEMBLY.
3. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019

A 1011700

REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR NO. 06655	3 MAR 64	WK



MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
8	AR	NAS	1081C4A8L THRU 12L			SCREW, SELF LOCKING, SET (SEE NOTE 2)			
7	3	NAS	1189C04P5L	74455155009		SCREW, SELF LOCKING, 100° FLAT HEAD			
6	1		1011892	85386900840		SERVO MOTOR & CONNECTOR, ASSY OF			
5	1		1011265	52386900520		PLATE, MOTOR MOUNTING			
4	1		1011263	57386900640		SLEEVE, OUTER HEATSINK			
3	1		1011262	57386900630		SLEEVE, INNER HEATSINK			
2	1		1011264	57386900650		SPACER, MOTOR			
1	1		1011254	85386900230		HOUSING, SEXTANT HEAD, ASSY OF			

LIST OF PARTS AND MATERIALS

1011701	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900730
DRAWN DATE 6-14-63
CHECKED
APPROVAL 8-15-63
APPROVAL 8-5-63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING & MOTOR
ASSEMBLY

CODE IDENT NO.
SIZE D
NASA NUMBER 1011700
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

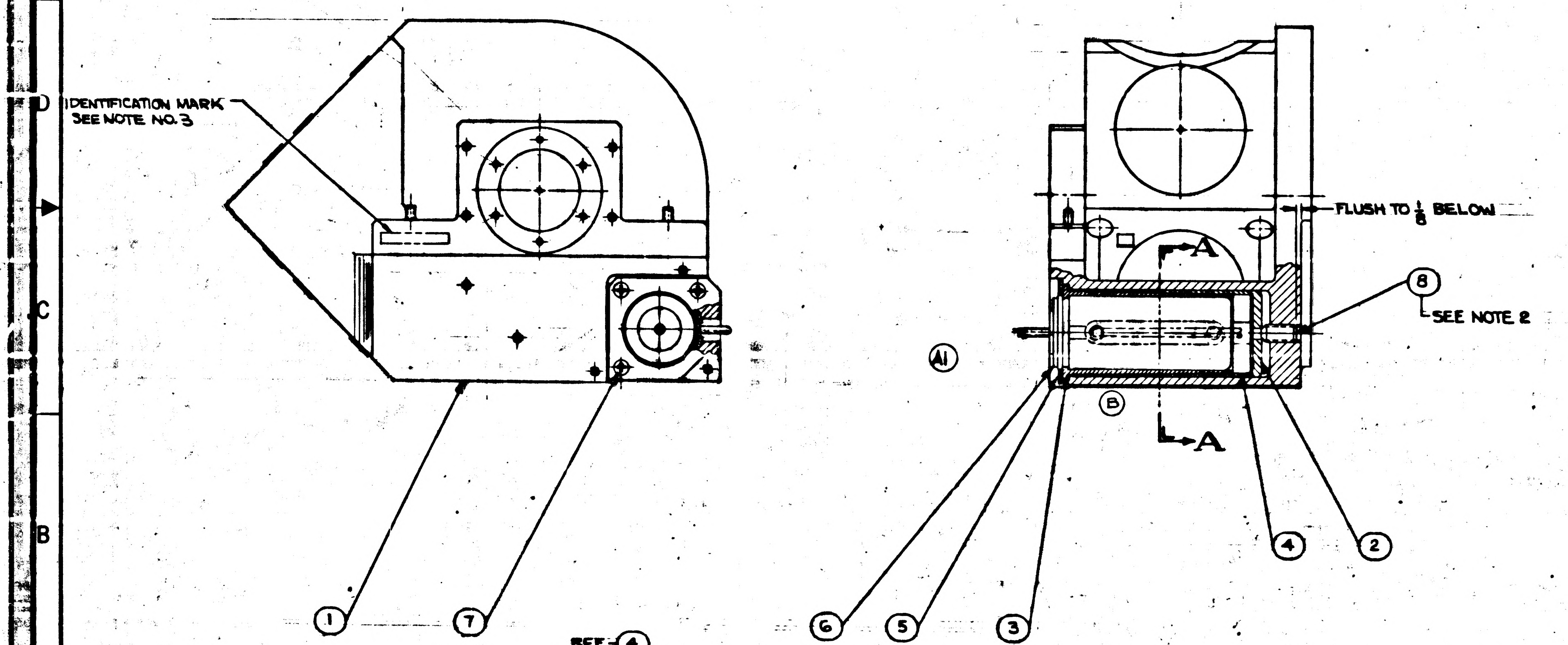
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

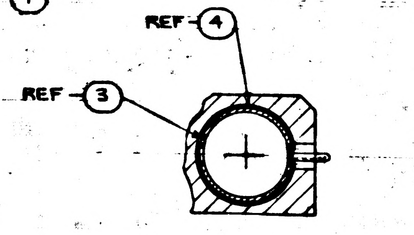
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ITEM NO. 8 (SCREW, SELF LOCKING, SET) TO BE SELECTED AT ASSEMBLY.
3. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019

1011700 B

REVISIONS 02623

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR NO. 06655	3 MAR 64	WK
B		REVISED PER TDRR NO 08608	5-13-64	[illegible]





PARTIAL SECTION A-A

MASTE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
8	AR	NAS	1081C4A8L THRU 12L			SCREW, SELF LOCKING, SET (SEE NOTE 2)			
7	3	NAS	1189C04P5L	74455155009		SCREW, SELF LOCKING, 100° FLAT HEAD			
6	1		1011892	85386900840		SERVO MOTOR & CONNECTOR, ASSY OF			
5	1		1011265	52386900520		PLATE, MOTOR MOUNTING			
4	1		1011263	57386900640		SLEEVE, OUTER HEATSINK			
3	1		1011262	57386900630		SLEEVE, INNER HEATSINK			
2	1		1011264	57386900650		SPACER, MOTOR			
1	1		1011254	85386900230		HOUSING, SEXTANT HEAD, ASSY OF			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011701	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900730
DRAWN [illegible] DATE 6-1963
CHECKED [illegible]
APPROVAL [illegible] 8-1-63
APPROVAL [illegible] 8-15-63
NASA APPROVAL W J Rhine 8-16-63
MIT APPROVAL [illegible] 8-16-63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

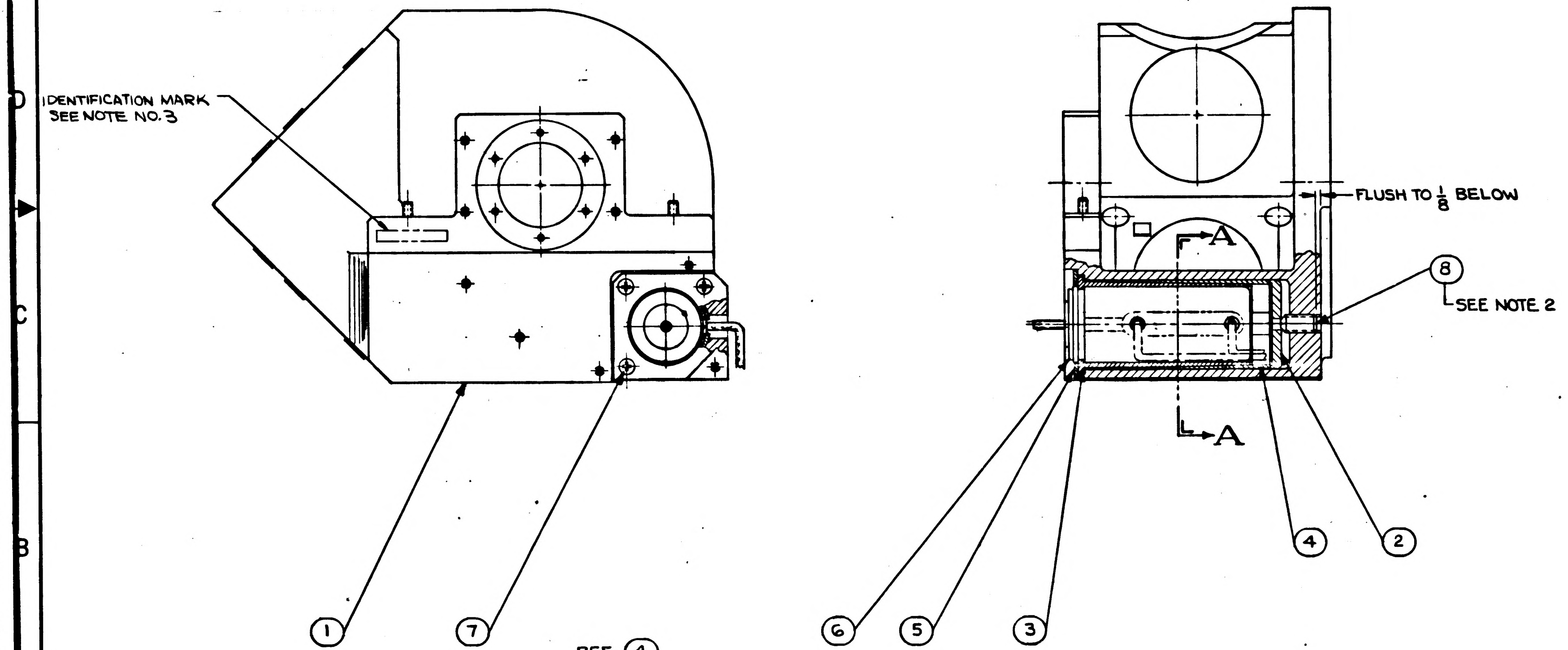
TITLE
HOUSING & MOTOR
ASSEMBLY

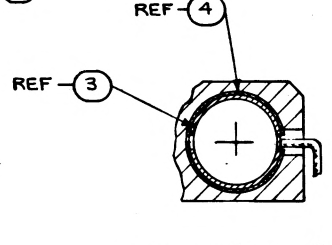
CODE IDENT NO.
SIZE D
NASA NUMBER 1011700
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

00L1101

REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ITEM NO. 8 (SCREW, SELF LOCKING, SET) TO BE SELECTED AT ASSEMBLY.
3. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019





PARTIAL SECTION A-A

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
8	AR	NAS	1081C4A8L THRU 12L			SCREW, SELF LOCKING, SET (SEE NOTE 2)			
7	3	NAS	1189C04P5L	74455155009		SCREW, SELF LOCKING, 100° FLAT HEAD			
6	1		1011892	85386900840		SERVO MOTOR & CONNECTOR, ASSY OF			
5	1		1011265	52386900520		PLATE, MOTOR MOUNTING			
4	1		1011263	57386900640		SLEEVE, OUTER HEATSINK			
3	1		1011262	57386900630		SLEEVE, INNER HEATSINK			
2	1		1011264	57386900650		SPACER, MOTOR			
1	1		1011254	85386900230		HOUSING, SEXTANT HEAD, ASSY OF			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011701	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900730
DRAWN DATE 6-14-63
CHECKED
APPROVAL 8-11-63
APPROVAL 8-5-63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING & MOTOR
ASSEMBLY

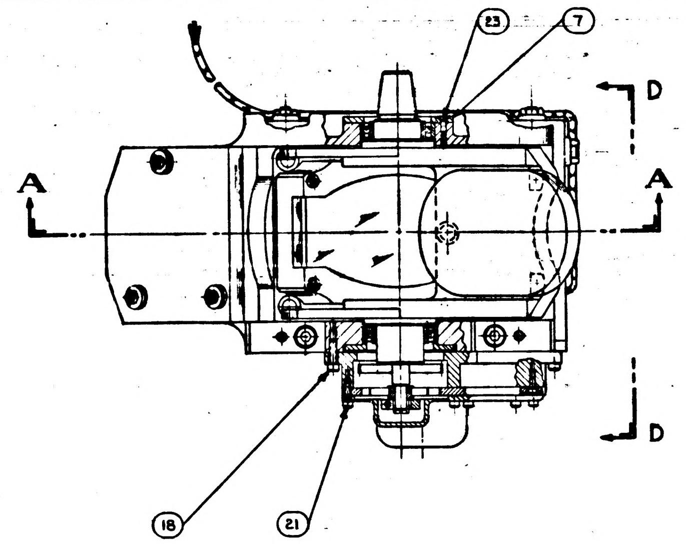
CODE IDENT NO.
SIZE D
NASA NUMBER 1011700
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

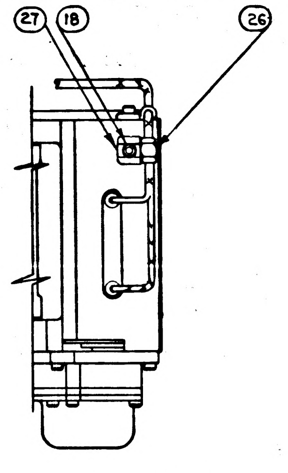
1011701 A

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A2		REVISED PER TDRR NO. 03357	9/23/63	9/26

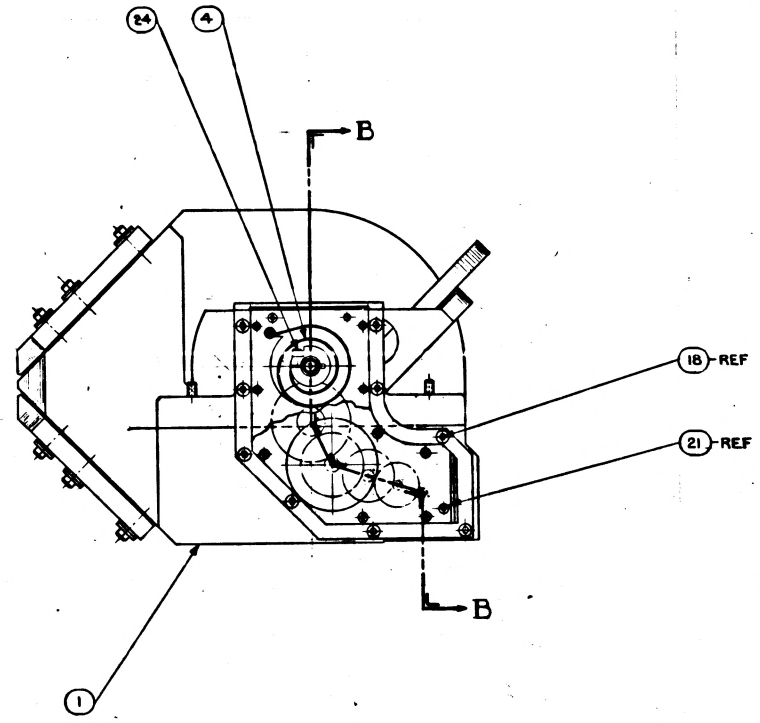
REVISIONS 02623

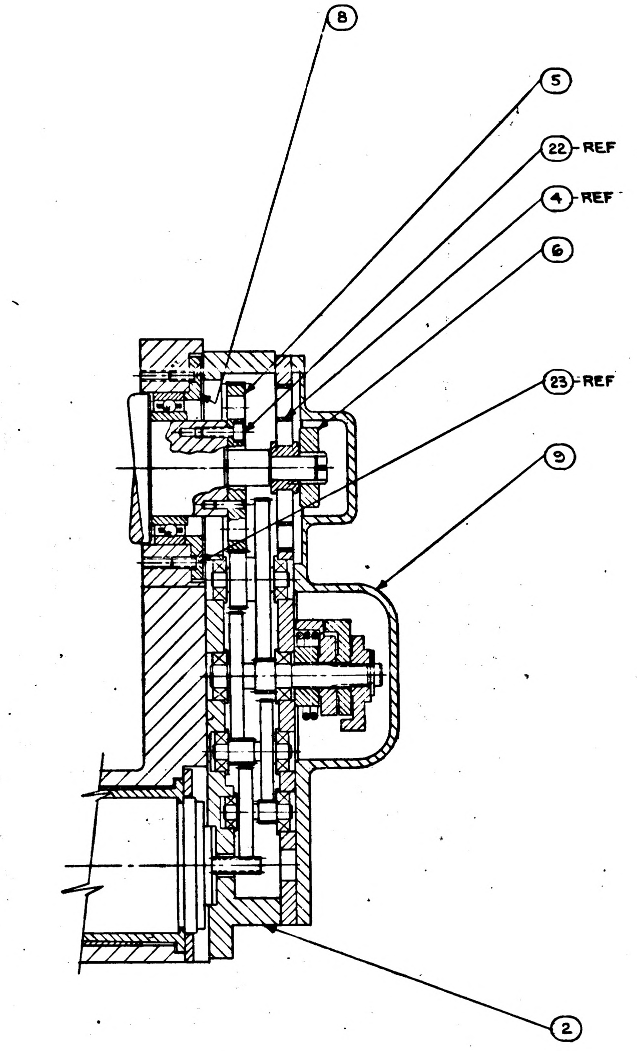
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLY AND TEST PROCEDURE IN ACCORDANCE WITH ATP 1011701.



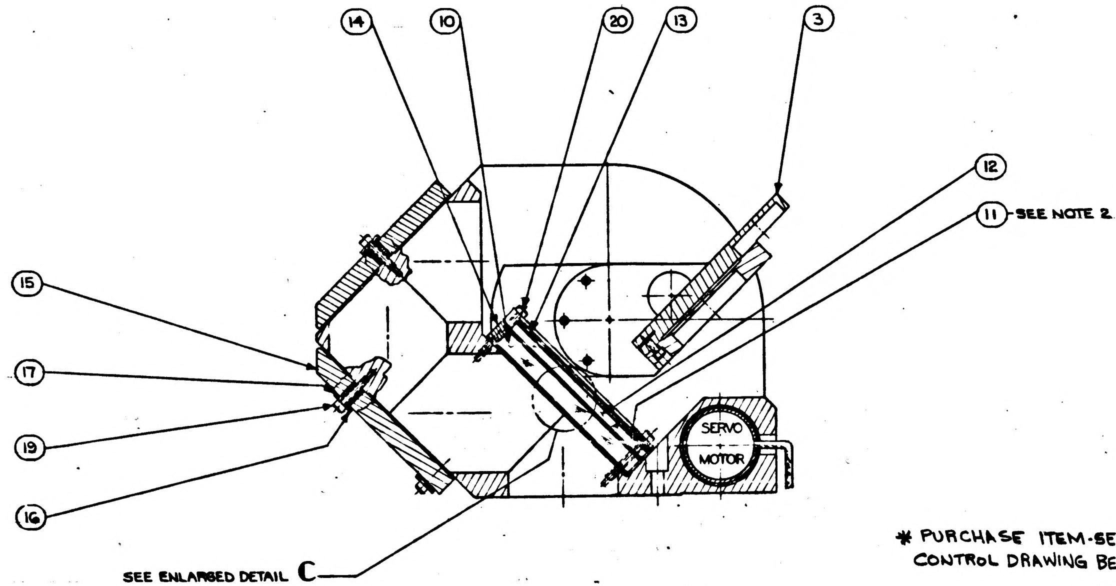


PARTIAL VIEW D-D

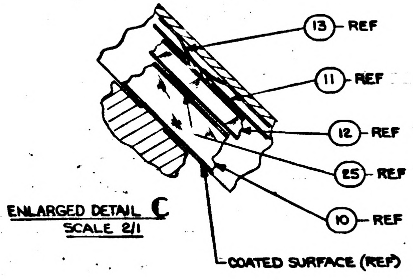




PARTIAL SECTION B-B
SCALE 2/1



SECTION A-A



ENLARGED DETAIL C
SCALE 2/1

* PURCHASE ITEM-SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
27	3		1000223			WASHER, CABLE CLAMP			
26	3		1000220			CLAMP, CABLE			
25	AR		1002128			INDIUM FOIL PROCUREMENT			
24	1	NAS	1352C02LL6	74455157007		SCREW, CAP, SOC HEAD, SELF LOCKING			
23	12	NAS	1189C02P4L	74455155002		SCREW, 100° FLAT HEAD, SELF LOCKING			
22	3	NAS	1352C02LL4	74455157006		SCREW, CAP, SOC HEAD, SELF LOCKING			
21	10	NAS	1352C03LL6	74455157010		SCREW, CAP, SOC HEAD, SELF LOCKING			
20	4	*	1011625-37			SCREW, CAP, SOC HEAD, SELF LOCKING			
19	6	NAS	1352C04LL10	74455157016		SCREW, CAP, SOC HEAD, SELF LOCKING			
18	12	NAS	1352C04LL6	74455157014		SCREW, CAP, SOC HEAD, SELF LOCKING			
17	6.		1011213	59386900010		WASHER, WAVE			
16	6		1011214	57386901000		BUSHING, MIRROR			
15	2		1011260	52386900500		MIRROR, SEXTANT HEAD			
14	1		1011598	52386900580		RETAINER, BEAM SPLITTER			
13	1		1011634	56386900370		SPRING, BEAM SPLITTER			
12	1		1011663	28386900490		FILTER, BEAM SPLITTER			
11	2		1011635	56386900380		SPACER, BEAM SPLITTER			
10	1		1011662	28386900480		BEAM SPLITTER			
9	1		1011595	52386900730		COVER, GEARBOX			
8	1		1011671	57386901190		RETAINER, DRIVE BEARING			
7	1		1011266	57386900690		RETAINER, BEARING			
6	1		1011355-4	57386901333		CLAMP, COLLAR			
5	1		1011910	85386900930		GEAR & PIN, ASSY OF			
4	1		1011940	85386901060		SPRING & COLLET, ASSY OF			
3	1		1011712	85386900680		INDEXING MIRROR & MOUNT ASSEMBLY			
2	1		1011706	85386900640		TRUNNION DRIVE GEARBOX ASSEMBLY			
1	1		1011700	85386900730		HOUSING & MOTOR ASSEMBLY			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011881	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCH.
TOL ON: FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL ~
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900760
DRAWN DATE 6-20-63
CHECKED
APPROVAL
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SEXTANT INDEX HEAD
ASSEMBLY

CODE IDENT NO. SIZE E NASA NUMBER 1011701
SCALE 1/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

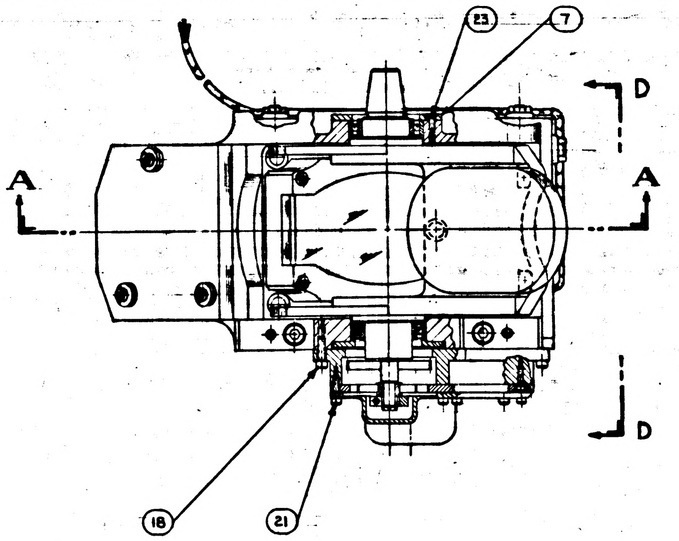
MASTER

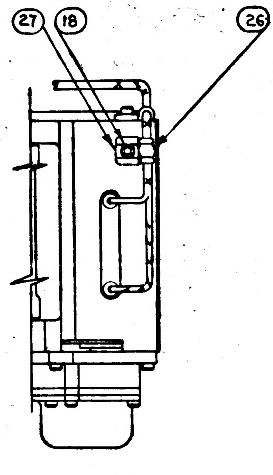
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLY AND TEST PROCEDURE IN ACCORDANCE WITH ATP 1011701.

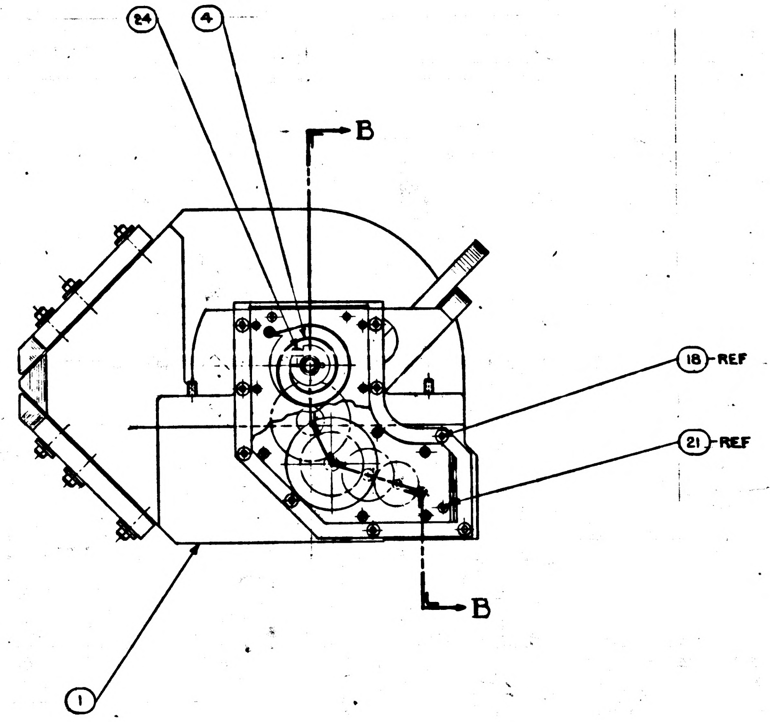
1011701 B

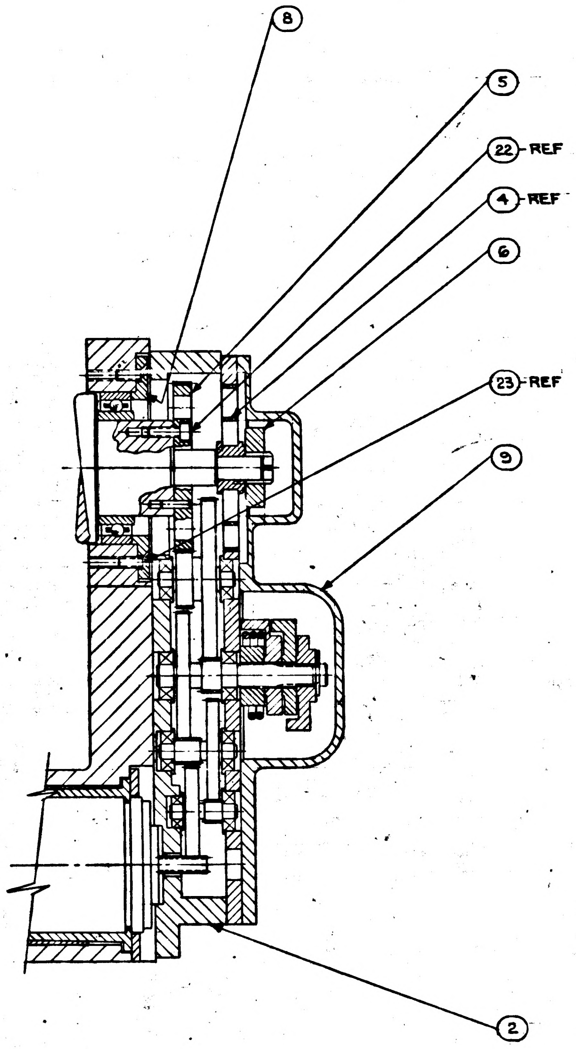
REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A2		REVISED PER TDRR NO. 03357	9/23/63	9/26
B		REVISED PER TDRR NO. 05735	14 JAN 64	



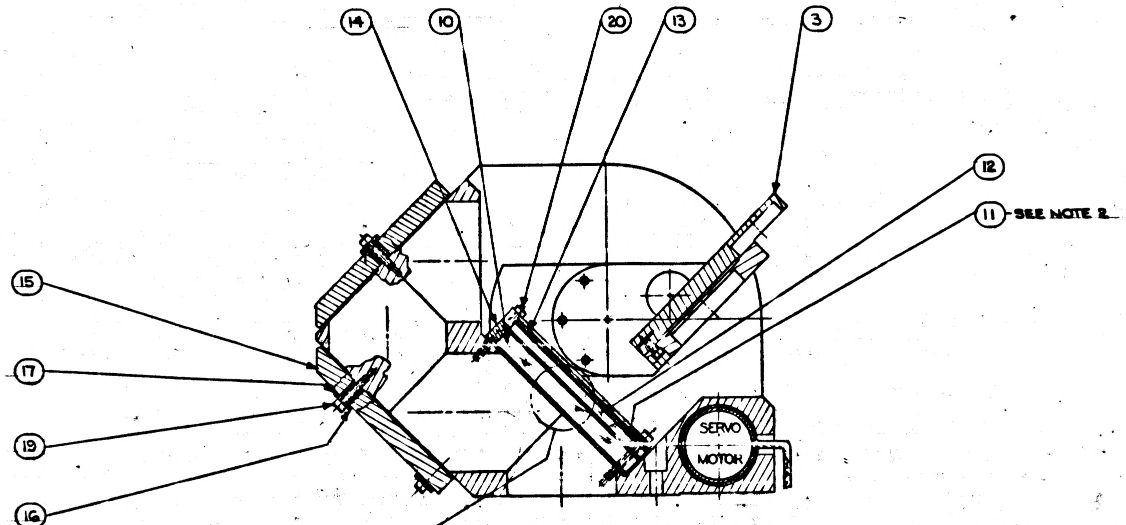


PARTIAL VIEW D-D

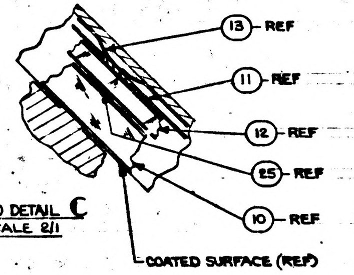




PARTIAL SECTION B-B
SCALE 2/1



SECTION A-A



ENLARGED DETAIL C
SCALE 2/1

MASTER

Ⓑ

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
27	3		1011918-1			WASHER, CABLE CLAMP			
26	3		1000220-3			CLAMP, CABLE			
25	AR		1002128			INDIUM FOIL PROCUREMENT			
24	1	NAS	1352C02LL6	74455157007		SCREW, CAP, SOC HEAD, SELF LOCKING			
23	12	NAS	1189C02P4L	74455155002		SCREW, 100° FLAT HEAD, SELF LOCKING			
22	3	NAS	1352C02LL4	74455157006		SCREW, CAP, SOC HEAD, SELF LOCKING			
21	10	NAS	1352C03LL6	74455157010		SCREW, CAP, SOC HEAD, SELF LOCKING			
20	4	*	1011625-37			SCREW, CAP, SOC HEAD, SELF LOCKING			
19	6	NAS	1352C04LL10	74455157016		SCREW, CAP, SOC HEAD, SELF LOCKING			
18	12	NAS	1352C04LL6	74455157014		SCREW, CAP, SOC HEAD, SELF LOCKING			
17	6		1011213	59386900010		WASHER, WAVE			
16	6		1011214	57386901000		BUSHING, MIRROR			
15	2		1011260	52386900500		MIRROR, SEXTANT HEAD			
14	1		1011598	52386900580		RETAINER, BEAM SPLITTER			
13	1		1011634	56386900370		SPRING, BEAM SPLITTER			
12	1		1011663	28386900490		FILTER, BEAM SPLITTER			
11	2		1011635	56386900380		SPACER, BEAM SPLITTER			
10	1		1011662	28386900480		BEAM SPLITTER			
9	1		1011595	52386900730		COVER, GEARBOX			
8	1		1011671	57386901190		RETAINER, DRIVE BEARING			
7	1		1011266	57386900690		RETAINER, BEARING			
6	1		1011355-4	57386901333		CLAMP, COLLAR			
5	1		1011910	85386900930		GEAR & PIN, ASSY OF			
4	1		1011940	85386901060		SPRING & COLLET, ASSY OF			
3	1		1011712	85386900680		INDEXING MIRROR & MOUNT ASSEMBLY			
2	1		1011706	85386900640		TRUNNION DRIVE GEARBOX ASSEMBLY			
1	1		1011700	85386900730		HOUSING & MOTOR ASSEMBLY			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM-SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

NEXT ASSY	USED ON
1011881	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900760

DRAWN DATE 6-20-63
CHECKED
APPROVAL
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

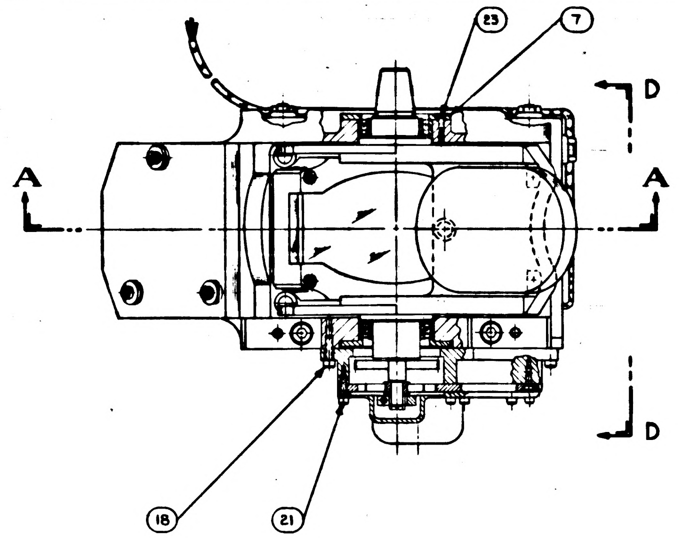
TITLE
SEXTANT INDEX HEAD ASSEMBLY

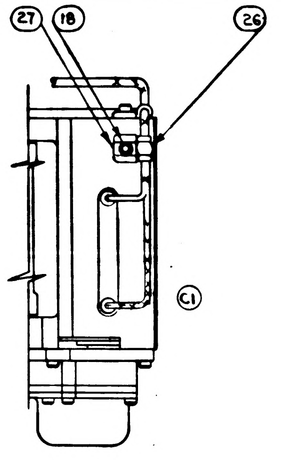
CODE IDENT NO.
SIZE E
NASA NUMBER 1011701
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 6

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLY AND TEST PROCEDURE IN ACCORDANCE WITH ATP 1011701.

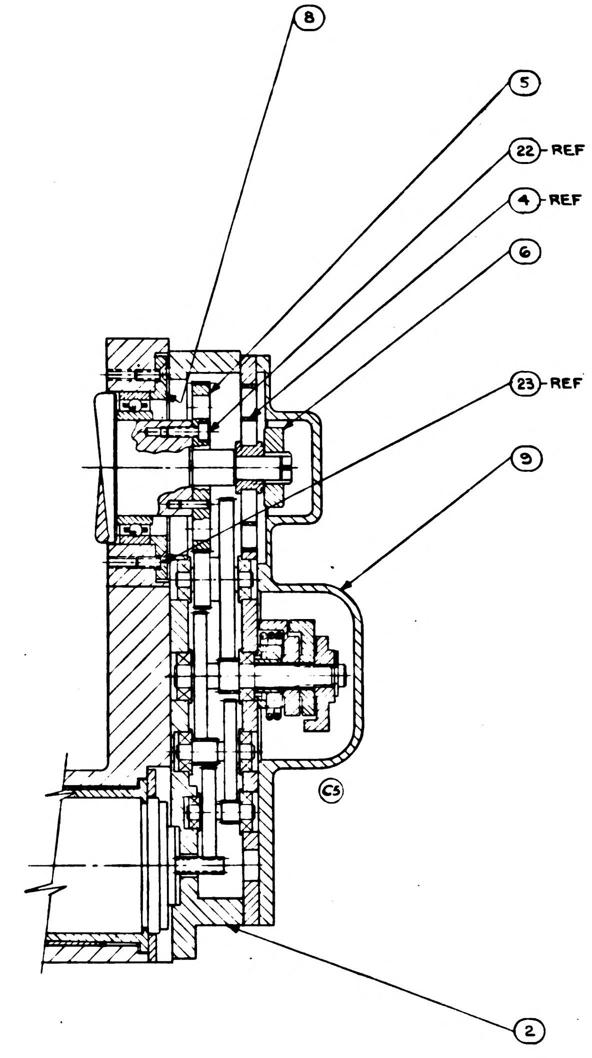
1011701 C

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS 02623				
A_2		REVISED PER TDRR NO. 03357	9/23/63	
B		REVISED PER TDRR NO. 05735	14 JAN 64	
C_5		REVISED PER TDRR NO. 07669	4-14-64	

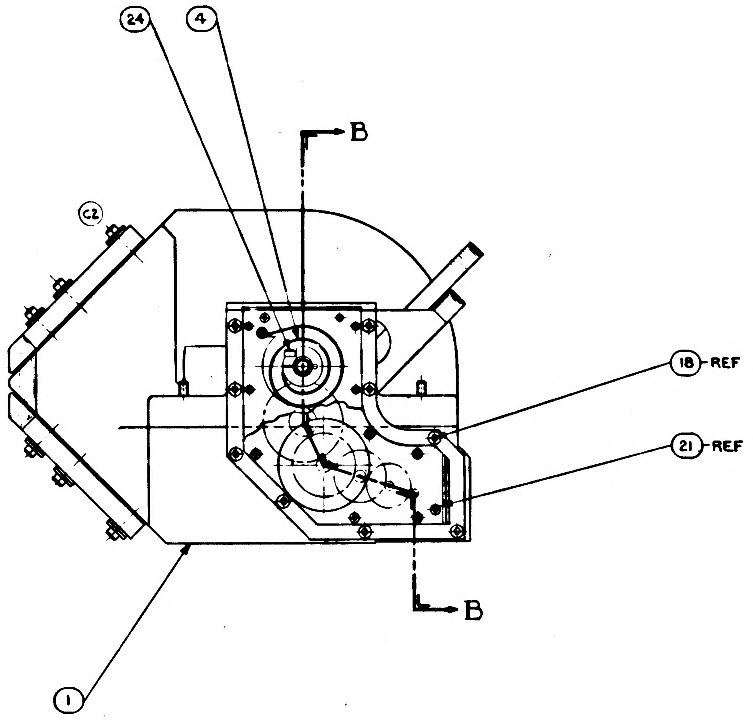


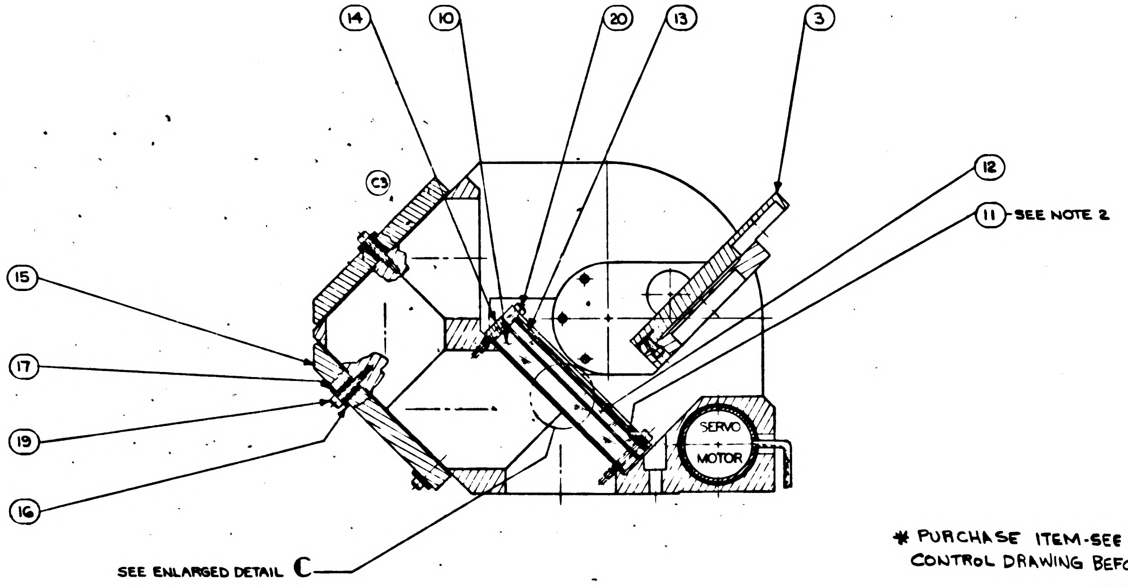


PARTIAL VIEW D-D

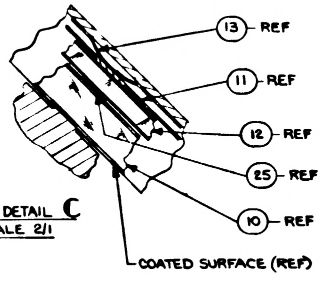


PARTIAL SECTION B-B
SCALE 2/1





SECTION A-A



ENLARGED DETAIL C
SCALE 2/1

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
27	3	*	1011918-1			WASHER, CABLE CLAMP			
26	3	*	1000220-3			CLAMP, CABLE			
25	AR	*	1002128			INDIUM FOIL PROCUREMENT			
24	1	NAS	1352C02LL6	74455157007		SCREW, CAP, SOC HEAD, SELF LOCKING			
23	12	NAS	1189C02P4L	74455155002		SCREW, 100° FLAT HEAD, SELF LOCKING			
22	3	NAS	1352C02LL4	74455157006		SCREW, CAP, SOC HEAD, SELF LOCKING			
21	10	NAS	1352C03LL6	74455157010		SCREW, CAP, SOC HEAD, SELF LOCKING			
20	4	*	1011625-37			SCREW, CAP, SOC HEAD, SELF LOCKING			
19	6	NAS	1352C04LL10	74455157016		SCREW, CAP, SOC HEAD, SELF LOCKING			
18	12	NAS	1352C04LL6	74455157014		SCREW, CAP, SOC HEAD, SELF LOCKING			
17	6		1011213	59386900010		WASHER, WAVE			
16	6		1011214	57386901000		BUSHING, MIRROR			
15	2		1011260	52386900500		MIRROR, SEXTANT HEAD			
14	1		1011598	52386900580		RETAINER, BEAM SPLITTER			
13	1		1011634	56386900370		SPRING, BEAM SPLITTER			
12	1		1011663	28386900490		FILTER, BEAM SPLITTER			
11	2		1011635	56386900380		SPACER, BEAM SPLITTER			
10	1		1011662	28386900480		BEAM SPLITTER			
9	1		1011595	52386900730		COVER, GEARBOX			
8	1		1011671	57386901190		RETAINER, DRIVE BEARING			
7	1		1011266	57386900690		RETAINER, BEARING			
6	1		1011355-4	57386901333		CLAMP, COLLAR			
5	1		1011910	85386900930		GEAR & PIN, ASSY OF			
4	1		1011940	85386901060		SPRING & COLLET, ASSY OF			
3	1		1011712	85386900680		INDEXING MIRROR & MOUNT ASSEMBLY			
2	1		1011706	85386900640		TRUNNION DRIVE GEARBOX ASSEMBLY			
1	1		1011700	85386900730		HOUSING & MOTOR ASSEMBLY			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM-SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

NEXT ASSY	USED ON
1011851	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900760
DRAWN DATE 6-20-63
CHECKED
APPROVAL
APPROVAL 8-15-63
NASA APPROVAL W. J. Rhine 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SEXTANT INDEX HEAD ASSEMBLY

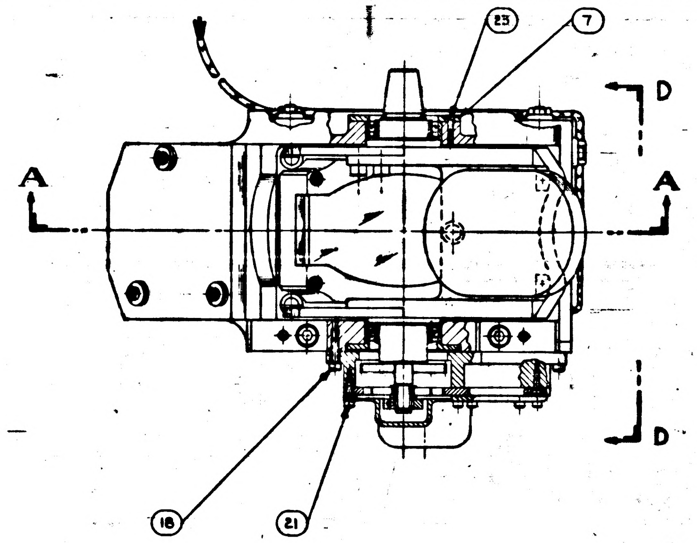
CODE IDENT NO.
SIZE E
NASA NUMBER 1011701
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

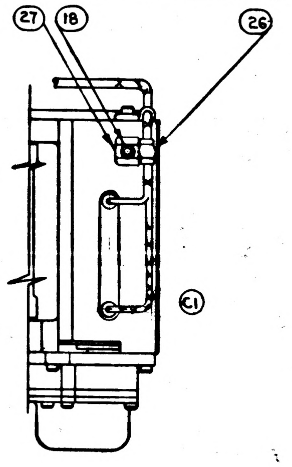
1011701 D

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLY AND TEST PROCEDURE IN ACCORDANCE WITH ATP 1011701.

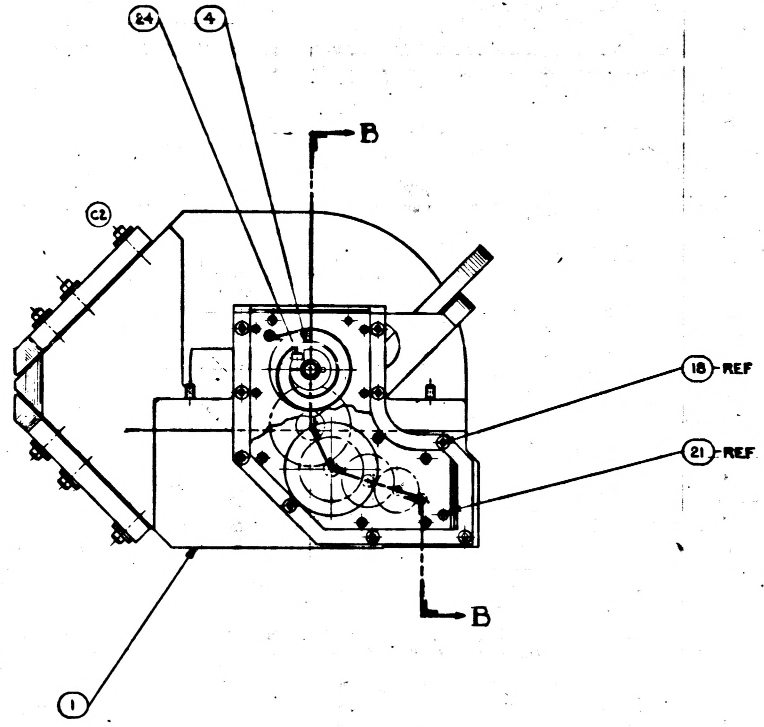
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A₂		REVISED PER TDRR NO. 03357	9/23/63	9/26
B		REVISED PER TDRR NO. 05735	14 JAN 64	
C₅		REVISED PER TDRR No. 07669	4-14-64	
D		REVISED PER TDRR NO. 07984	4-28-64	

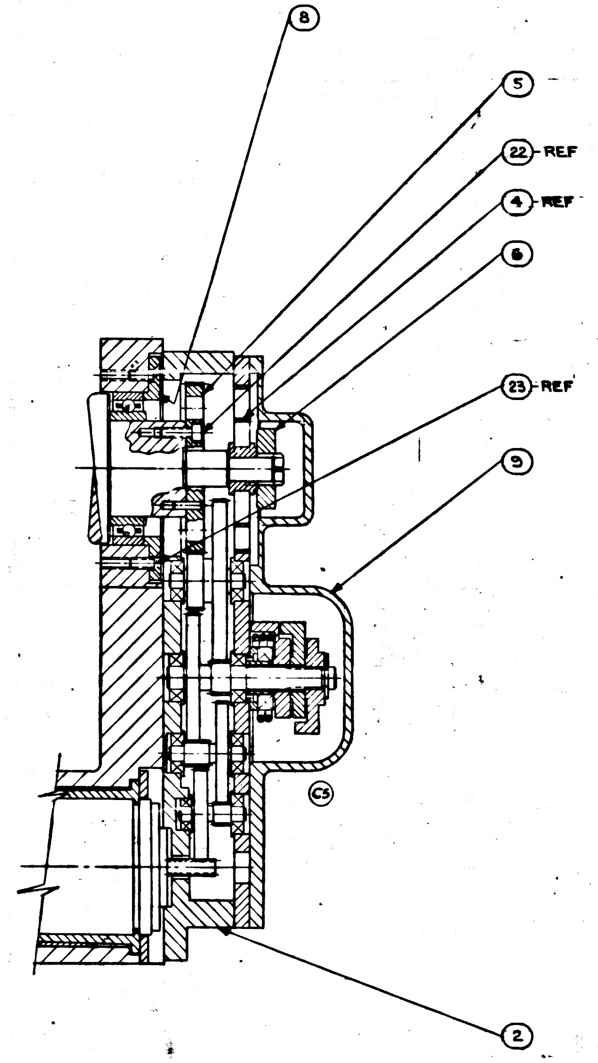
REVISIONS 02623



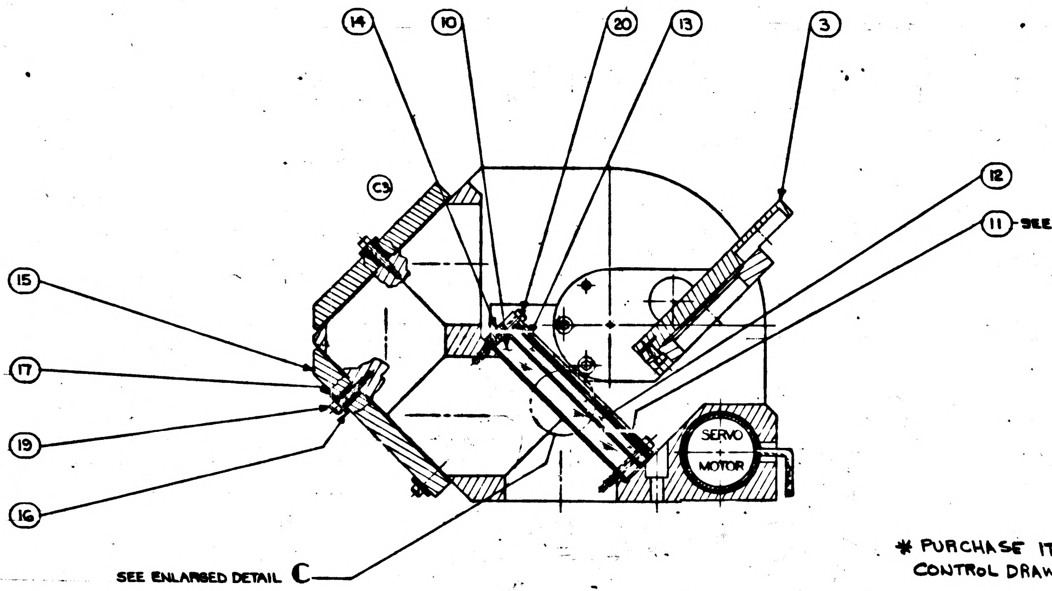


PARTIAL VIEW D-D

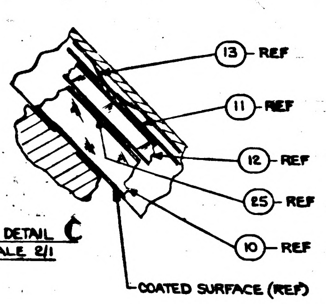




PARTIAL SECTION B-B
SCALE 2/1



SECTION A-A



ENLARGED DETAIL C
SCALE 2/1

✱ PURCHASE ITEM-SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
Ⓑ 27	3	✱	1011918-1			WASHER, CABLE CLAMP			
26	3	✱	1000220-3			CLAMP, CABLE			
Ⓒ4 25	AR	✱	1002128			INDIUM FOIL PROCUREMENT			
24	1	NAS	1352C02LL6	74455157007		SCREW, CAP, SOC HEAD, SELF LOCKING			
23	12	NAS	1189C02P4L	74455155002		SCREW, 100° FLAT HEAD, SELF LOCKING			
22	3	NAS	1352C02LL4	74455157006		SCREW, CAP, SOC HEAD, SELF LOCKING			
21	10	NAS	1352C03LL6	74455157010		SCREW, CAP, SOC HEAD, SELF LOCKING			
20	4	✱	1011625-37			SCREW, CAP, SOC HEAD, SELF LOCKING			
19	6	NAS	1352C04LL10	74455157016		SCREW, CAP, SOC HEAD, SELF LOCKING			
18	12	NAS	1352C04LL6	74455157014		SCREW, CAP, SOC HEAD, SELF LOCKING			
17	6		1011213	59386900010		WASHER, WAVE			
16	6		1011214	57386901000		BUSHING, MIRROR			
15	2		1011260	52386900500		MIRROR, SEXTANT HEAD			
14	1		1011598	52386900580		RETAINER, BEAM SPLITTER			
13	1		1011634	56386900370		SPRING, BEAM SPLITTER			
12	1		1011663	28386900490		FILTER, BEAM SPLITTER			
11	2		1011635	56386900380		SPACER, BEAM SPLITTER			
10	1		1011662	28386900480		BEAM SPLITTER			
9	1		1011595	52386900730		COVER, GEARBOX			
8	1		1011671	57386901190		RETAINER, DRIVE BEARING			
7	1		1011266	57386900690		RETAINER, BEARING			
6	1		1011355-4	57386901333		CLAMP, COLLAR			
5	1		1011910	85386900930		GEAR & PIN, ASSY OF			
4	1		1011940	85386901060		SPRING & COLLET, ASSY OF			
3	1		1011712	85386900680		INDEXING MIRROR & MOUNT ASSEMBLY			
2	1		1011706	85386900640		TRUNNION DRIVE GEARBOX ASSEMBLY			
1	1		1011700	85386900730		HOUSING & MOTOR ASSEMBLY			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL ~
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900760
DRAWN DATE 6-20-63
CHECKED
APPROVAL
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

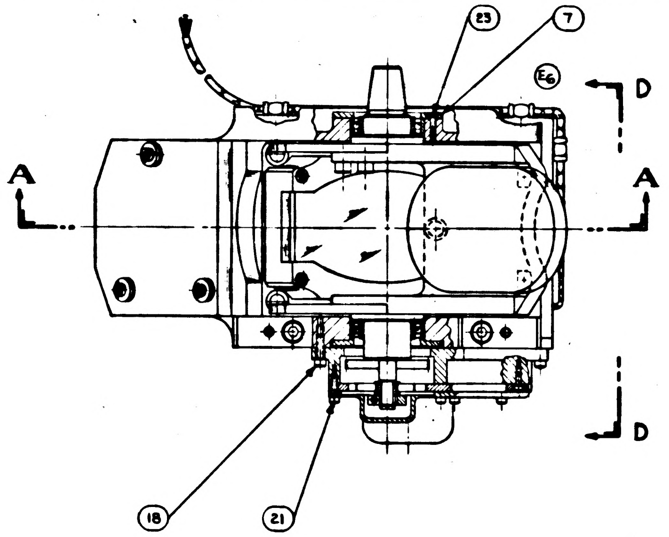
TITLE
SEXTANT INDEX HEAD
ASSEMBLY

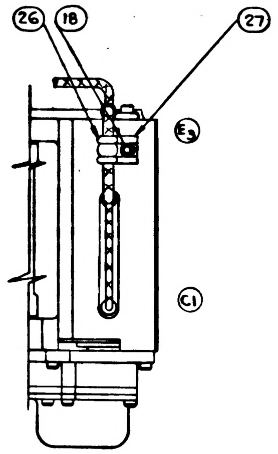
CODE IDENT NO.
SIZE E
NASA NUMBER 1011701
SCALE 1/1
WEIGHT
CALC / ACTUAL
SHEET 1 OF 1

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLY AND TEST PROCEDURE IN ACCORDANCE WITH ATP 1011701.

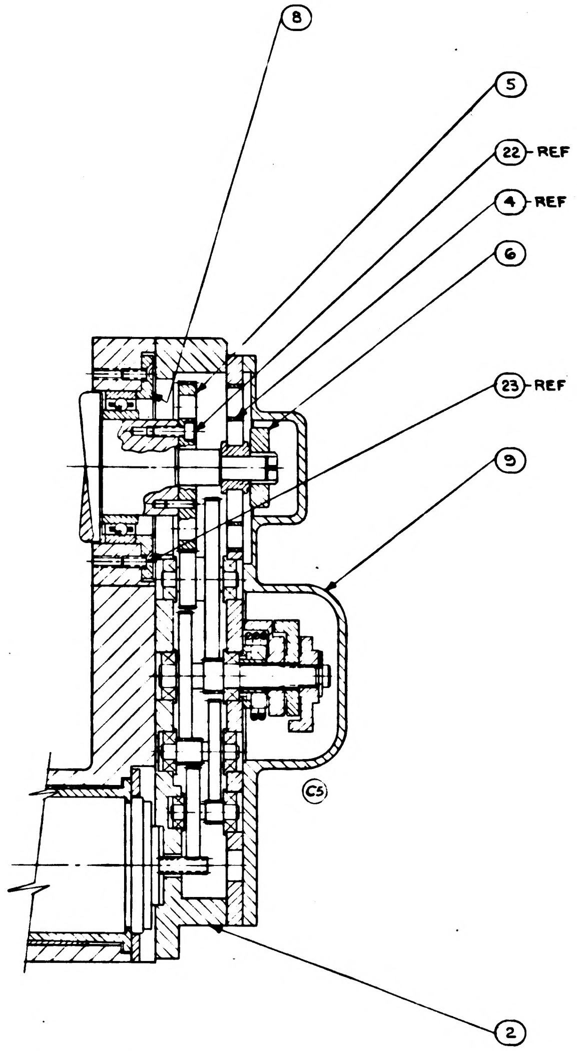
3 | 10L1101

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A_2		REVISED PER TDRR NO. 03357	9/23/63	
B		REVISED PER TDRR NO. 05735	14 JAN 64	
C_5		REVISED PER TDRR NO. 07669	4-14-6	
D		REVISED PER TDRR NO. 07984	4-28-	
E_7		REVISED PER TDRR NO. 07985	4-20-64	

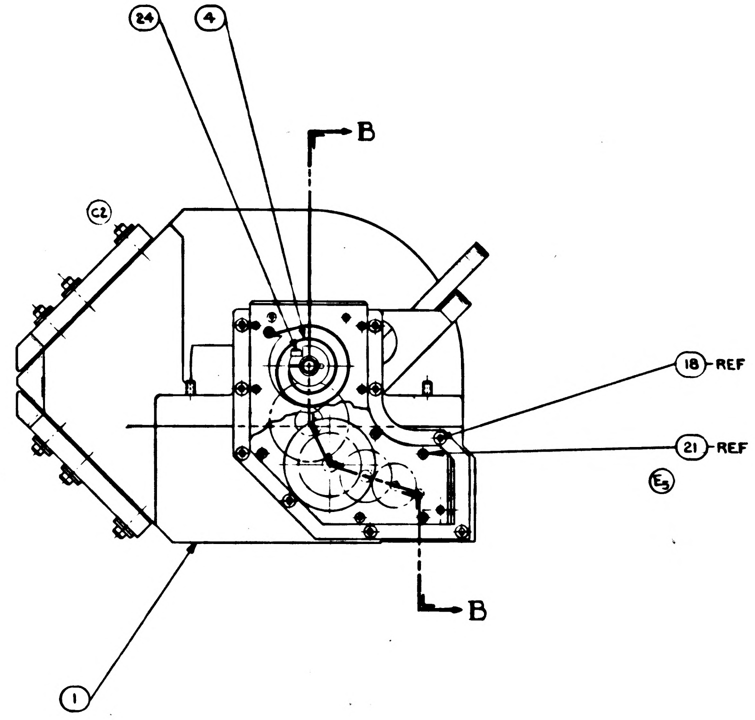


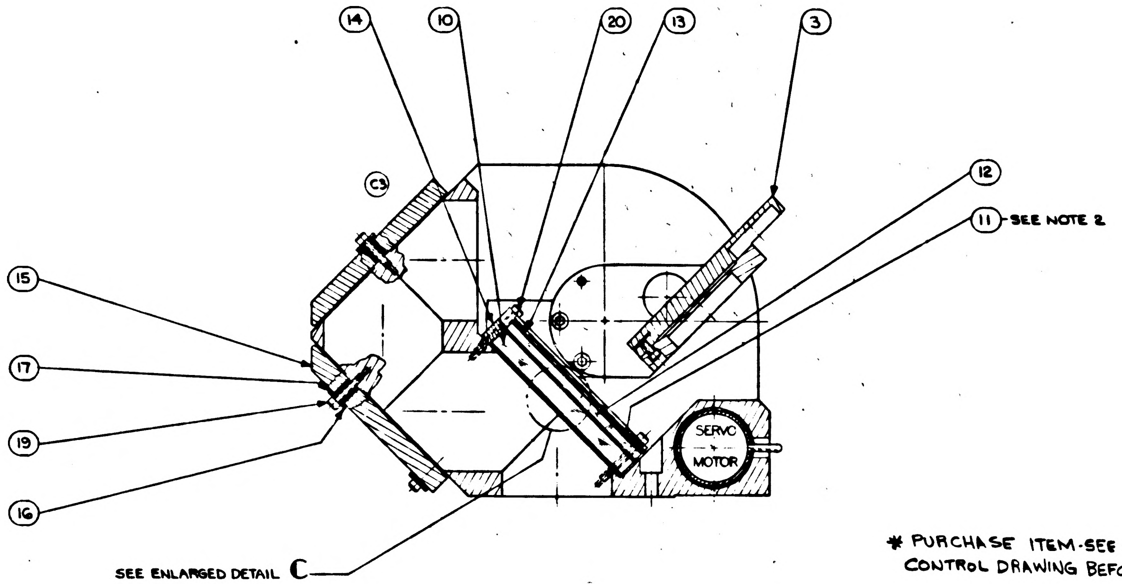


PARTIAL VIEW D-D



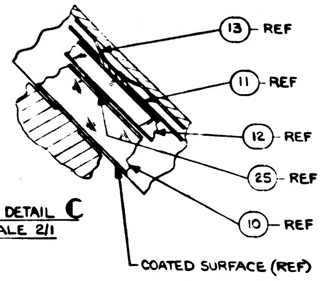
PARTIAL SECTION B-B
SCALE 2/1





SEE ENLARGED DETAIL C

SECTION A-A



ENLARGED DETAIL C
SCALE 2/1

COATED SURFACE (REF)

* PURCHASE ITEM-SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
27	3	*	1011918-1			WASHER, CABLE CLAMP			
26	3	*	1000220-4			CLAMP, CABLE			
25	AR	*	1002128			INDIUM FOIL PROCUREMENT			
24	1	NAS	1352C02LL6	74455157007		SCREW, CAP, SOC HEAD, SELF LOCKING			
23	12	NAS	1189C02P4L	74455155002		SCREW, 100° FLAT HEAD, SELF LOCKING			
22	3	NAS	1352C02LL4	74455157006		SCREW, CAP, SOC HEAD, SELF LOCKING			
21	9	NAS	1352C03LL6	74455157010		SCREW, CAP, SOC HEAD, SELF LOCKING			
20	4	*	1011625-37			SCREW, CAP, SOC HEAD, SELF LOCKING			
19	6	NAS	1352C04LL10	74455157016		SCREW, CAP, SOC HEAD, SELF LOCKING			
18	12	NAS	1352C04LL6	74455157014		SCREW, CAP, SOC HEAD, SELF LOCKING			
17	6		1011213	59386900010		WASHER, WAVE			
16	6		1011214	57386901000		BUSHING, MIRROR			
15	2		1011260	52386900500		MIRROR, SEXTANT HEAD			
14	1		1011598	52386900580		RETAINER, BEAM SPLITTER			
13	1		1011634	56386900370		SPRING, BEAM SPLITTER			
12	1		1011663	28386900490		FILTER, BEAM SPLITTER			
11	AR		1011635	56386900380		SPACER, BEAM SPLITTER			
10	1		1011662	28386900480		BEAM SPLITTER			
9	1		1011595	52386900730		COVER, GEARBOX			
8	1		1011671	57386901190		RETAINER, DRIVE BEARING			
7	1		1011266	57386900690		RETAINER, BEARING			
6	1		1011355-4	57386901333		CLAMP, COLLAR			
5	1		1011910	85386900930		GEAR & PIN, ASSY OF			
4	1		1011940	85386901060		SPRING & COLLET, ASSY OF			
3	1		1011712	85386900680		INDEXING MIRROR & MOUNT ASSEMBLY			
2	1		1011706	85386900640		TRUNNION DRIVE GEARBOX ASSEMBLY			
1	1		1011700	85386900730		HOUSING & MOTOR ASSEMBLY			

LIST OF PARTS AND MATERIALS

1011891	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900760
DRAWN DATE 6-20-63
CHECKED
APPROVAL 8-14-63
APPROVAL 8-15-63
NASA APPROVAL W. J. Rhine 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

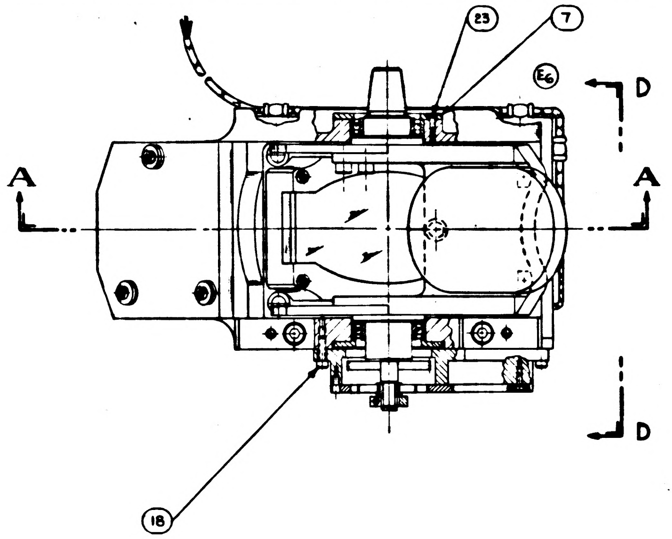
TITLE
SEXTANT INDEX HEAD
ASSEMBLY

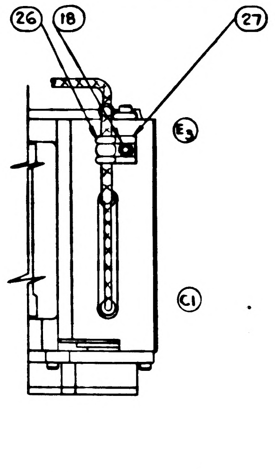
CODE IDENT NO. | SIZE E | NASA NUMBER 1011701
SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

F 1011701

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. SELECT ITEM 10 AND TWO OF ITEM 15 TO PRODUCE OPTIMUM FOCUS AND RESOLUTION IN CONJUNCTION WITH ITEM 3 ACCORDING TO THE FOLLOWING CRITERIA, DETERMINED FROM INSPECTION OF THE ELEMENTS BY INTERFEROMETER:
   A.) THE SUM OF THE FRINGE MEASUREMENTS, TAKING CONCAVE AS PLUS AND CONVEX AS MINUS, SHALL BE 1/2 OR LESS FOR ALL FOUR REFLECTING SURFACES MEASURED ALONG THE AXIS OF THE "USED AREA" OF EACH (2 1/4 IN.).
   B.) THE SUM OF THE FRINGE COUNTS SHALL ALSO BE 1/2 OR LESS, MEASURED ALONG THE SHORT AXIS, (1 5/8 IN) OF ALL FOUR REFLECTING SURFACES.
   C.) THE SUM "A" AND "B" SHALL BE EQUAL TO THE NEAREST 1/2 FRINGE (TAKING SIGNS INTO ACCOUNT.)
   D) MEASUREMENT PRECISION OF 1/4 FRINGE IS ASSUMED.
   E) ALL MEASUREMENTS ARE MADE AT APPROXIMATELY 5461Å.
3. SELECT ITEM 12 WITH THE SELECTED ITEM 10 TO PRODUCE NO MORE THAN 1.5 MILLI DIOPTER OF FOCUS POWER BY TRANSMISSION AT 45° INCIDENCE IF SUCH POWER IS OF THE SAME SIGN AS THE FRINGE SUM IN NOTE "2" OR NO MORE THAN 1 MILLI DIOPTER POWER OF OPPOSITE SIGN TO THE FRINGE SUM OF NOTE 2.
4. CHANGE SELECTIONS OF NOTE 2 OR 3, IF NECESSARY, TO ACHIEVE 5 SECONDS RESOLUTION AND 1.5 MILLI DIOPTERS MAX POWER, OR DIFFERENCE OF POWER, THROUGH PATHS "A" AND "B".
5. ITEM 8 SHALL BE ADJUSTED AT ASSEMBLY BY MACHINING TO PROVIDE THE FOLLOWING TRUNNION ROTATIONAL CHARACTERISTICS:
   A) THERE SHALL BE ZERO END PLAY OF ITEM 3 WITH RESPECT TO ITEM 1 UNDER AN AXIAL THRUST OF 2 LBS IN EITHER DIRECTION.
   B) THE MAXIMUM TORQUE REQUIRED TO START ROTATION ITEM 3 SHALL NOT EXCEED 3 IN-OZ ANYWHERE IN ITS RANGE OF ROTATION.
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURER'S SYMBOL PER ND 002019.

(F1)

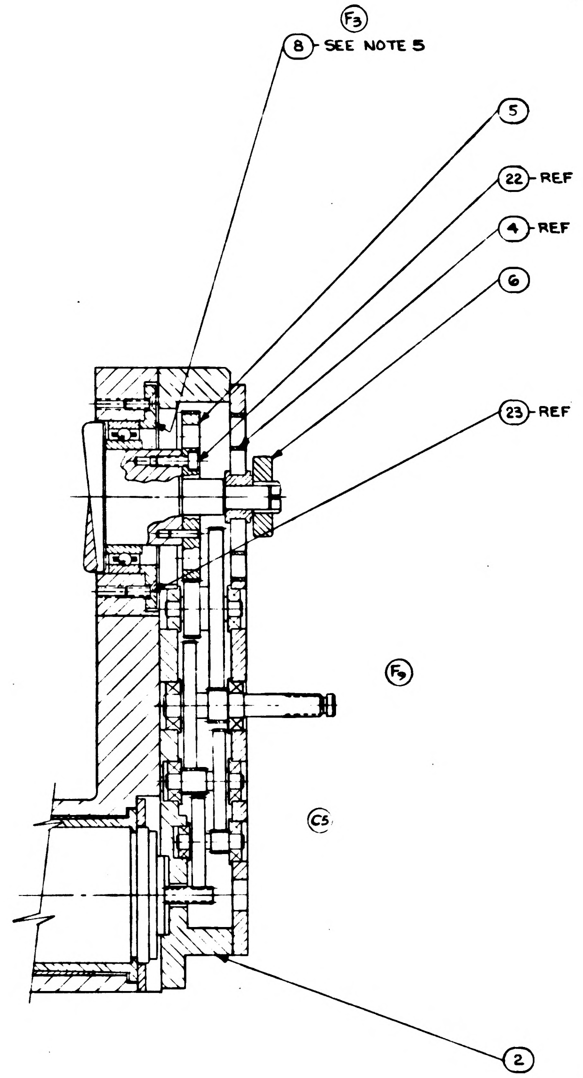




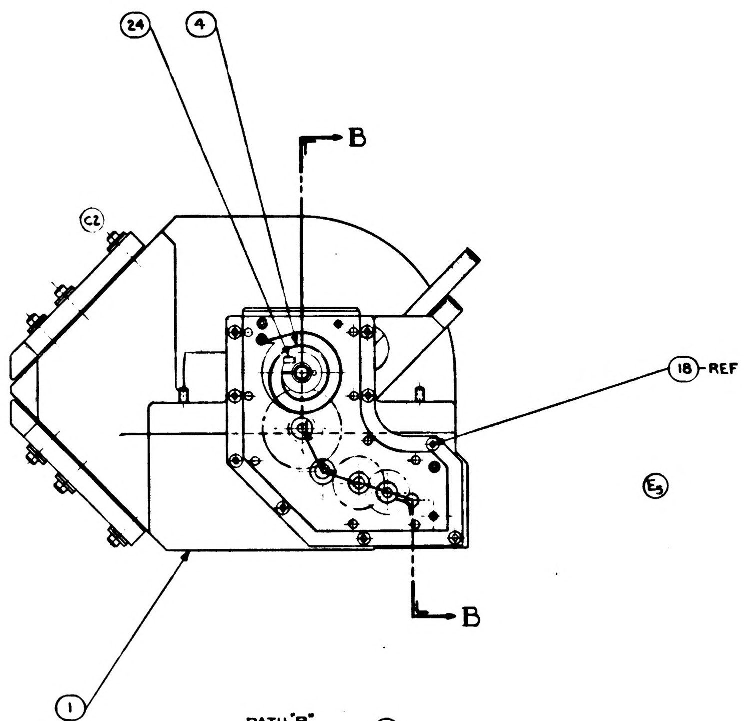
PARTIAL VIEW D-D

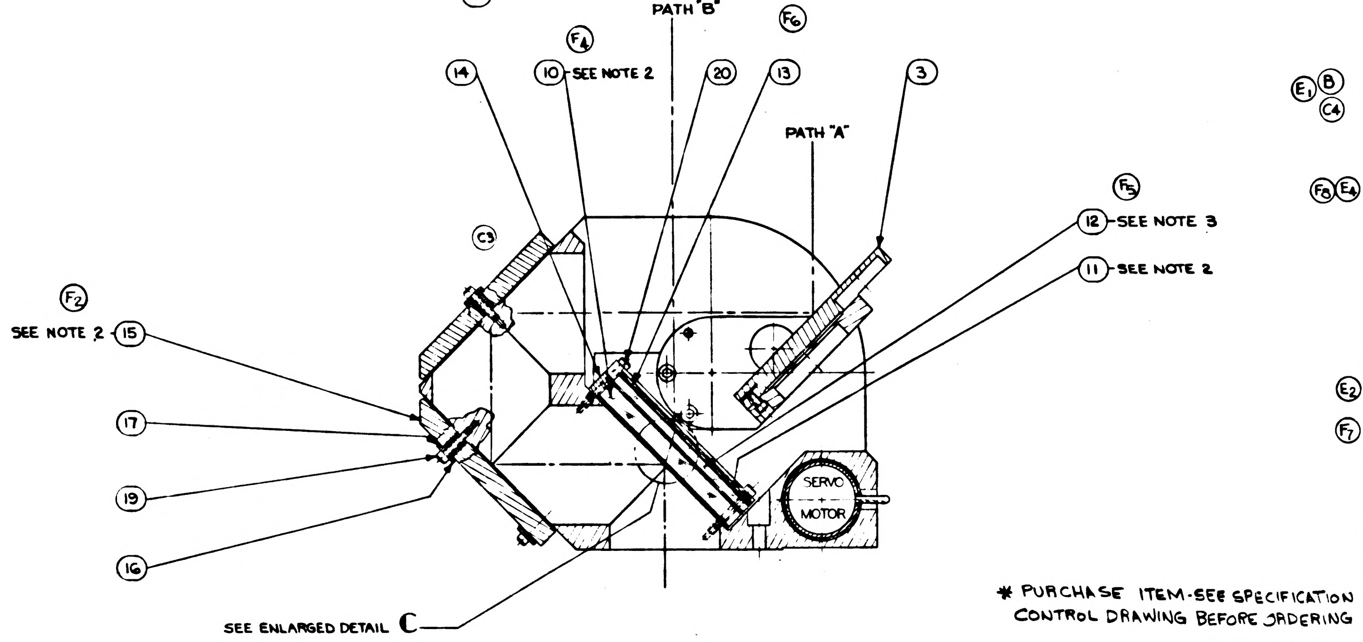
REVISIONS C 26 23

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A2		REVISED PER TDRR NO. 03357	9/23/63	
B		REVISED PER TDRR NO. 05735	14 JAN 64	
C5		REVISED PER TDRR NO. 07669	4-14-64	
D		REVISED PER TDRR NO. 07984	4-20-64	
E7		REVISED PER TDRR NO. 07985	4/20/64	
F9		REVISED PER TDRR NO. 07986	4/20/64	

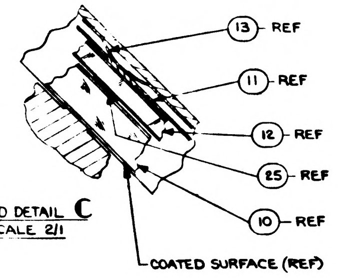


PARTIAL SECTION B-B
SCALE 2/1





SECTION A-A



ENLARGED DETAIL C
SCALE 2/1

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
27	3	*	1011918-1			WASHER, CABLE CLAMP			
26	3	*	1000220-4			CLAMP, CABLE			
25	AR	*	1002128			INDIUM FOIL PROCUREMENT			
24	1	NAS	1352C02LL6	74455157007		SCREW, CAP. SOC HEAD, SELF LOCKING			
23	12	NAS	1189C02P4L	74455155002		SCREW, 100° FLAT HEAD, SELF LOCKING			
22	3	NAS	1352C02LL4	74455157006		SCREW, CAP. SOC HEAD, SELF LOCKING			
21									
20	4	*	1011625-37			SCREW, CAP. SOC HEAD, SELF LOCKING			
19	6	NAS	1352C04LL10	74455157016		SCREW, CAP. SOC HEAD, SELF LOCKING			
18	12	NAS	1352C04LL6	74455157014		SCREW, CAP. SOC HEAD, SELF LOCKING			
17	6		1011213	59386900010		WASHER, WAVE			
16	6		1011214	57386901000		BUSHING, MIRROR			
15	2		1011260	52386900500		MIRROR, SEXTANT HEAD			
14	1		1011598	52386900580		RETAINER, BEAM SPLITTER			
13	1		1011634	56386900370		SPRING, BEAM SPLITTER			
12	1		1011663	28386900490		FILTER, BEAM SPLITTER			
11	AR		1011635	56386900380		SPACER, BEAM SPLITTER			
10	1		1011662	28386900480		BEAM SPLITTER			
9									
8	1		1011671	57386901190		RETAINER, DRIVE BEARING			
7	1		1011266	57386900690		RETAINER, BEARING			
6	1		1011355-4	57386901333		CLAMP, COLLAR			
5	1		1011910	85386900930		GEAR & PIN, ASSY OF			
4	1		1011940	85386901060		SPRING & COLLET, ASSY OF			
3	1		1011712	85386900680		INDEXING MIRROR & MOUNT ASSEMBLY			
2	1		1011706	85386900640		TRUNNION DRIVE GEARBOX ASSEMBLY			
1	1		1011700	85386900730		HOUSING & MOTOR ASSEMBLY			

LIST OF PARTS AND MATERIALS

(E1) (B) item 26; (C4) item 25; (F8) (E4) item 21; (E2) item 11; (F7) item 9

* PURCHASE ITEM-SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

NEXT ASSY	USED ON
1011851	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900760
DRAWN DATE 6-20-63
CHECKED
APPROVAL 8-14-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SEXTANT INDEX HEAD
ASSEMBLY

CODE IDENT NO. | SIZE E | NASA NUMBER 1011701
SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF

5 1OL1101

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. SELECT ITEM 10 AND TWO OF ITEM 15 TO PRODUCE OPTIMUM FOCUS AND RESOLUTION IN CONJUNCTION WITH ITEM 3 ACCORDING TO THE FOLLOWING CRITERIA, DETERMINED FROM INSPECTION OF THE ELEMENTS BY INTERFEROMETER:
   A.) THE SUM OF THE FRINGE MEASUREMENTS, TAKING CONCAVE AS PLUS AND CONVEX AS MINUS, SHALL BE 1/2 OR LESS FOR ALL FOUR REFLECTING SURFACES MEASURED ALONG THE AXIS OF THE "USED AREA" OF EACH (2 1/4 IN.).
   B.) THE SUM OF THE FRINGE COUNTS SHALL ALSO BE 1/2 OR LESS, MEASURED ALONG THE SHORT AXIS, (1 5/8 IN) OF ALL FOUR REFLECTING SURFACES.
   C.) THE SUM "A" AND "B" SHALL BE EQUAL TO THE NEAREST 1/2 FRINGE (TAKING SIGNS INTO ACCOUNT.)
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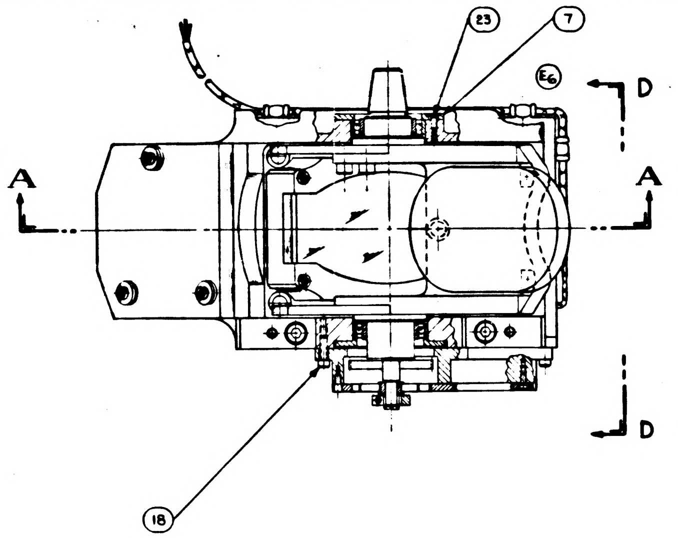
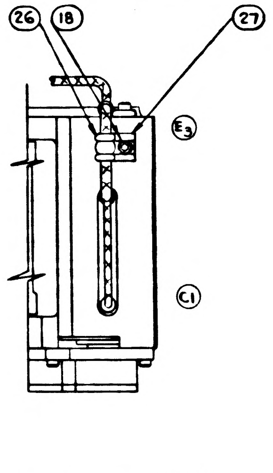
   B) THE MAXIMUM TORQUE REQUIRED TO START ROTATION ITEM 3 SHALL NOT EXCEED 3 IN-OZ ANYWHERE IN ITS RANGE OF ROTATION.
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURER'S SYMBOL PER ND 002019.

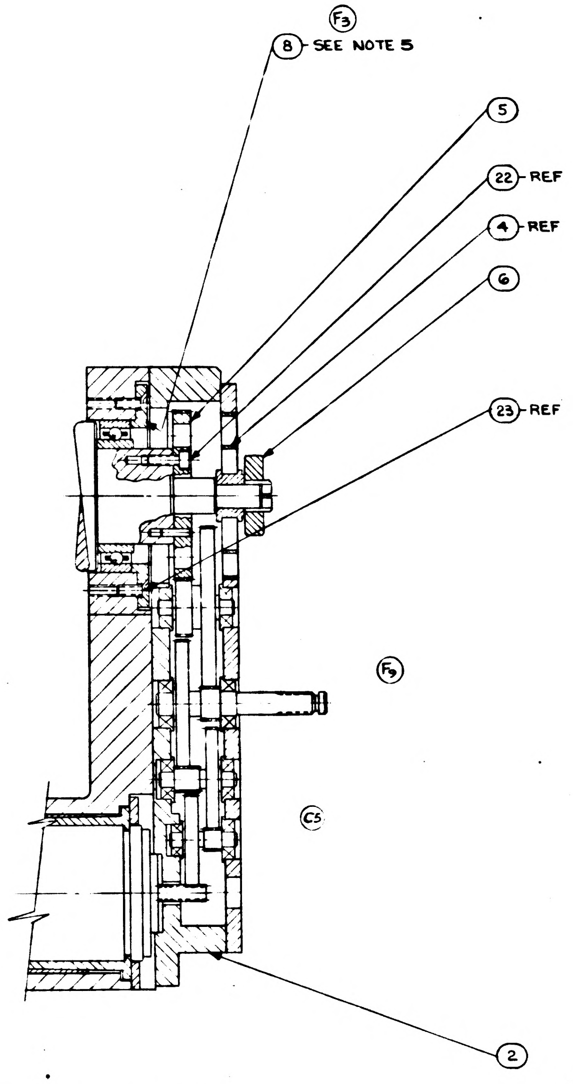
REVISIONS C 26 23

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A2		REVISED PER TDRR NO. 03337	9/23/63	
B		REVISED PER TDRR NO. 05735	14 JAN 64	
C5		REVISED PER TDRR NO. 07669	4-14-64	
D		REVISED PER TDRR NO. 07984	4-28-64	
E7		REVISED PER TDRR NO. 07985	4/28/64	
		REVISED PER TDRR NO. 07986	4/28/64	
3		REVISED PER TDRR NO 5347	1/6/3	

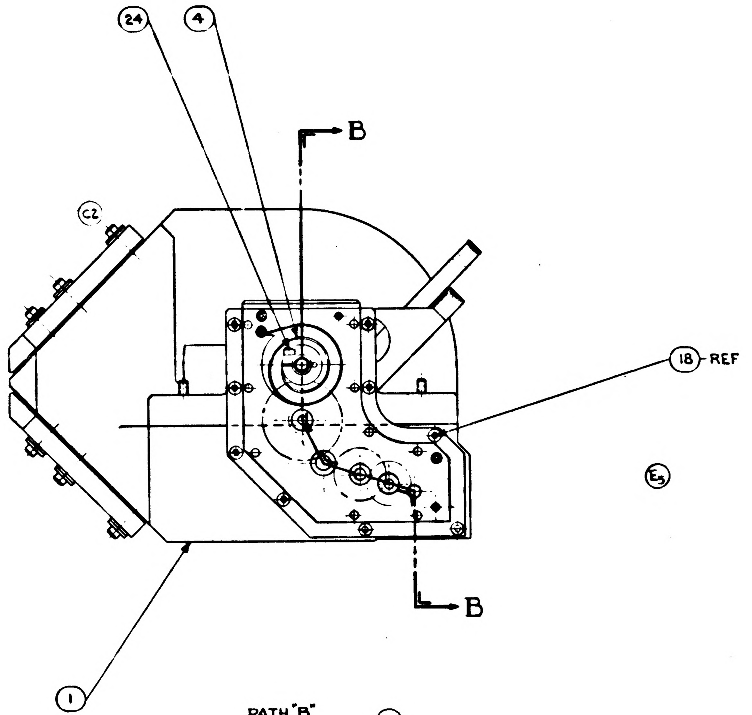


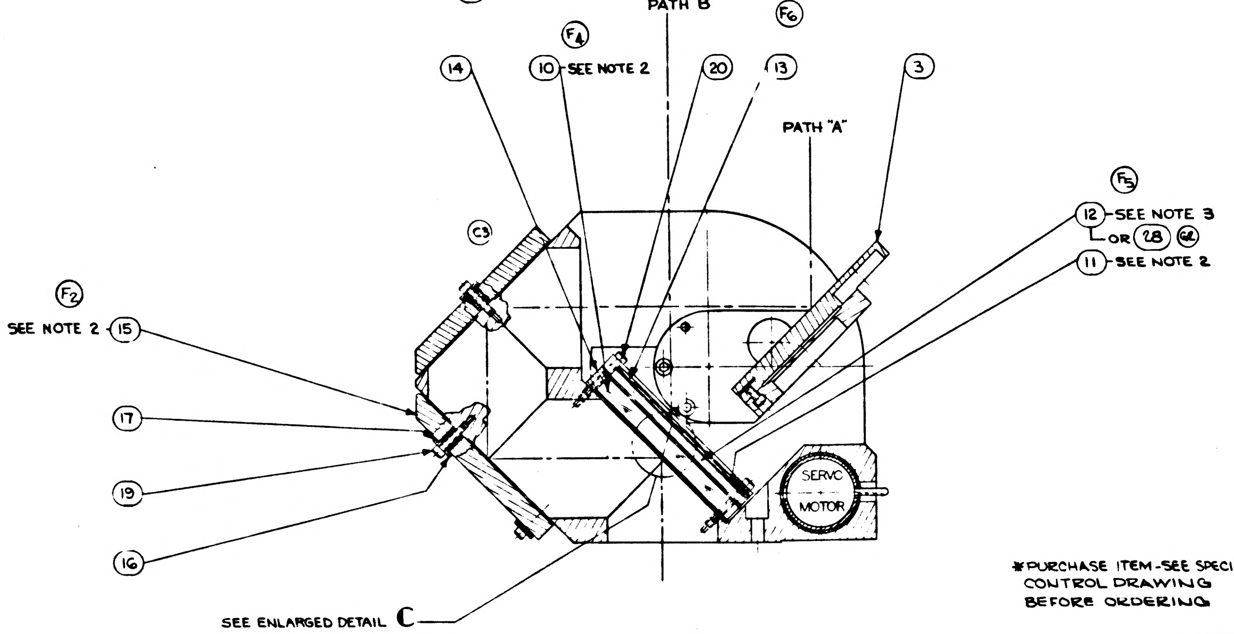


PARTIAL VIEW D-D

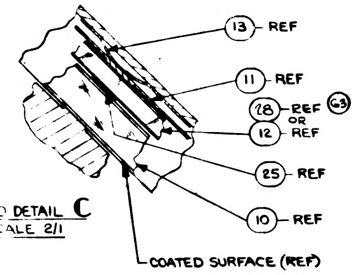


PARTIAL SECTION B-B
SCALE 2/1





SECTION A-A



ENLARGED DETAIL C
SCALE 2/1

*PURCHASE ITEM-SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

QTY REQ 001	QTY REQ 000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
1	0	28			1011950			ADAPTER, BEAMSPLITTER			
3	3	27		*	1011918-1			WASHER, CABLE CLAMP			
3	3	26		*	1000220-4			CLAMP, CABLE			
0	AR	25		*	1002128			INDIUM FOIL PROCUREMENT			
1	1	24		NAS	1352C02LL6	74455157007		SCREW, CAP. SOC HEAD, SELF LOCKING			
12	12	23		NAS	1183C02P4L	74455155002		SCREW, 100° FLAT HEAD, SELF LOCKING			
3	8	22		NAS	1352C02LL4	74455157006		SCREW, CAP. SOC HEAD, SELF LOCKING			
		21									
4	4	20		*	1011625-37			SCREW, CAP, SOC HEAD, SELF LOCKING			
6	6	19		NAS	1352C04LL10	74455157016		SCREW, CAP. SOC HEAD, SELF LOCKING			
12	12	18		NAS	1352C04LL6	74455157014		SCREW, CAP. SOC HEAD, SELF LOCKING			
6	6	17			1011213	59386900010		WASHER, WAVE			
6	6	16			1011214	57386901000		BUSHING, MIRROR			
2	2	15			1011260	52386900500		MIRROR, SEXTANT HEAD			
1	1	14			1011598	52386900580		RETAINER, BEAM SPLITTER			
1	1	13			1011634	56386900370		SPRING, BEAM SPLITTER			
0	1	12			1011663	28386900490		FILTER, BEAM SPLITTER			
AR	AR	11			1011635	56386900380		SPACER, BEAM SPLITTER			
1	1	10			1011662	28386900480		BEAM SPLITTER			
		9									
1	1	8			1011671	57386901190		RETAINER, DRIVE BEARING			
1	1	7			1011266	57386900690		RETAINER, BEARING			
1	1	6			1011355-4	57386901333		CLAMP, COLLAR			
1	1	5			1011910	85386900930		GEAR & PIN, ASSY OF			
1	1	4			1011940	85386901060		SPRING & COLLET, ASSY OF			
1	1	3			1011712	85386900680		INDEXING MIRROR & MOUNT ASSEMBLY			
1	1	2			1011706	85386900640		TRUNNION DRIVE GEARBOX ASSEMBLY			
1	1	1			1011700	85386900730		HOUSING & MOTOR ASSEMBLY			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011851	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900760
DRAWN DATE 6-20-63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL 8-26-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SEXTANT INDEX HEAD ASSEMBLY

CODE IDENT NO.
SIZE E
NASA NUMBER 1011701
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF

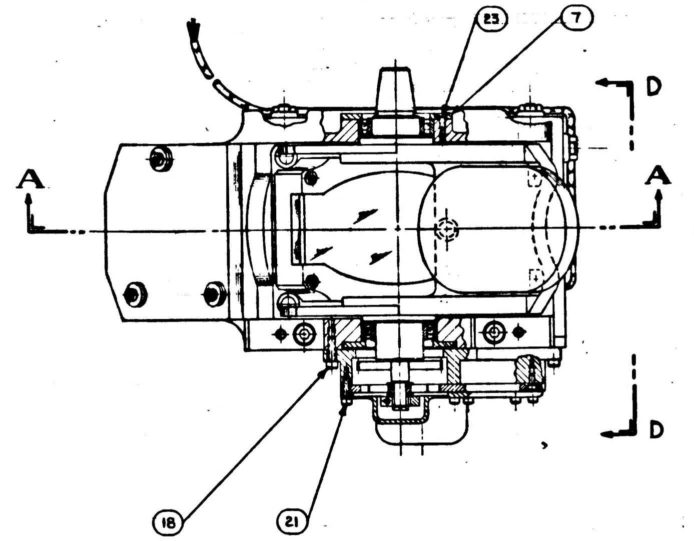
1011701 G

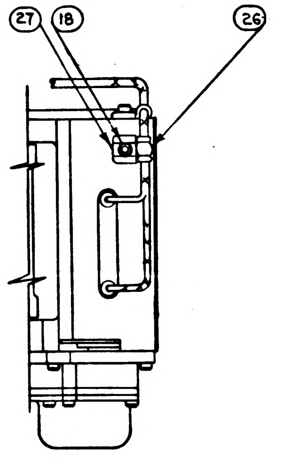
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLY AND TEST PROCEDURE IN ACCORDANCE WITH ATP 1011701.

1OL1101

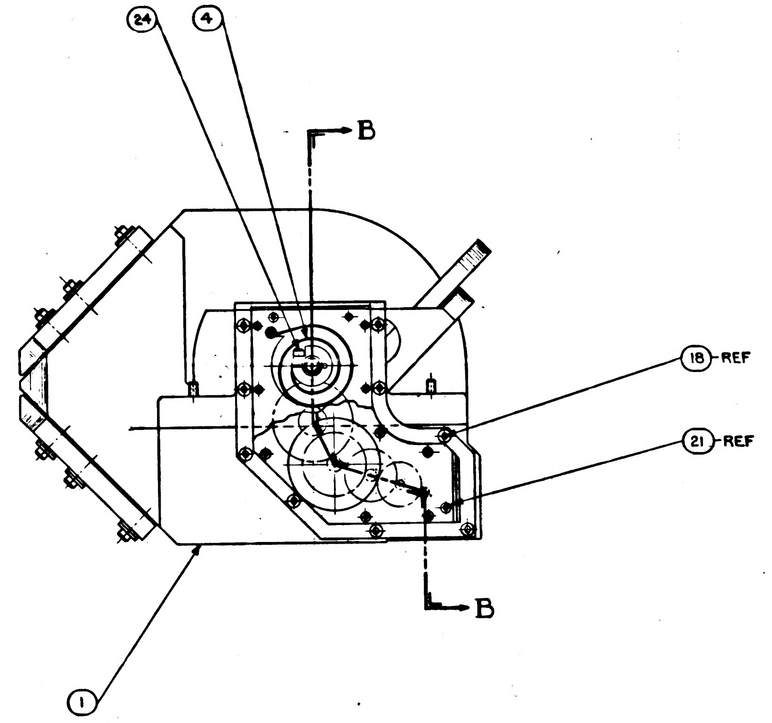
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

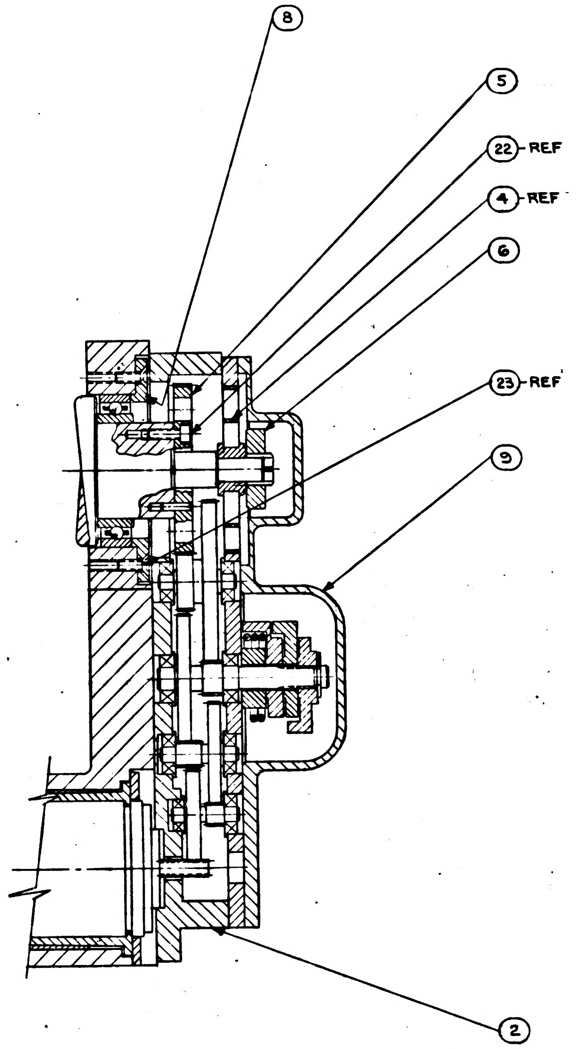
REVISIONS 02623



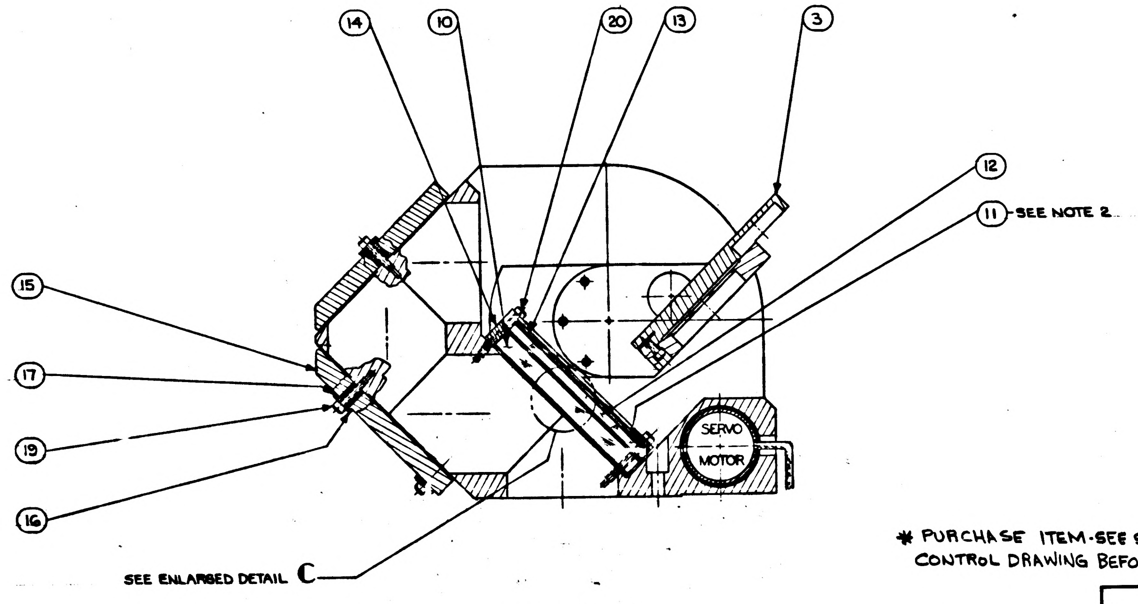


PARTIAL VIEW D-D

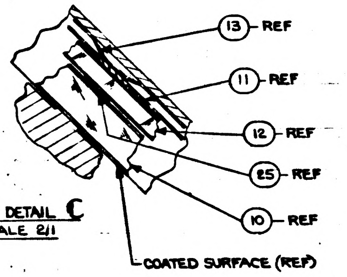




PARTIAL SECTION B-B
SCALE 2/1



SECTION A-A



ENLARGED DETAIL C
SCALE 2/1

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
27	3		1000223			WASHER, CABLE CLAMP			
26	3		1000220			CLAMP, CABLE			
25	AR		1002128			INDIUM FOIL PROCUREMENT			
24	1	NAS	1352C02LL6	74455157007		SCREW, CAP, SOC HEAD, SELF LOCKING			
23	12	NAS	1189C02P4L	74455155002		SCREW, 100° FLAT HEAD, SELF LOCKING			
22	3	NAS	1352C02LL4	74455157006		SCREW, CAP, SOC HEAD, SELF LOCKING			
21	10	NAS	1352C03LL6	74455157010		SCREW, CAP, SOC HEAD, SELF LOCKING			
20	4	*	1010468-4			SCREW, CAP, SOC HEAD, SELF LOCKING			
19	6	NAS	1352C04LL10	74455157016		SCREW, CAP, SOC HEAD, SELF LOCKING			
18	12	NAS	1352C04LL6	74455157014		SCREW, CAP, SOC HEAD, SELF LOCKING			
17	6		1011213	59386900010		WASHER, WAVE			
16	6		1011214	57386901000		BUSHING, MIRROR			
15	2		1011260	52386900500		MIRROR, SEXTANT HEAD			
14	1		1011598	52386900580		RETAINER, BEAM SPLITTER			
13	1		1011634	56386900370		SPRING, BEAM SPLITTER			
12	1		1011663	28386900490		FILTER, BEAM SPLITTER			
11	2		1011635	56386900380		SPACER, BEAM SPLITTER			
10	1		1011662	28386900480		BEAM SPLITTER			
9	1		1011595	52386900730		COVER, GEARBOX			
8	1		1011671	57386901190		RETAINER, DRIVE BEARING			
7	1		1011266	57386900690		RETAINER, BEARING			
6	1		1011355-4	57386901333		CLAMP, COLLAR			
5	1		1011910	85386900930		GEAR & PIN, ASSY OF			
4	1		1011827	58386900130		SPRING & COLLET			
3	1		1011712	85386900680		INDEXING MIRROR & MOUNT ASSEMBLY			
2	1		1011706	85386900640		TRUNNION DRIVE GEARBOX ASSEMBLY			
1	1		1011700	85386900730		HOUSING & MOTOR ASSEMBLY			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM-SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

MASTER

NEXT ASSY	USED ON
1011851	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900760
DRAWN J. Delillo DATE 6-20-63
CHECKED
APPROVAL 8-1-63
APPROVAL 8-15-63
NASA APPROVAL W. J. Rhine 8-16-63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SEXTANT INDEX HEAD ASSEMBLY

CODE IDENT NO.
SIZE E
NASA NUMBER 1011701
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011701

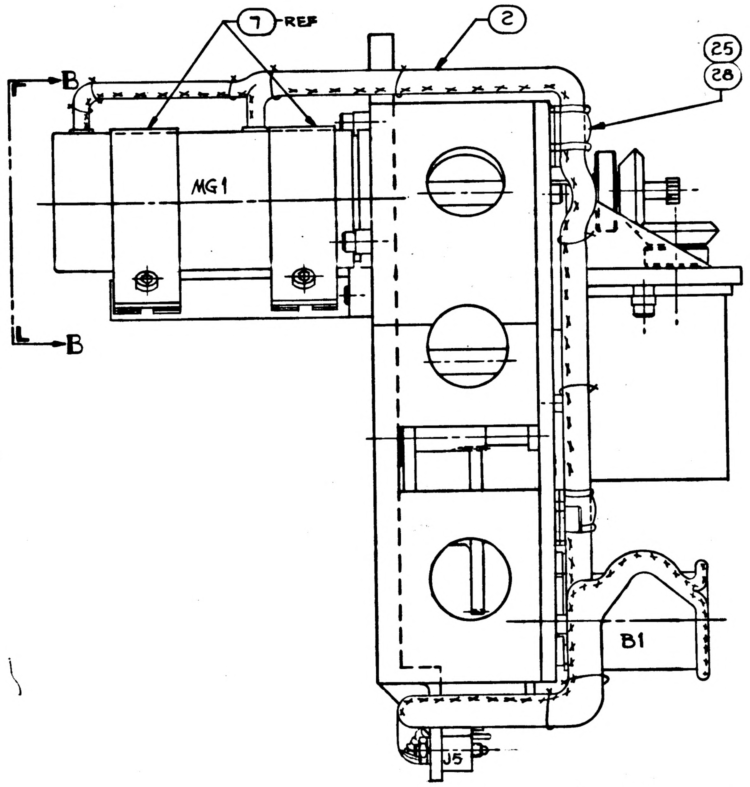
1011702 A

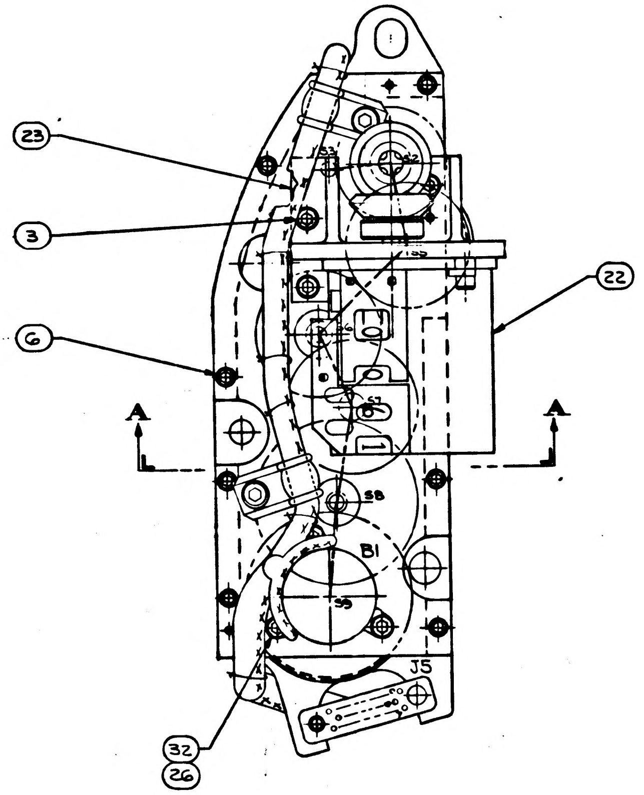
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO. 03058	5-9-63	WK

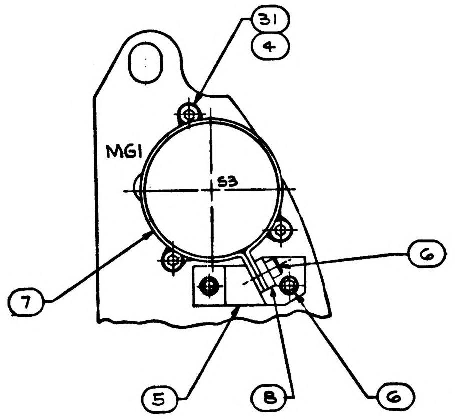
REVISIONS TDRR 02624

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. SHIM SHAFTS TO OBTAIN ZERO ENDPLAY
3. ALIGN BEVEL GEARS (ITEMS 18 & 20) FOR "ZERO" BACKLASH

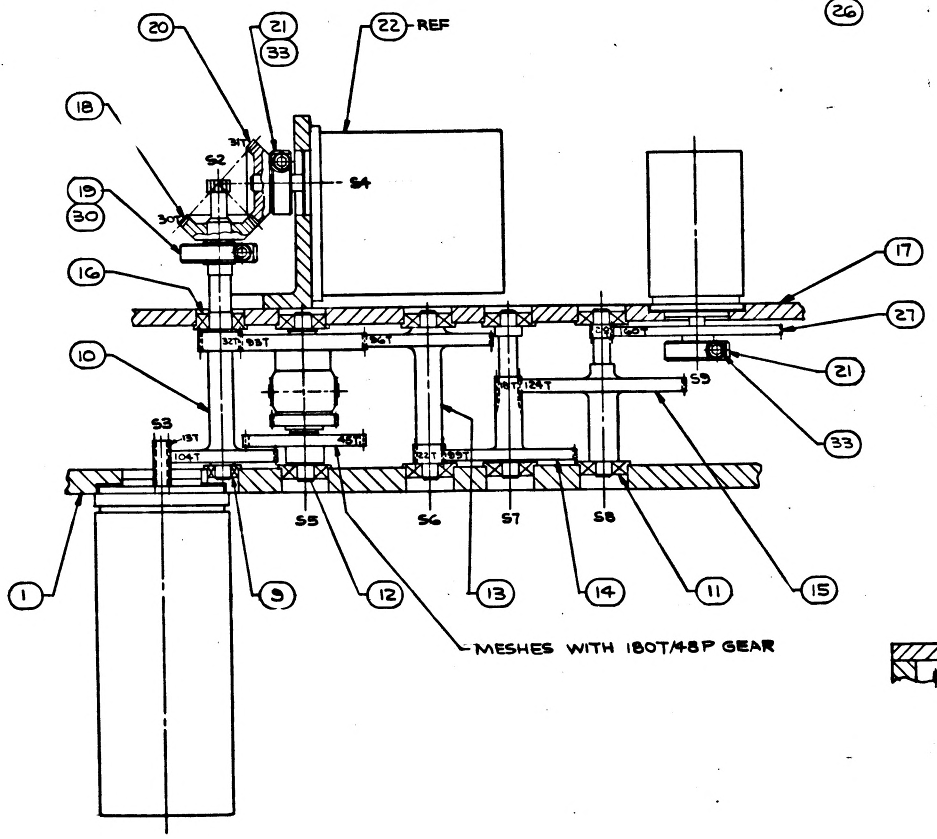
5. ASSEMBLE AND TEST IN ACCORDANCE WITH A.T.P 1011702
6. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019

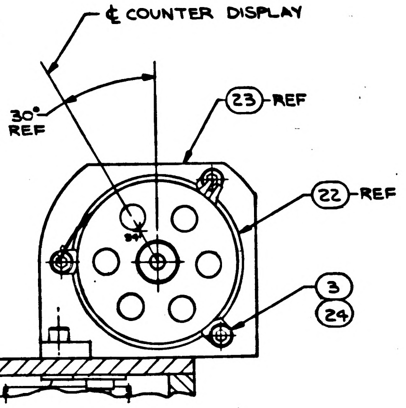






PARTIAL VIEW B-B





PARTIAL SECTION A-A

PURCHASED ITEM:- SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

MASTER

SEE NOTE NO. 2

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
33	2		1011625-11	7445515101l		SCREW, CAP, SOC HD			
32	3		1011625-16	74455151016		SCREW, CAP, SOC HD			
31	3		1011625-18	74455151018		SCREW, CAP, SOC HD			
30	1	NAS	1352C02LL6	74455157007		SCREW, CAP, SOC HD			
29	AS REQD		1011804-	7938690 0301 0309		WASHER, FLAT			
* 28	2	NAS	1352C06LL4	74455157018		SCREW, CAP, SOC HD, SELF LOCKING			
27	1		1011277	33386900380		GEAR, SPUR (160T/120P)			
26	3		1011868-3	54386900332		CLAMP, RIM CLENCHING			
25	2		1000220-4			CLAMP, CABLE			
24	3		1011868-2	54386900331		CLAMP, RIM CLENCHING			
23	1		1011275	52386900570		BRACKET, COUNTER			
22	1		1011744	88237000001		COUNTER, ANGLE			
21	2		1011355-2	57386901331		CLAMP, COLLAR			
20	1		1011357	33386900540		GEAR, BEVEL (31T/48P)			
19	1		1011355-4	57386901333		CLAMP, COLLAR			
18	1		1011356	33386900530		GEAR, BEVEL (30T/48P)			
17	1		1011308	85386900280		PLATE, BEARING, ASSEMBLY OF			
* 16	1		1011608-4	30257700120		BEARING, BALL, ANNULAR (FLANGED)			
15	1		1011276	33386900370		GEARSHAFT (20T/120P, 124T/96P)			
14	1		1011279	33386900400		GEARSHAFT (18T/96P, 99T/96P)			
13	1		1011280	33386900410		GEARSHAFT (22T/96P, 96T/96P)			
* 12	1		1011281	74471370001		DIFFERENTIAL			
* 11	8		1011608-3	30257700082		BEARING, BALL, ANNULAR (FLANGED)			
10	1		1011358	33386900550		GEARSHAFT (104T/120P, 32T/96P)			
* 9	1		1011608-1	30257700080		BEARING, BALL, ANNULAR (FLANGED)			
8	2		1011802	56386900410		PLATE, FLAT			
7	2		1011314	56386900190		HEAT SINK			
6	11	NAS	1352C02LL4	74455157006		SCREW, CAP, SOC HD			
5	1		1011801	52386900870		BRACKET, HEAT CONDUCTOR			
4	3		1011868-1	54386900330		CLAMP, RIM CLENCHING			
3	6	NAS	1352C03LL4	74455157009		SCREW, CAP, SOC HD			
2	1		1011935	80386900060		SCT TRUNNION DRIVE HARNESS, ASSY OF			
1	1		1011306	52386900610		HOUSING GEAR SCT TRUNNION DRIVE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS + - DECIMALS + - ANGLES + -
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900770
DRAWN R BRUNELLE DATE 6-20-63
CHECKED 7/12/63
APPROVAL 8/1/63
APPROVAL 8-15 63
NASA APPROVAL W J 8-16-63
MIT APPROVAL W 16 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCT TRUNNION DRIVE GEARBOX
ASSEMBLY OF

CODE IDENT NO.
SIZE E
NASA NUMBER 1011702
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
PHOTOGRAPHIC SCALE ONLY

1011702 B

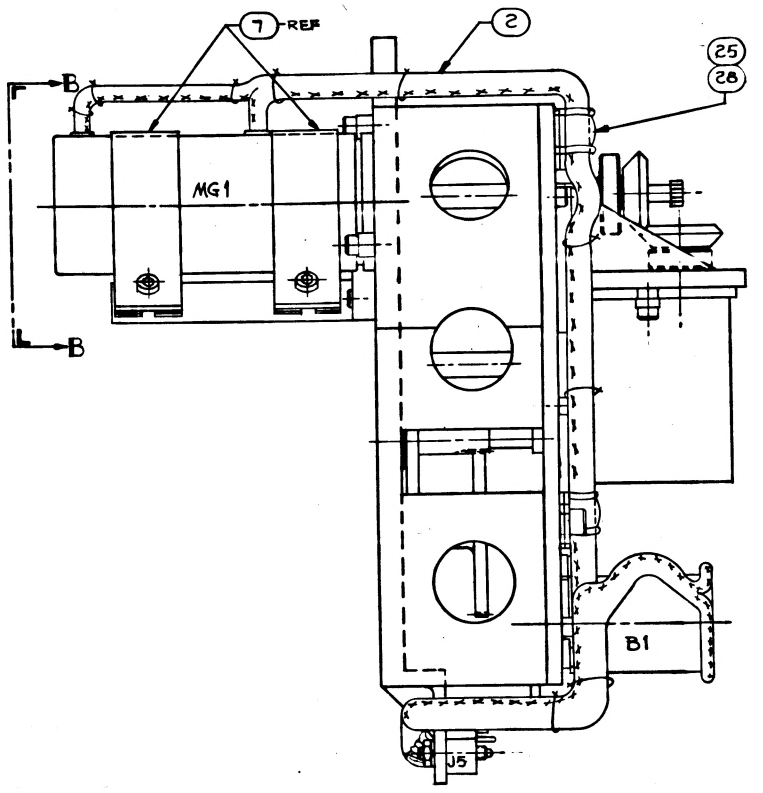
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO. 03058	5-9-63 10-Jly-63	WK
B		REVISED PER TDRR NO. 03991	17 Oct 63	WK

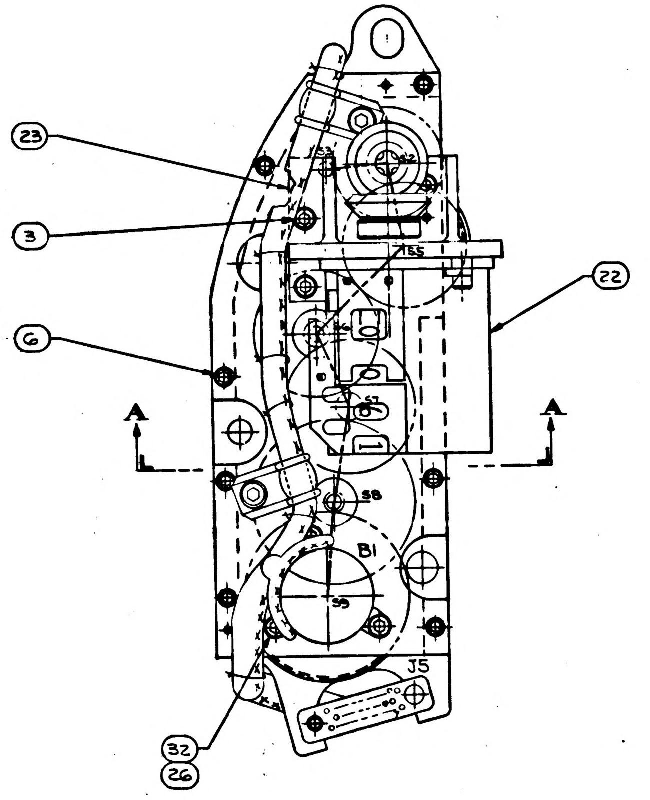
REVISIONS TDRR 02624

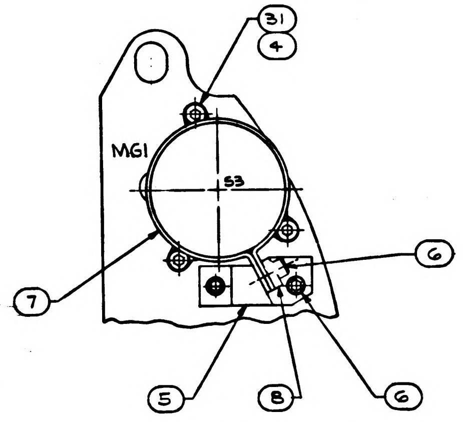
NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

(B1)

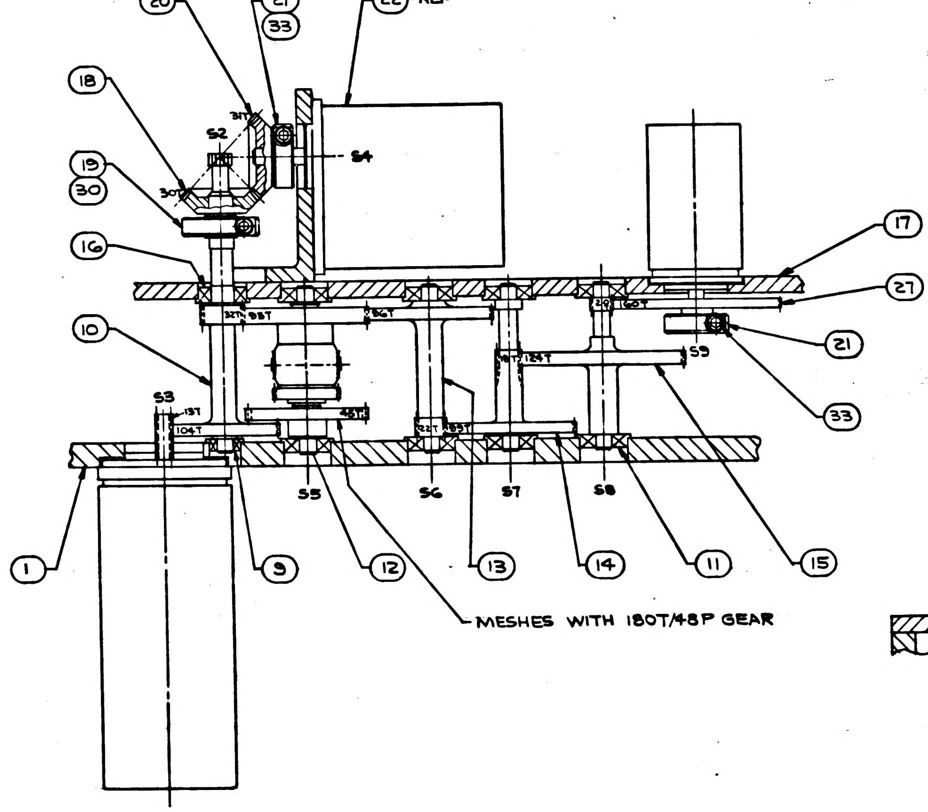
5. ASSEMBLE AND TEST IN ACCORDANCE WITH A.T.P 1011702
6. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019

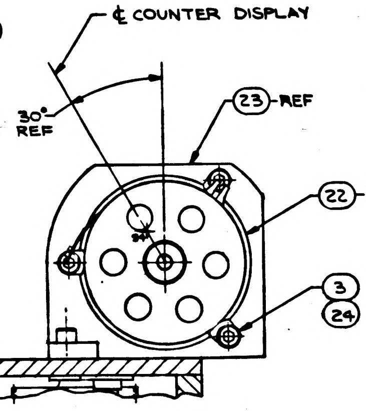






PARTIAL VIEW B-B





PARTIAL SECTION A-A

ITEM NO.	QTY REQD		GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
33	2		1011625-11	74455151011		SCREW, CAP, SOC HD			
32	3		1011625-16	74455151016		SCREW, CAP, SOC HD			
31	3		1011625-18	74455151018		SCREW, CAP, SOC HD			
30	1	NAS	1352C02LL6	74455157007		SCREW, CAP, SOC HD			
(B1) 29	AS REQD		1011804-	7938690 0301 0303		WASHER, FLAT			
28	2	NAS	1352C06LL4	74455157018		SCREW, CAP, SOC HD, SELF LOCKING			
27	1		1011277	33386900380		GEAR, SPUR (160T/120P)			
26	3		1011868-3	54386900332		CLAMP, RIM CLENCHING			
25	2		1000220-4			CLAMP, CABLE			
24	3		1011868-2	54386900331		CLAMP, RIM CLENCHING			
23	1		1011275	52386900570		BRACKET, COUNTER			
22	1		1011744	88237000001		COUNTER, ANGLE			
21	2		1011355-2	57386901331		CLAMP, COLLAR			
20	1		1011357	33386900540		GEAR, BEVEL (31T/48P)			
19	1		1011355-4	57386901333		CLAMP, COLLAR			
18	1		1011356	33386900530		GEAR, BEVEL (30T/48P)			
17	1		1011308	85386900280		PLATE, BEARING, ASSEMBLY OF			
16	1	*	1011608-4	30257700120		BEARING, BALL, ANNULAR (FLANGED)			
15	1		1011276	33386900370		GEARSHAFT (20T/120P, 124T/96P)			
14	1		1011279	33386900400		GEARSHAFT (18T/96P, 99T/96P)			
13	1		1011280	33386900410		GEARSHAFT (22T/96P, 96T/96P)			
12	1	*	1011281	74471370001		DIFFERENTIAL			
11	8	*	1011608-3	30257700062		BEARING, BALL, ANNULAR (FLANGED)			
10	1		1011358	33386900550		GEARSHAFT (104T/120P, 32T/96P)			
9	1	*	1011608-1	30257700080		BEARING, BALL, ANNULAR (FLANGED)			
8	2		1011802	56386900410		PLATE, FLAT			
7	2		011314	56386900190		HEAT SINK			
6	11	NAS	1352C02LL4	74455157006		SCREW, CAP, SOC HD			
5	1		1011801	52386900870		BRACKET, HEAT CONDUCTOR			
4	3		1011868-1	54386900330		CLAMP, RIM CLENCHING			
3	6	NAS	1352C03LL4	74455157009		SCREW, CAP, SOC HD			
2	1		1011935	80386900060		SCT TRUNNION DRIVE HARNESS, ASS OF			
1	1		1011306	52386900610		HOUSING GEAR SCT TRUNNION DRIVE			

LIST OF PARTS AND MATERIALS

1011930	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900770
DRAWN R BRUNELLE DATE 6-20-63
CHECKED 7/12/63
APPROVAL 8/17/63
APPROVAL 8-15 63
NASA APPROVAL W J 8-16-63
MIT APPROVAL W 16 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCT TRUNNION DRIVE GEARBOX
ASSEMBLY OF

CODE IDENT NO.
SIZE E
NASA NUMBER 1011702
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

* PURCHASED ITEM:- SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

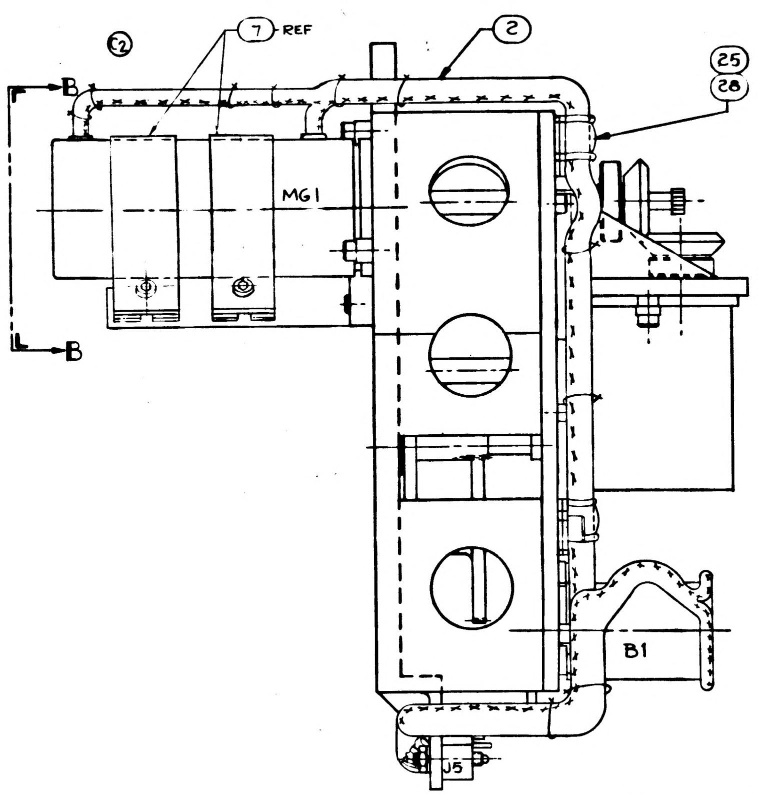
1011702

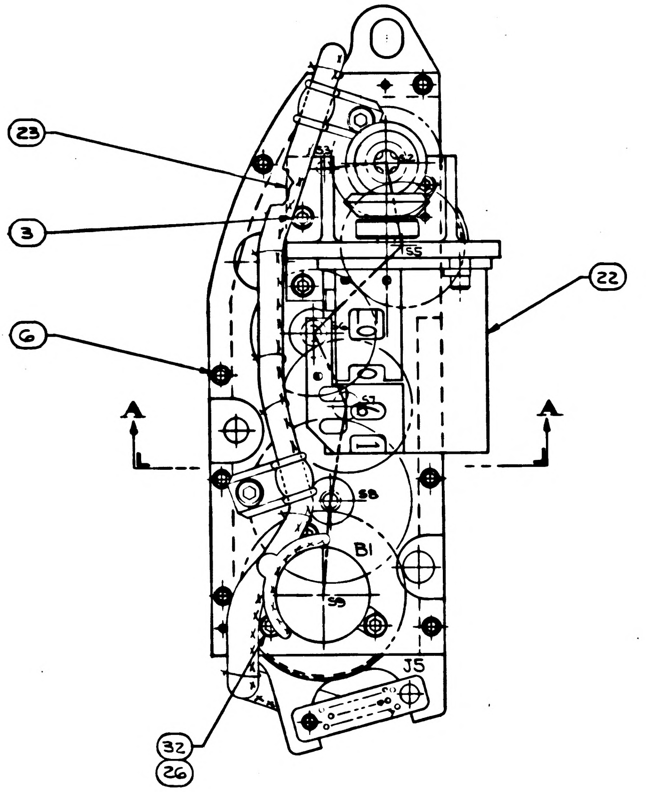
INCHES
0
PHOTOGRAPHIC SCALE ONLY

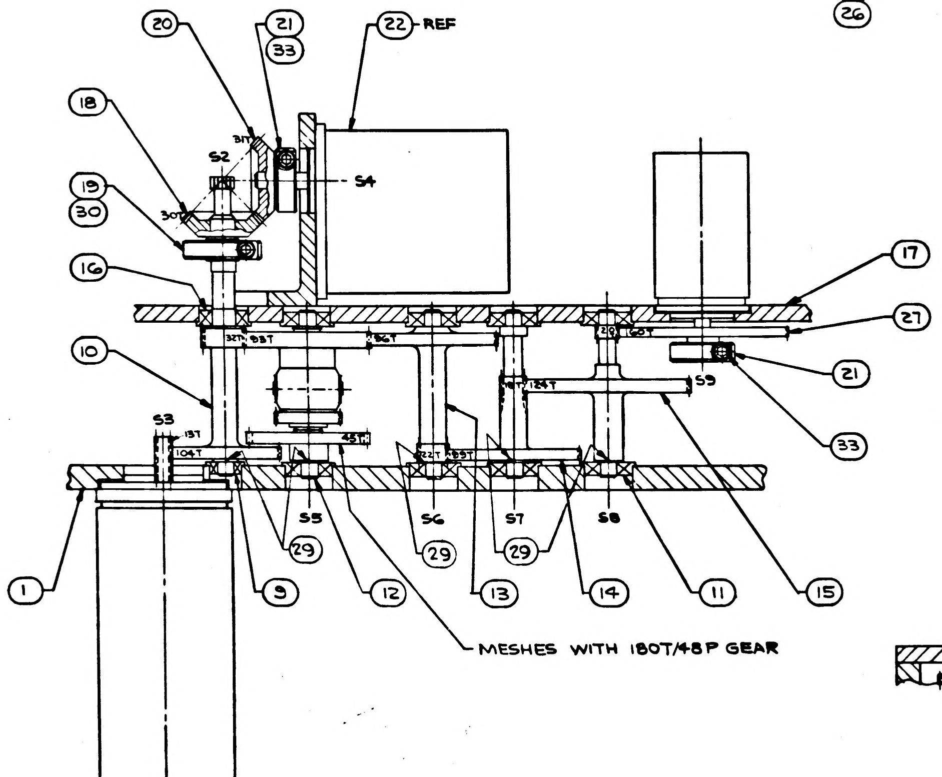
NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. USE ITEM 29 WHERE SHOWN AND AS REQD TO LIMIT END PLAY TO .004 MAX (B1) (C1)
3. IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019.

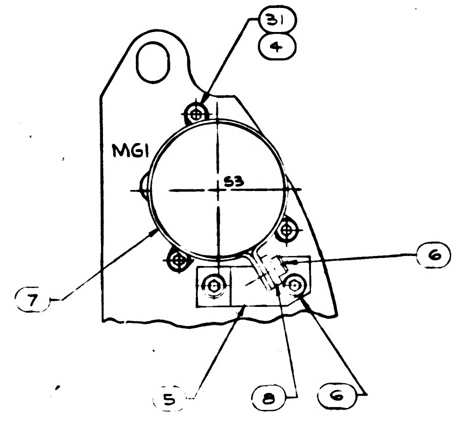
1011702 C

REVISIONS TDRR 02624				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO. 03058	5-9-63	WK
B		REVISED PER TDRR NO. 03991	17 Oct 63	WK
C4		REVISED PER TDRR NO. 07826		

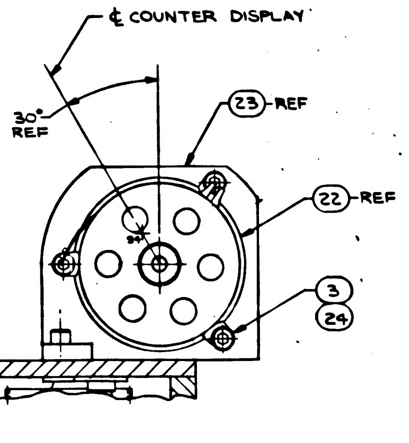








PARTIAL VIEW B-B



PARTIAL SECTION A-A

SEE NOTE #2 (C4)(B1) (C3)

ITEM NO.	QTY REQD		GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
33	2	*	1011625-11	74455151011		SCREW, CAP, SOC HD			
32	3	*	1011625-16	74455151016		SCREW, CAP, SOC HD			
31	3	*	1011625-18	74455151018		SCREW, CAP, SOC HD			
30	1	NAS	1352C02LL6	74455157007		SCREW, CAP, SOC HD			
29	AS REQD		1011804-	7938690 0301 0309		WASHER, FLAT			
28	2	NAS	1352C06LL4	74455157018		SCREW, CAP, SOC HD, SELF LOCKING			
27	1		1011277	33386900380		GEAR, SPUR (160T/120P)			
26	3		1011868-3	54386900332		CLAMP, RIM CLENCHING			
25	2	*	1000220-4			CLAMP, CABLE			
24	3		1011868-2	54386900331		CLAMP, RIM CLENCHING			
23	1		1011275	52386900570		BRACKET, COUNTER			
22	1	*	1011744	88237000001		COUNTER, ANGLE			
21	2		1011355-2	57386901331		CLAMP, COLLAR			
20	1		1011357	33386900540		GEAR, BEVEL (31T/48P)			
19	1		1011355-4	57386901333		CLAMP, COLLAR			
18	1		1011356	33386900530		GEAR, BEVEL (30T/48P)			
17	1		1011308	85386900280		PLATE, BEARING, ASSEMBLY OF			
16	1	*	1011608-4	30257700120		BEARING, BALL, ANNULAR (FLANGED)			
15	1		1011276	33386900370		GEARSHAFT (20T/120P, 124T/96P)			
14	1		1011279	33386900400		GEARSHAFT (18T/96P, 99T/96P)			
13	1		1011280	33386900410		GEARSHAFT (22T/96P, 96T/96P)			
12	1	*	1011281	74471370001		DIFFERENTIAL			
11	8	*	1011608-3	30257700082		BEARING, BALL, ANNULAR (FLANGED)			
10	1		1011358	33386900550		GEARSHAFT (104T/120P, 32T/96P)			
9	1	*	1011608-1	30257700080		BEARING, BALL, ANNULAR (FLANGED)			
8	2		1011802	563869004		PLATE FLAT			
7	2		1011314	56386900[illegible]		HEAT SINK			
6	11	NAS	1352C02LL4	74455157006		SCREW, CAP, SOC HD			
5	1		1011801	52386900870		BRACKET, HEAT CONDUCTOR			
4	3		1011868-1	54386900330		CLAMP, RIM CLENCHING			
3	6	NAS	1352C03LL4	74455157009		SCREW, CAP, SOC HD			
2	1		1011935	80386900060		SCT TRUNNION DRIVE HARNESS, ASSY OF			
1	1		1011306	52386900610		HOUSING GEAR SCT TRUNNION DRIVE			

LIST OF PARTS AND MATERIALS

* PURCHASED ITEM:- SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

1011890	1011000
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± / DECIMALS ± / ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900770
DRAWN R BRUNELLE DATE 6-20-63
CHECKED 7/12/63
APPROVAL 8/13/63
APPROVAL 8-15-63
NASA APPROVAL W G White 8-16-63
MIT APPROVAL W Kupfer 16 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCT TRUNNION DRIVE GEARBOX
ASSEMBLY OF

CODE IDENT NO.
SIZE E
NASA NUMBER 1011702
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

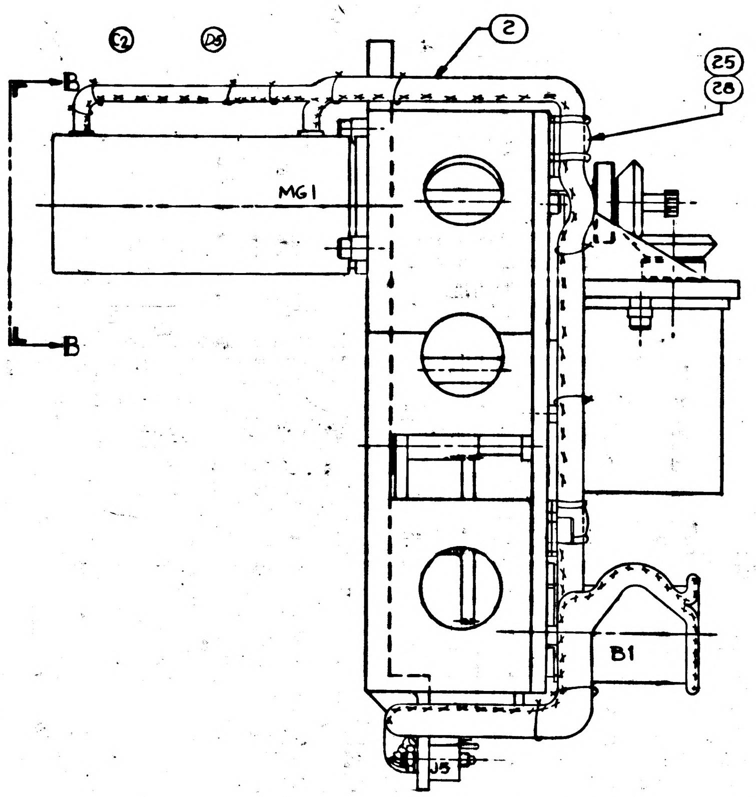
1011702

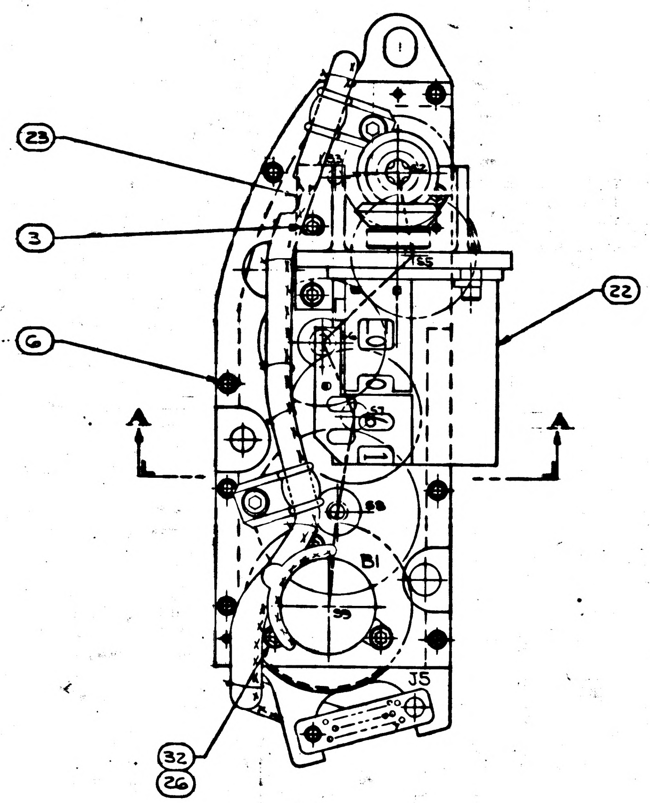
1011702 D

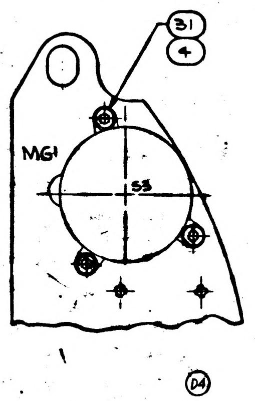
NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
(B1) 2. USE ITEM 29 WHERE SHOWN AND AS REQD TO LIMIT END PLAY TO .004 MAX.
3. IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019.

REVISIONS TDRR 02624

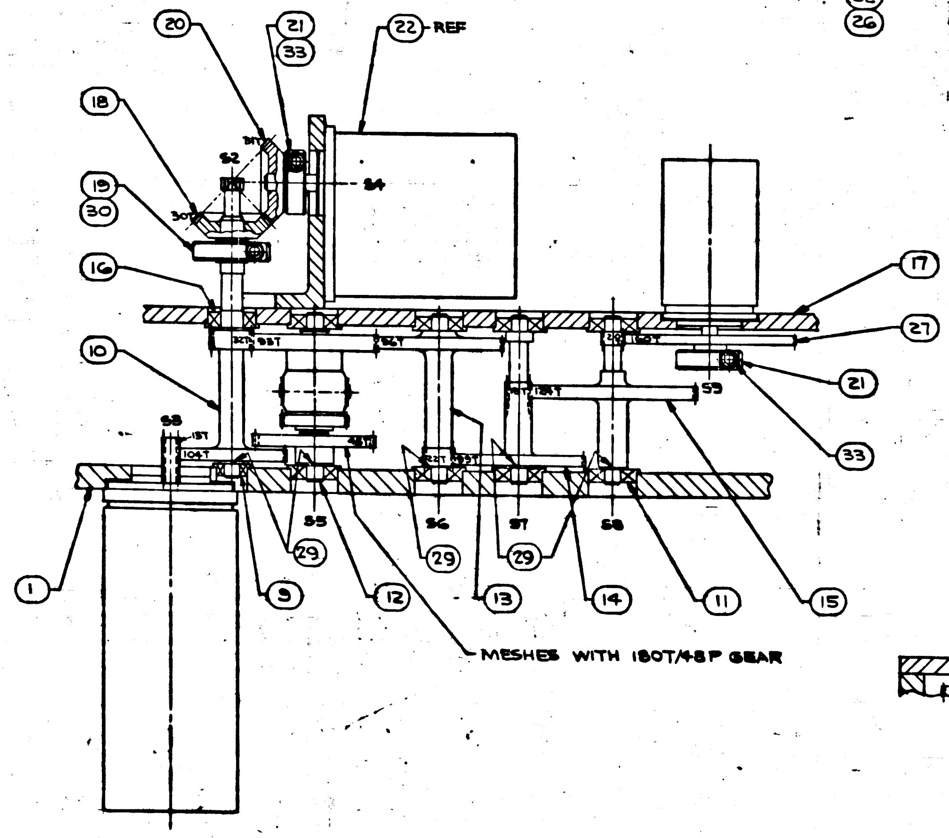
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO. 03058	5-9-63	WK
B		REVISED PER TDRR NO. 03991	17 Oct 63	WK
C4		REVISED PER TDRR NO. 07826		
D5		REVISED PER TDRR NO. 08030	4-20-64	

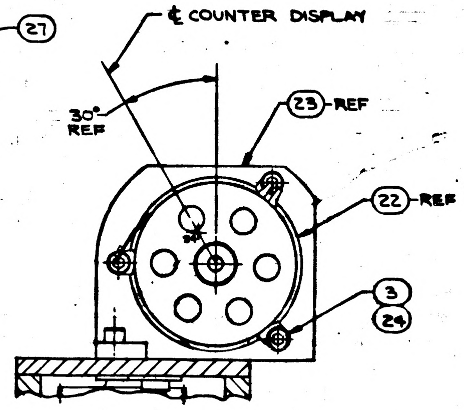






PARTIAL VIEW B-B





PARTIAL SECTION A-A

SEE NOTE #2 (C4)(B1)

ITEM NO.	QTY REQD		GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
33	2	*	1011625-11	74455151011		SCREW, CAP, SOC HD			
32	3	*	1011625-16	74455151016		SCREW, CAP, SOC HD			
31	3	*	1011625-18	74455151018		SCREW, CAP, SOC HD			
30	1	NAS	1352C02LL6	74455157007		SCREW, CAP, SOC HD			
29	AS REQD		1011804-	7938690 0501 0302		WASHER, FLAT			
28	2	NAS	1352C06LL4	74455157018		SCREW, CAP, SOC HD, SELF LOCKING			
27	1		1011277	33386900380		GEAR, SPUR (160T/120P)			
26	3		1011868-3	54386900332		CLAMP, RIM CLENCHING			
25	2	*	1000220-4			CLAMP, CABLE			
24	3		1011868-2	54386900331		CLAMP, RIM CLENCHING			
23	1		1011275	52386900570		BRACKET, COUNTER			
22	1	*	1011744	88237000001		COUNTER, ANGLE			
21	2		1011355-2	57386901331		CLAMP, COLLAR			
20	1		1011357	33386900540		GEAR, BEVEL (31T/48P)			
19	1		1011355-4	57386901333		CLAMP, COLLAR			
18	1		1011356	33386900530		GEAR, BEVEL (30T/48P)			
17	1		1011308	85386900280		PLATE, BEARING, ASSEMBLY OF			
16	1	*	1011608-4	30257700120		BEARING, BALL, ANNULAR (FLANGED)			
15	1		1011276	33386900370		GEARSHAFT (20T/120P, 124T/96P)			
14	1		1011279	33386900400		GEARSHAFT (18T/96P, 99T/96P)			
13	1		1011280	33386900410		GEARSHAFT (22T/96P, 96T/96P)			
12	1	*	1011281	74471370001		DIFFERENTIAL			
11	8	*	1011608-3	30257700082		BEARING, BALL, ANNULAR (FLANGED)			
10	1		1011358	33386900550		GEARSHAFT (104T/120P, 32T/96P)			
9	1	*	1011608-1	30257700080		BEARING, BALL, ANNULAR (FLANGED)			
8									
7									
6	7	NAS	1352C02LL4	74455157006		SCREW, CAP, SOC HD			
5									
4	3		1011868-1	54386900330		CLAMP, RIM CLENCHING			
3	6	NAS	1352C03LL4	74455157009		SCREW, CAP, SOC HD			
2	1		1011935	80386900060		SCT TRUNNION DRIVE HARNESS, ASSY OF			
1	1		1011306	52386900610		HOUSING GEAR SCT TRUNNION DRIVE			

LIST OF PARTS AND MATERIALS

* PURCHASED ITEM:- SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

MASTER

1011930	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900770
DRAWN R BRUNELLE DATE 6-20-63
CHECKED 7/12/63
APPROVAL 8/1/63
APPROVAL 8-15-63
NASA APPROVAL W.J. 8-26-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCT TRUNNION DRIVE GEARBOX
ASSEMBLY OF

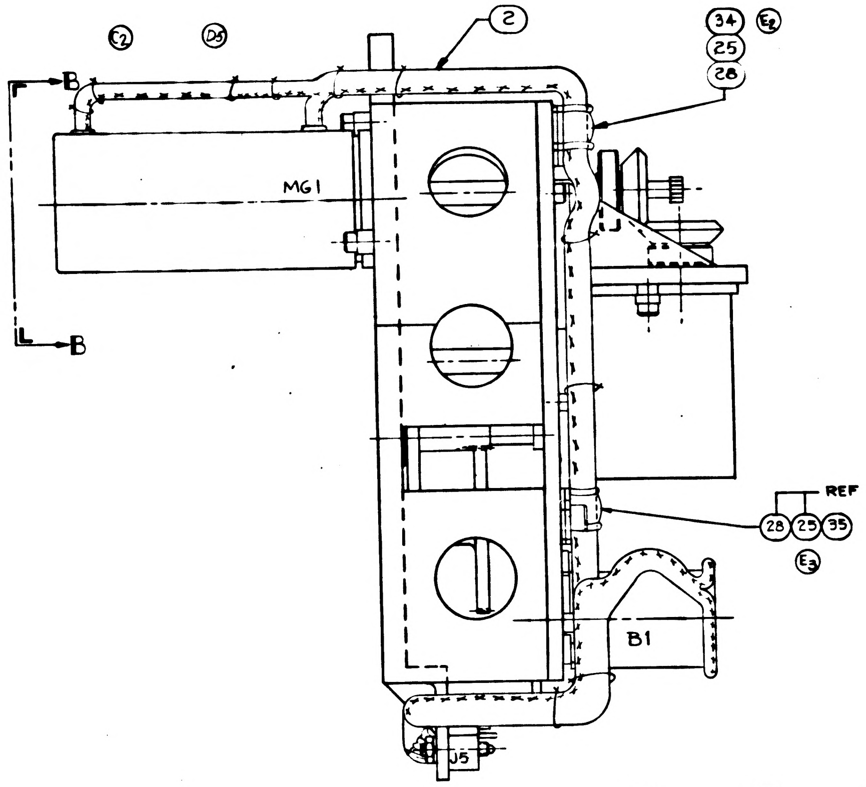
CODE IDENT NO.
SIZE E
NASA NUMBER 1011702
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

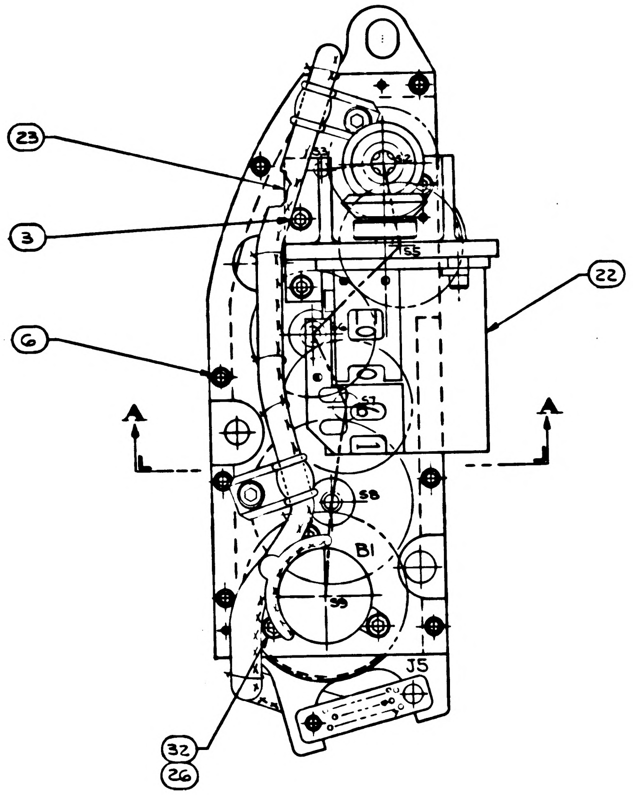
1011702 E

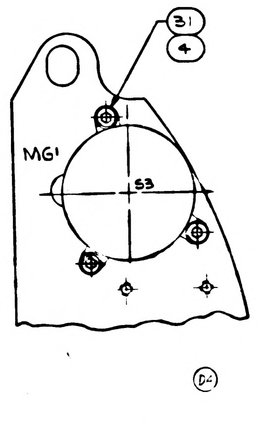
NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327. (E1)
2. USE ITEM 29 WHERE SHOWN AND AS REQD TO LIMIT END PLAY TO .004 MAX (B1)
3. IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019.

REVISIONS TDRR 02624

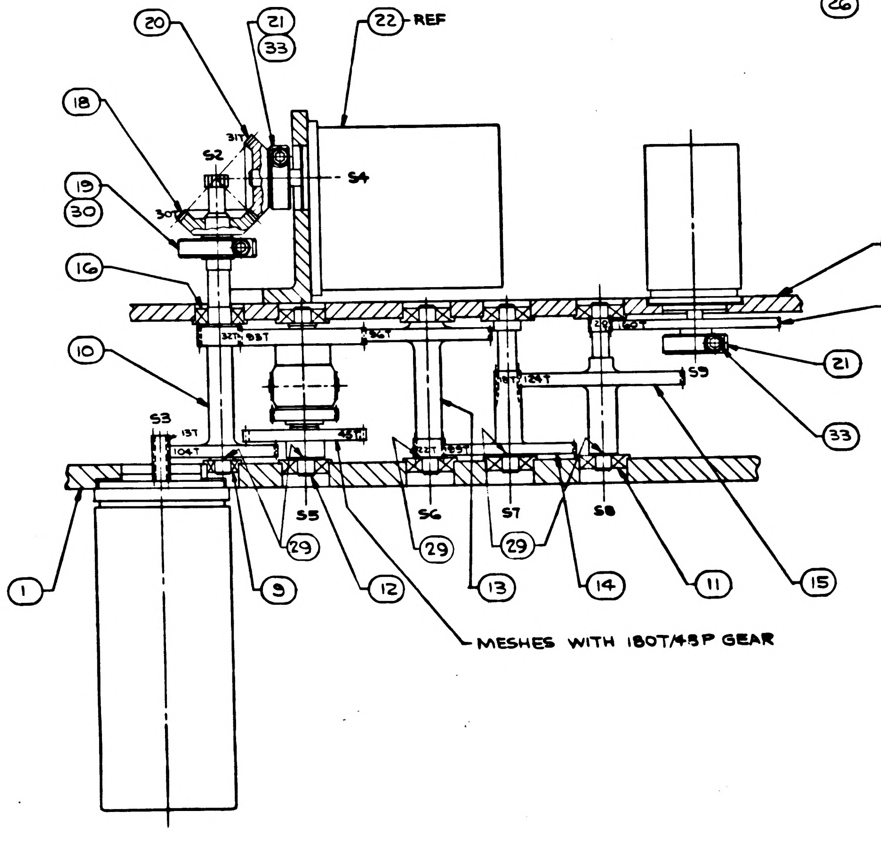
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO. 03058	5-9-63	WR
B		REVISED PER TDRR NO. 03991	17 Oct 63	
C4		REVISED PER TDRR NO. 07826		
D5		REVISED PER TDRR NO. 08030	4-20-64	
E3		REVISED PER TDRR NO. 08449	5/12/64	

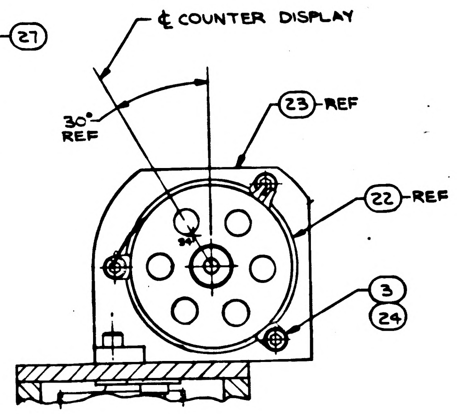






PARTIAL VIEW B-B





PARTIAL SECTION A-A

SEE NOTE #2 (C4)(B1)

ITEM NO.	QTY REQD		GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
(E1) 35	1		MS15795-305			WASHER, FLAT, METAL, ROUND			
34	1		1011918-3			WASHER, CABLE CLAMP			
33	2	*	1011625-11	74455151011		SCREW, CAP, SOC HD			
(C3) 32	3	*	1011625-16	74455151016		SCREW, CAP, SOC HD			
31	3	*	1011625-18	74455151018		SCREW, CAP, SOC HD			
30	1	NAS	1352C02LL6	74455157007		SCREW, CAP, SOC HD			
29	AS REQD		1011804-	7938690 0301 0309		WASHER, FLAT			
28	2	NAS	1352C06LL4	74455157018		SCREW, CAP, SOC HD, SELF LOCKING			
27	1		1011277	33386900380		GEAR, SPUR (160T/120P)			
26	3		1011868-3	54386900332		CLAMP, RIM CLENCHING			
25	2	*	1000220-4			CLAMP, CABLE			
24	3		1011868-2	54386900331		CLAMP, RIM CLENCHING			
23	1		1011275	52386900570		BRACKET, COUNTER			
22	1	*	1011744	88237000001		COUNTER, ANGLE			
21	2		1011355-2	57386901331		CLAMP, COLLAR			
20	1		1011357	33386900540		GEAR, BEVEL (31T/48P)			
19	1		1011355-4	57386901333		CLAMP, COLLAR			
18	1		1011356	33386900530		GEAR, BEVEL (30T/48P)			
17	1		1011308	85386900280		PLATE, BEARING, ASSEMBLY OF			
16	1	*	1011608-4	30257700120		BEARING, BALL, ANNULAR (FLANGED)			
15	1		1011276	33386900370		GEARSHAFT (20T/120P, 124T/96P)			
14	1		1011279	33386900400		GEARSHAFT (18T/96P, 99T/96P)			
13	1		1011280	33386900410		GEARSHAFT (22T/96P, 96T/96P)			
12	1	*	1011281	74471370001		DIFFERENTIAL			
11	8	*	1011608-3	30257700082		BEARING, BALL, ANNULAR (FLANGED)			
10	1		1011358	33386900550		GEARSHAFT (104T/120P, 32T/96P)			
9	1	*	1011608-1	30257700080		BEARING, BALL, ANNULAR (FLANGED)			
(D3) 8									
7									
(D1) 6	7	NAS	1352C02LL4	74455157006		SCREW, CAP, SOC HD			
(D2) 5									
4	3		1011868-1	54386900330		CLAMP, RIM CLENCHING			
3	6	NAS	1352C03LL4	74455157009		SCREW, CAP, SOC HD			
2	1		1011935	80386900060		SCT TRUNNION DRIVE HARNESS ASSY OF			
1	1		1011306	52386900610		HOUSING GEAR SCT TRUNNION DRIVE			

LIST OF PARTS AND MATERIALS

* PURCHASED ITEM:- SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

1011890	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900770
DRAWN R BRUNELLE DATE 6-20-63
CHECKED 7/12/63
APPROVAL 8/13/63
APPROVAL 8-15-63
NASA APPROVAL W G White 8-26-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCT TRUNNION DRIVE GEARBOX
ASSEMBLY OF

CODE IDENT NO. | SIZE E | NASA NUMBER 1011702
SCALE 2/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

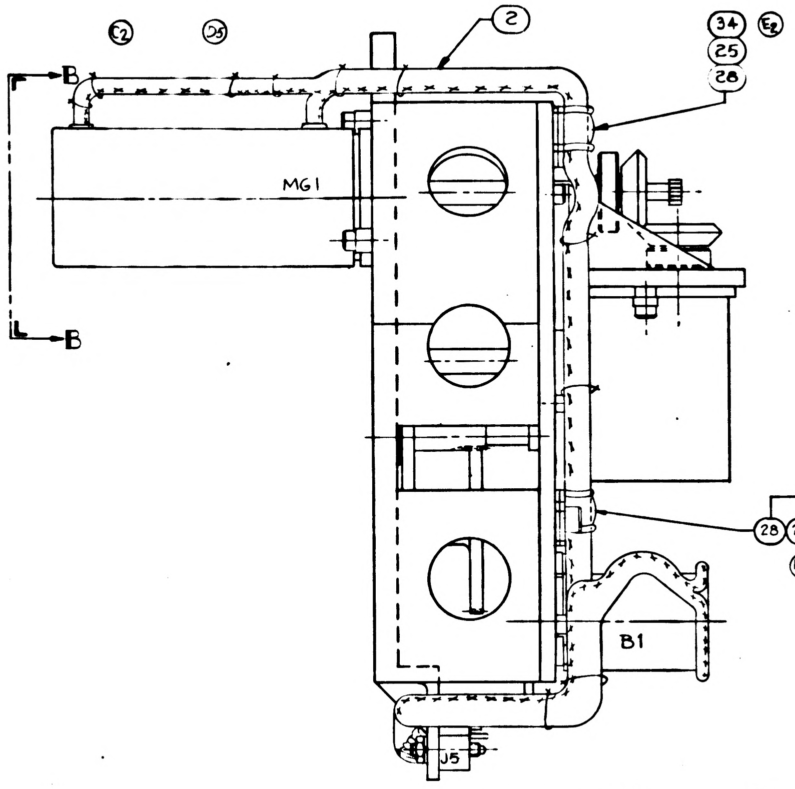
F	1011702

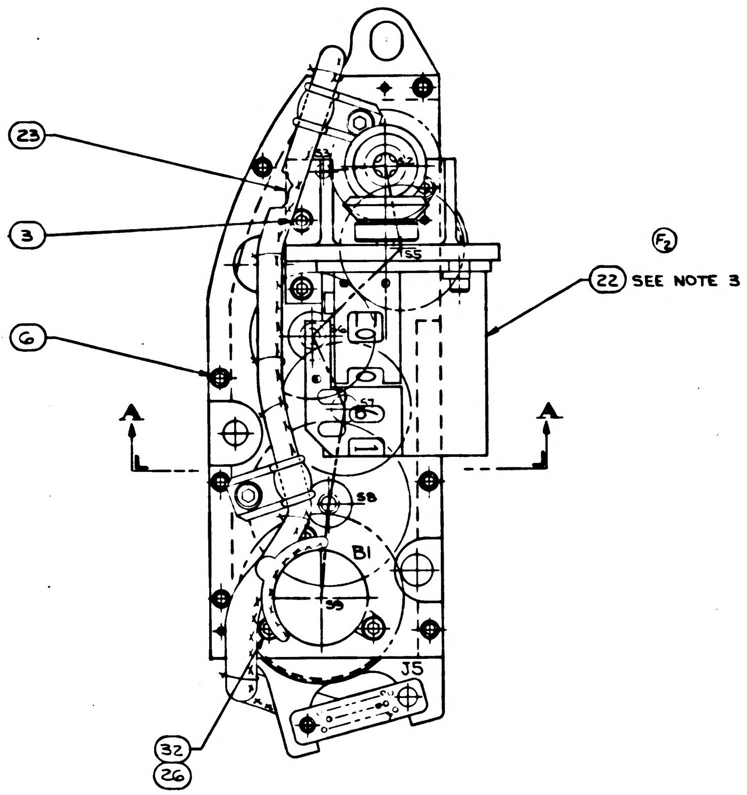
NOTES:

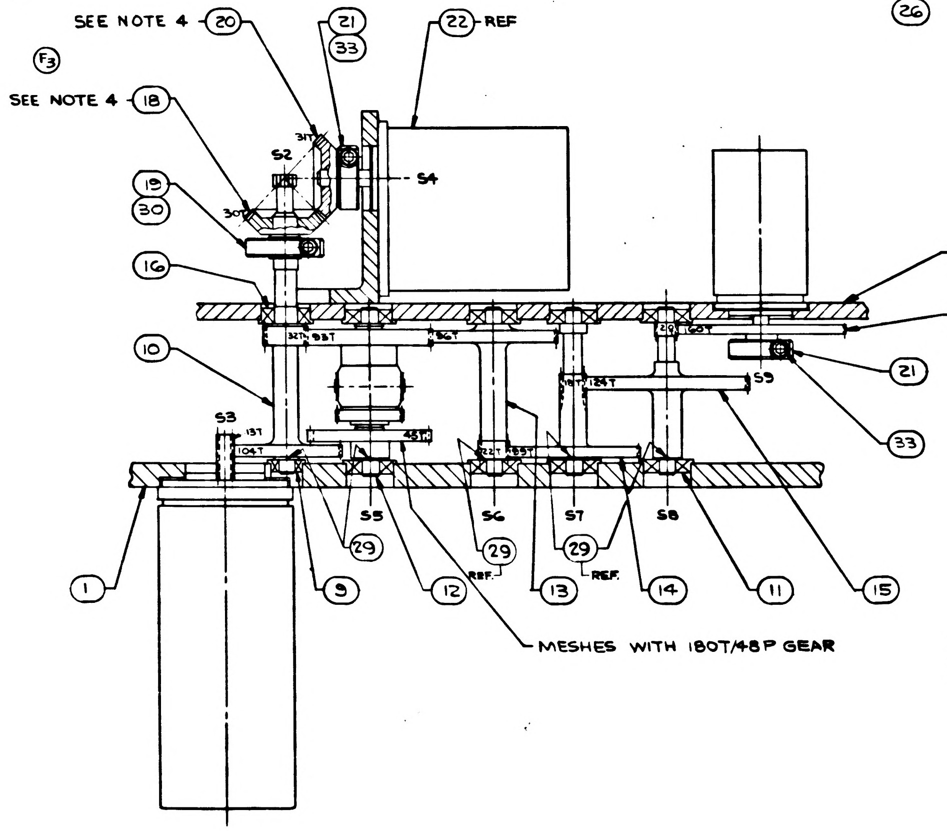
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. FLAT WASHERS (ITEM 29), OF INCREMENTAL THICKNESS, SHALL BE SELECTED AND INSERTED BETWEEN GEARSHAFT SHOULDERS AND BEARING TO LIMIT END PLAY TO .004 IN. MAX AT SHAFTS S2, S5, S6, S7 AND S8.
3. COUNTER (ITEM 22) SHALL REGISTER ZERO WHEN RESOLVER B1 IS AT ITS NULL SETTING INDICATED BY MARKING ON SHAFT AND BODY.
4. BEVEL GEARS (ITEMS 18 AND 20) SHALL BE ALIGNED FOR MINIMUM BACKLASH COMPATIBLE WITH NOTE 5. (F1) (C1) (B)
5. COMPLETE ASSEMBLY SHALL START WHEN THE MOTOR MG-1 IS ENERGIZED WITH 4.0 VOLTS, 400 CPS MAX, AND RUN CONTINUOUSLY AT 2.0 VOLTS MAX, IN EITHER DIRECTION, THROUGH 360° COUNTER ROTATION EXCEPT AT 0° AND 180° POINTS WHERE THE STARTING AND RUNNING VOLTAGES MAY BE 8.0 VOLTS MAX. STARTING VOLTAGE TO BE CHECKED AT POINTS WHERE DRIVE APPEARS TO SLOW DOWN.
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019.

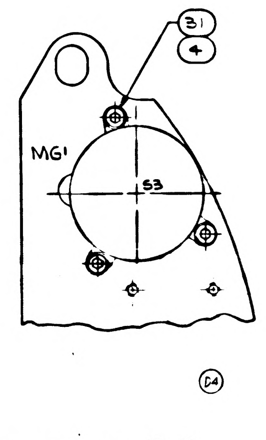
REVISIONS TDRR 02624

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO. 03058	5-9-63	WK
B		REVISED PER TDRR NO. 03991	17 Oct 63	wk
C4		REVISED PER TDRR NO. 07826	[illegible]	[illegible]
D5		REVISED PER TDRR NO. 08030	4-20-64	[illegible]
E3		REVISED PER TDRR NO. 08449	5/12/64	[illegible]
F		REVISED PER TDRR NO. 08475	8/14/64	[illegible]

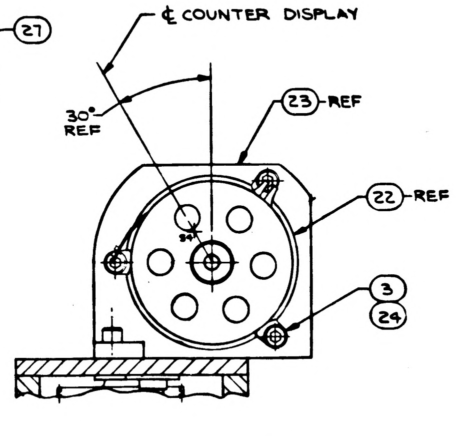








PARTIAL VIEW B-B



PARTIAL SECTION A-A

SEE NOTE #2

ITEM NO	QTY REQD		GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
(E1) 35	1		MS15795-305			WASHER, FLAT, METAL, ROUND			
34	1		1011918-3			WASHER, CABLE CLAMP			
33	2	*	1011625-11	74455151011		SCREW, CAP, SOC HD			
(C3) 32	3	*	1011625-16	74455151016		SCREW, CAP, SOC HD			
31	3	*	1011625-18	74455151018		SCREW, CAP, SOC HD			
30	1	NAS	1352C02LL6	74455157007		SCREW, CAP, SOC HD			
(C4) (B1) 29	AS REQD		1011804-	7938690 0301 0309		WASHER, FLAT			
28	2	NAS	1352C06LL4	74455157018		SCREW, CAP, SOC HD, SELF LOCKING			
27	1		1011277	33386900380		GEAR, SPUR (160T/120P)			
26	3		1011868-3	54386900332		CLAMP, RIM CLENCHING			
25	2	*	1000220-4			CLAMP, CABLE			
24	3		1011868-2	54386900331		CLAMP, RIM CLENCHING			
23	1		1011275	52386900570		BRACKET, COUNTER			
22	1	*	1011744	88237000001		COUNTER, ANGLE			
21	2		1011355-2	57386901331		CLAMP, COLLAR			
20	1		1011357	33386900540		GEAR, BEVEL (31T/48P)			
19	1		1011355-4	57386901333		CLAMP, COLLAR			
18	1		1011356	33386900530		GEAR, BEVEL (30T/48P)			
17	1		1011308	85386900280		PLATE, BEARING, ASSEMBLY OF			
16	1	*	1011608-4	30257700120		BEARING, BALL, ANNULAR (FLANGED)			
15	1		1011276	33386900370		GEARSHAFT (20T/120P, 124T/96P)			
14	1		1011279	33386900400		GEARSHAFT (18T/96P, 99T/96P)			
13	1		1011280	33386900410		GEARSHAFT (22T/96P, 96T/96P)			
12	1	*	1011281	74471370001		DIFFERENTIAL			
11	8	*	1011608-3	30257700082		BEARING, BALL, ANNULAR (FLANGED)			
10	1		1011358	33386900550		GEARSHAFT (104T/120P, 32T/96P)			
9	1	*	1011608-1	30257700080		BEARING, BALL, ANNULAR (FLANGED)			
(D3) 8									
7									
(D1) 6	7	NAS	1352C02LL4	74455157006		SCREW, CAP, SOC HD			
(D2) 5									
4	3		1011868-1	54386900330		CLAMP, RIM CLENCHING			
3	6	NAS	1352C03LL4	74455157009		SCREW, CAP, SOC HD			
2	1		1011935	80386900060		SCT TRUNNION DRIVE HARNESS ASSY OF			
1	1		1011306	52386900610		HOUSING GEAR SCT TRUNNION DRIVE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900770
DRAWN R BRUNELLE DATE 6-20-63
CHECKED [illegible] 7/12/63
APPROVAL [illegible] 8/7/63
APPROVAL [illegible] 8-5-63
NASA APPROVAL W J [illegible] 8-16-63
MIT APPROVAL W Kupfer [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCT TRUNNION DRIVE GEARBOX ASSEMBLY OF.

CODE IDENT NO. | SIZE E | NASA NUMBER 1011702
SCALE 2/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

* PURCHASED ITEM:- SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

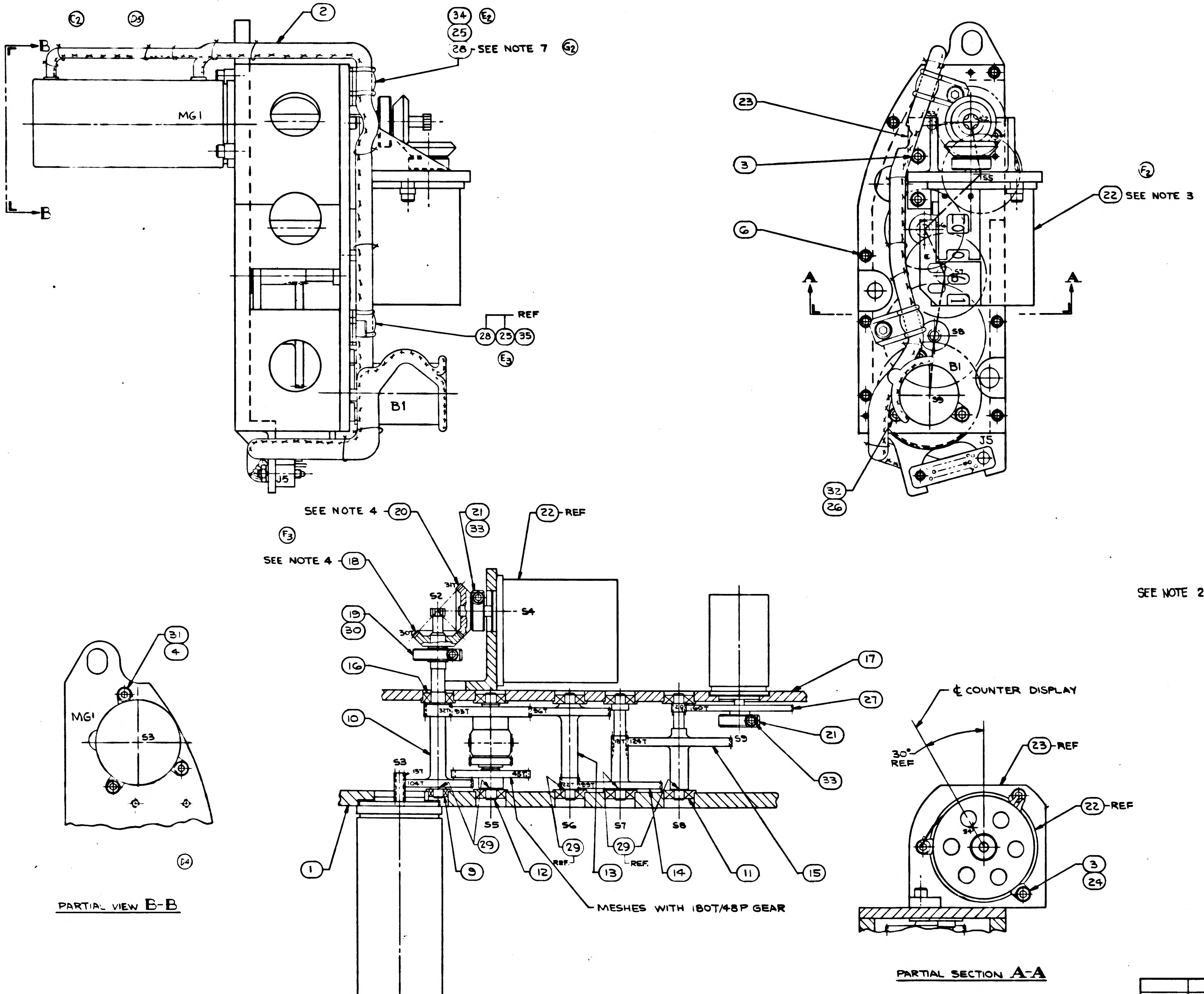
1011702 F

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. FLAT WASHERS (ITEM 29), OF INCREMENTAL THICKNESS, SHALL BE SELECTED AND INSERTED BETWEEN GEARSHAFT SHOULDERS AND BEARING TO LIMIT END PLAY TO .004 IN. MAX AT SHAFTS S2, S5, S6, S7 AND S8.
3. COUNTER (ITEM 22) SHALL REGISTER ZERO WHEN RESOLVER B1 IS AT ITS NULL SETTING INDICATED BY MARKING ON SHAFT AND BODY.
4. BEVEL GEARS (ITEMS 18 AND 20) SHALL BE ALIGNED FOR MINIMUM BACKLASH COMPATIBLE WITH NOTE 5. (F1) (C1) (B1)
5. COMPLETE ASSEMBLY SHALL START WHEN THE MOTOR MG-1 IS ENERGIZED WITH 4.0 VOLTS, 400 CPS MAX, AND RUN CONTINUOUSLY AT 2.0 VOLTS MAX, IN EITHER DIRECTION, THROUGH 360° COUNTER ROTATION EXCEPT AT 0° AND 80° POINTS WHERE THE STARTING AND RUNNING VOLTAGES MAY BE 8.0 VOLTS MAX. STARTING VOLTAGE TO BE CHECKED AT POINTS WHERE DRIVE APPEARS TO SLOW DOWN.
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019.
7. VIBRATION PROOF ITEM 28 USING LOCKING COMPOUND GRADE "EV" PER MIL-S-22473. (G3)

G	2011701

REVISIONS TDRR 02624

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO. 03058	5-9-63	WR
B		REVISED PER TDRR NO. C3991	17 Oct 63	WR
C4		REVISED PER TDRR NO. 07826		
D5		REVISED PER TDRR NO. 08030	4-20-64	
E3		REVISED PER TDRR NO. 08449	5/12/64	
F		REVISED PER TDRR NO. 08475	5/14/64	
G3		REVISED PER TDRR NO. 08617	5/19/64	



	ITEM NO.	QTY REQD		GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
(E1)	35	1		MS15795-305			WASHER, FLAT, METAL, ROUND			
	34	1		1011918-3			WASHER, CABLE CLAMP			
	33	2	*	1011625-11	74455151011		SCREW, CAP, SOC HD			
(C3)	32	3	*	1011625-16	74455151016		SCREW, CAP, SOC HD			
	31	3	*	1011625-18	74455151018		SCREW, CAP, SOC HD			
	30	1	NAS	1352C02LL6	74455157007		SCREW, CAP, SOC HD			
SEE NOTE 2 (C4) (B1)	29	AS REQD		1011804-	7938690 0301 0304		WASHER, FLAT			
(G1)	28	2	NAS	1352C06-6			SCREW, CAP, SOC HD			
	27	1		1011277	33386900380		GEAR, SPUR (160T/120P)			
	26	3		1011868-3	54386900332		CLAMP, RIM CLENCHING			
	25	2	*	1000220-4			CLAMP, CABLE			
	24	3		1011868-2	54386900331		CLAMP, RIM CLENCHING			
	23	1		1011275	52386900570		BRACKET, COUNTER			
	22	1	*	1011744	88237000001		COUNTER, ANGLE			
	21	2		1011355-2	57386901331		CLAMP, COLLAR			
	20	1		1011357	33386900540		GEAR, BEVEL (31T/48P)			
	19	1		1011355-4	57386901333		CLAMP, COLLAR			
	18	1		1011356	33386900530		GEAR, BEVEL (30T/48P)			
	17	1		1011308	85386900280		PLATE, BEARING, ASSEMBLY OF			
	16	1	*	1011608-4	30257700120		BEARING, BALL, ANNULAR, FLANGED)			
	15	1		1011276	33386900370		GEARSHAFT (20T/120P, 124T/96P)			
	14	1		1011279	33386900400		GEARSHAFT (18T/96P, 99T/96P)			
	13	1		1011280	33386900410		GEARSHAFT (22T/96P, 96T/96P)			
	12	1	*	1011281	74471370001		DIFFERENTIAL			
	11	8	*	1011608-3	30257700082		BEARING, BALL, ANNULAR, FLANGED)			
	10	1		1011358	33386900550		GEARSHAFT (104T/120P, 32T/96P)			
	9	1	*	1011608-1	30257700080		BEARING, BALL, ANNULAR (FLANGED)			
(D8)	8									
	7									
(C1)	6	[illegible]	NAS	1352C02LL4	74455157006		SCREW, CAP, SOC HD			
(D2)	5									
	4	3		1011868-1	54386900330		CLAMP, RIM CLENCHING			
	3	6	NAS	1352C03LL4	74455157009		SCREW, CAP, SOC HD			
	2	1		1011935	80386900060		SCT TRUNNION DRIVE HARNESS ASSY OF			
	1	1		1011306	52386900610		HOUSING GEAR SCT TRUNNION DRIVE			

LIST OF PARTS AND MATERIALS

* PURCHASED ITEM:- SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

NEXT ASSY	USED ON
1011850	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900770

DRAWN R BRUNELLE DATE 6-20-63
CHECKED 7/12/63
APPROVAL 8/7/63
APPROVAL 8/15/63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCT TRUNNION DRIVE GEARBOX
ASSEMBLY OF

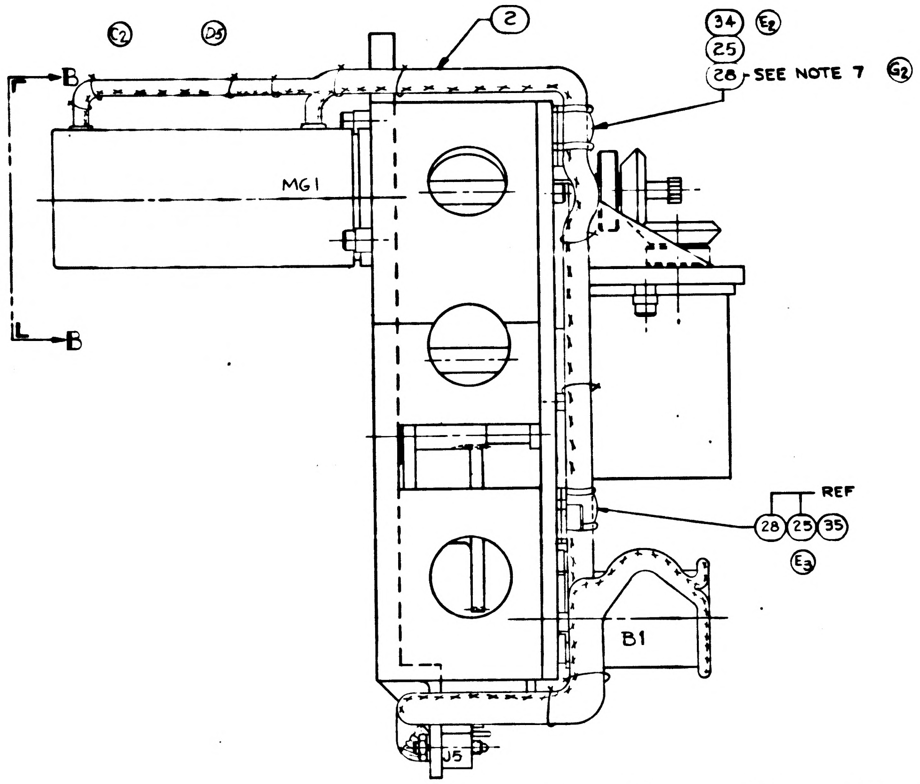
CODE IDENT NO.
SIZE E
NASA NUMBER 1011702
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

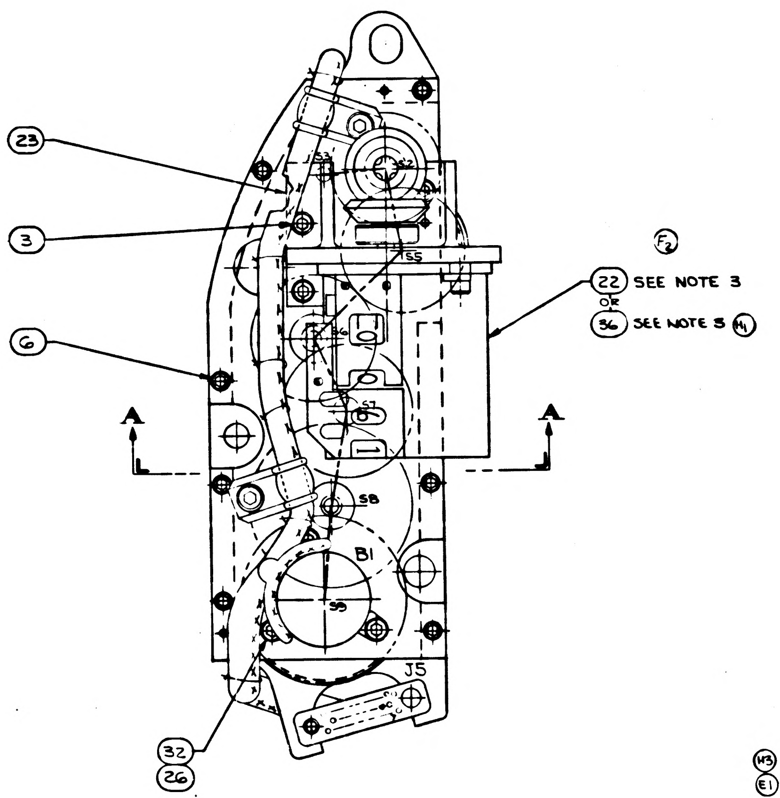
H 2011101

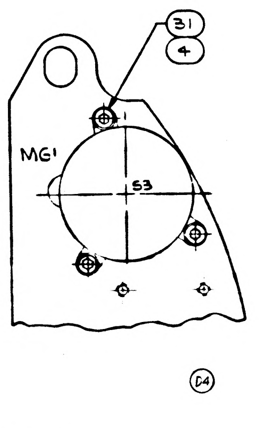
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. FLAT WASHERS (ITEM 29), OF INCREMENTAL THICKNESS, SHALL BE SELECTED AND INSERTED BETWEEN GEARSHAFT SHOULDERS AND BEARING TO LIMIT END PLAY TO .004 IN. MAX AT SHAFTS S2, S5, S6, S7 AND S8.
3. COUNTER (ITEM 22 OR 36) SHALL REGISTER ZERO WHEN RESOLVER B1 IS AT ITS NULL SETTING INDICATED BY MARKING ON SHAFT AND BODY.
4. BEVEL GEARS (ITEMS 18 AND 20) SHALL BE ALIGNED FOR MINIMUM BACKLASH COMPATIBLE WITH NOTE 5. (F1) (C1) (B1)
5. COMPLETE ASSEMBLY SHALL START WHEN THE MOTOR MG-1 IS ENERGIZED WITH 4.0 VOLTS, 400 CPS MAX, AND RUN CONTINUOUSLY AT 2.0 VOLTS MAX, IN EITHER DIRECTION, THROUGH 360° COUNTER ROTATION EXCEPT AT 0° AND 180° POINTS WHERE THE STARTING AND RUNNING VOLTAGES MAY BE 8.0 VOLTS MAX. STARTING VOLTAGE TO BE CHECKED AT POINTS WHERE DRIVE APPEARS TO SLOW DOWN.
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.
7. VIBRATION PROOF ITEM 28 USING LOCKING COMPOUND GRADE "EV" PER MIL-S-22473. (G3)

REVISIONS TDRR 22624

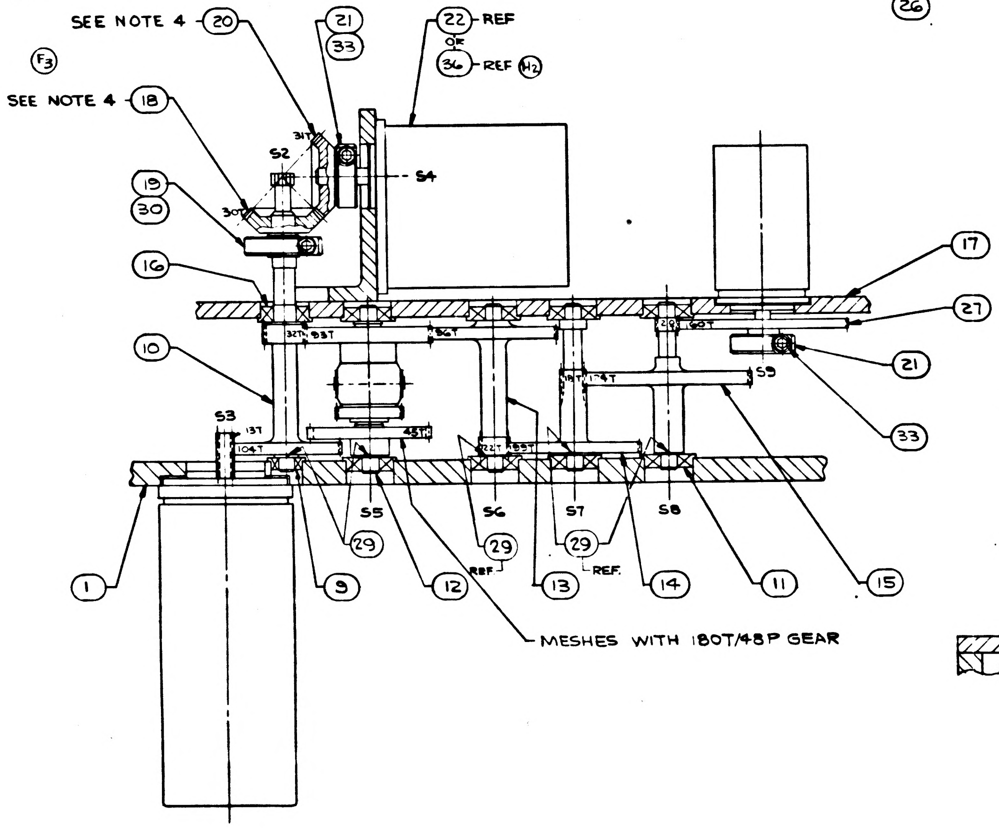
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO. 03058	5-9-63	WK
B		REVISED PER TDRR NO. 03991	17 Oct 63	
C4		REVISED PER TDRR NO. 07826		
D5		REVISED PER TDRR NO. 08030	4-28-64	
E3		REVISED PER TDRR NO. 08449	5/12/64	
F		REVISED PER TDRR NO. 08475	5/14/64	
G3		REVISED PER TDRR NO. 08617	5/19/64	
H3		REVISED PER TDRR NO. 15345	1/4/65	

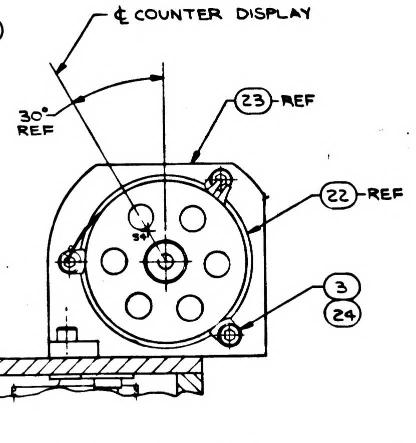






PARTIAL VIEW B-B





PARTIAL SECTION A-A

	QTY REQ 001	QTY REQ 000	ITEM NO.			GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
(H3)	1	0	36		*	1012512	75005006801		COUNTER, ANGLE			
(E1)	1	1	35			MS15795-305			WASHER, FLAT, METAL, ROUND			
	1	1	34			1011918-3			WASHER, CABLE CLAMP			
	2	2	33		*	1011625-11	74455151011		SCREW, CAP, SOC HD			
(C3)	3	3	32		*	1011625-16	74455151016		SCREW, CAP, SOC HD			
	3	3	31		*	1011625-18	74455151018		SCREW, CAP, SOC HD			
	1		30			NAS 1352C02LL6	74455157007		SCREW, CAP, SOC HD			
SEE NOTE 2 (C4) (B1)	AS REQ	AS REQ	29			1011804-	7938690 0301 0309		WASHER, FLAT			
(G1)	2	2	28			NAS 1352C06-6			SCREW, CAP, SOC HD			
	1	1	27			1011277	33386900380		GEAR, SPUR (160T/120P)			
	3	3	26			1011868-3	54386900332		CLAMP, RIM CLENCHING			
	2	2	25		*	1000220-4			CLAMP, CABLE			
	3	3	24			1011868-2	54386900331		CLAMP, RIM CLENCHING			
	1	1	23			1011275	52386900570		BRACKET, COUNTER			
	0	1	22		*	1011744	88237000001		COUNTER, ANGLE			
	2	2	21			1011355-2	57386901331		CLAMP, COLLAR			
	1	1	20			1011357	33386900540		GEAR, BEVEL (31T/48P)			
	1	1	19			1011355-4	57386901333		CLAMP, COLLAR			
	1	1	18			1011356	33386900530		GEAR, BEVEL (30T/48P)			
	1	1	17			1011308	85386900280		PLATE, BEARING, ASSEMBLY OF			
	1	1	16		*	1011608-4	30257700120		BEARING, BALL, ANNULAR (FLANGED)			
	1	1	15			1011276	33386900370		GEARSHAFT (20T/120P, 124T/96P)			
	1	1	14			1011279	33386900400		GEARSHAFT (18T/96P, 99T/96P)			
	1	1	13			1011280	33386900410		GEARSHAFT (22T/96P, 96T/96P)			
	1	1	12		*	1011281	74471370001		DIFFERENTIAL			
	8	8	11		*	1011608-3	30257700082		BEARING, BALL, ANNULAR (FLANGED)			
	1	1	10			1011358	33386900550		GEARSHAFT (104T/120P, 32T/96P)			
	1	1	9		*	1011608-1	30257700080		BEARING, BALL, ANNULAR (FLANGED)			
(D3)			8									
			7									
(D1)	7	7	6			NAS 1352C02LL4	74455157006		SCREW, CAP, SOC HD			
(D2)			5									
	3	3	4			1011868-1	54386900330		CLAMP, RIM CLENCHING			
	6	6	3			NAS 1352C03LL4	74455157009		SCREW, CAP, SOC HD			
	1	1	2			1011935	80386900060		SCT TRUNNION DRIVE HARNESS, ASSY OF			
	1	1	1			1011306	52386900610		HOUSING GEAR SCT TRUNNION DRIVE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900770
DRAWN R BRUNELLE DATE 6-20-63
CHECKED 7/12/63
APPROVAL
APPROVAL 8-15-63
NASA APPROVAL W J White
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCT TRUNNION DRIVE GEARBOX
ASSEMBLY OF

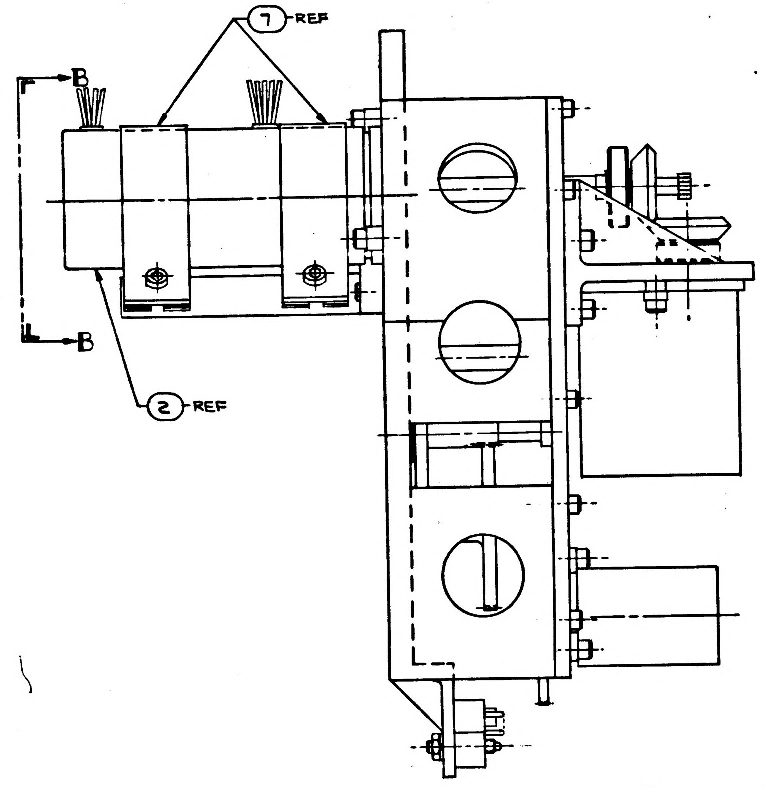
CODE IDENT NO.
SIZE E
NASA NUMBER 1011702
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

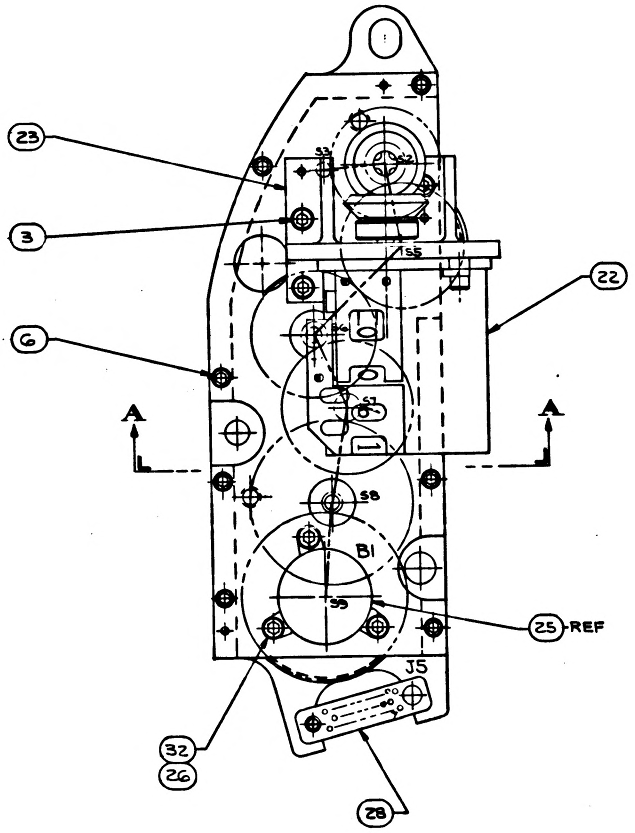
* PURCHASED ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

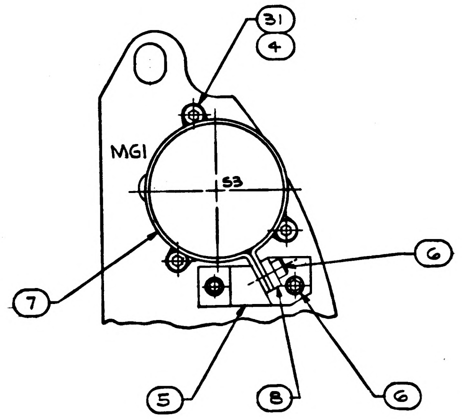
2021101

REVISIONS TDRR 02629				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

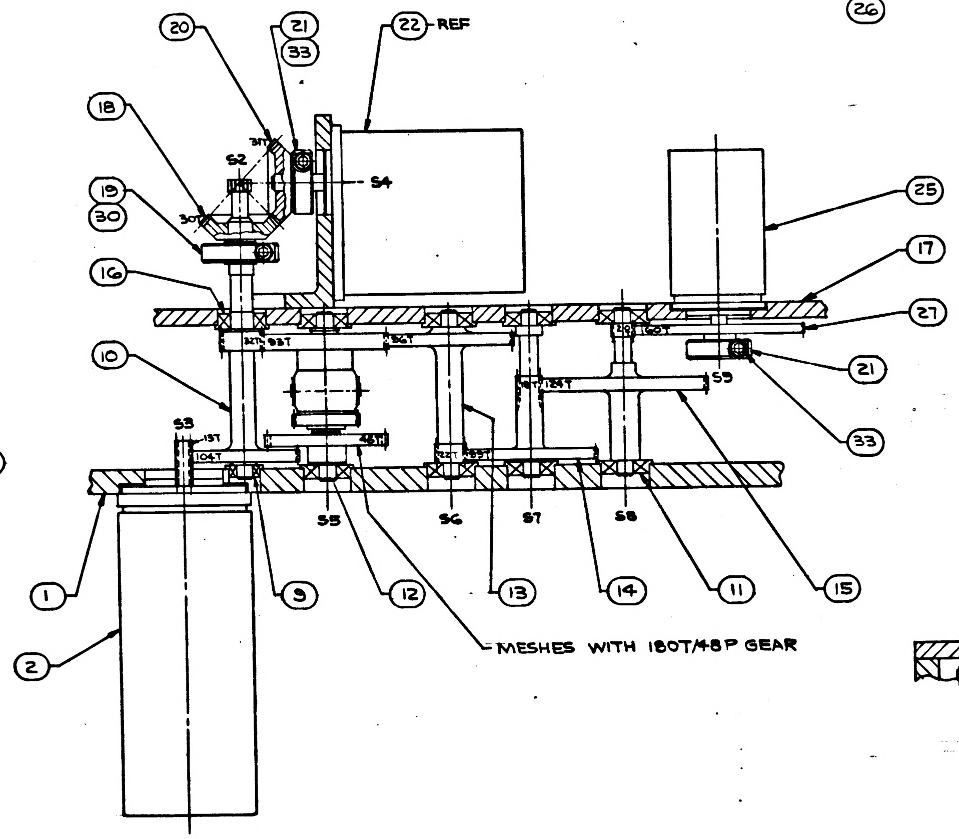
NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. SHIM SHAFTS TO OBTAIN ZERO ENDPLAY
3. ALIGN BEVEL GEARS (ITEMS 18 & 20) FOR "ZERO" BACKLASH
4. RUBBER STAMP COMPONENT SYMBOLS 3/32 HIGH AS SHOWN IN ACCORDANCE WITH KES-4A.1
5. ASSEMBLE AND TEST IN ACCORDANCE WITH A.T.P 1011702
6. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019

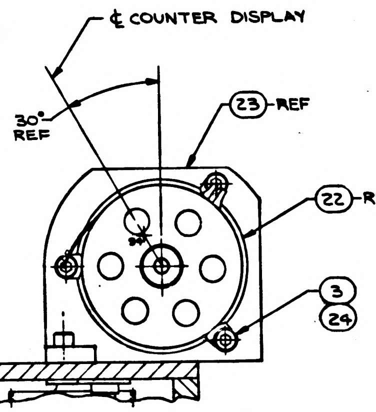






PARTIAL VIEW B-B





PARTIAL SECTION A-A

SEE NOTE NO. 2 (item 29)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
33	2		1011625-11	74455151011		SCREW, CAP, SOC HD			
32	3		1011625-16	74455151016		SCREW, CAP, SOC HD			
31	3		1011625-18	74455151018		SCREW, CAP, SOC HD			
30	1	NAS	1352C02LL6	74455157007		SCREW, CAP, SOC HD			
29	AS REQD		1011804-	7938690 0301 0309		WASHER, FLAT			
* 28	1	J5	1011740	68502016801		CONNECTOR, ELECTRICAL			
27	1		1011277	33386900380		GEAR, SPUR (160T/120P)			
26	3		1011868-3	54386900332		CLAMP, RIM CLENCHING			
* 25	1	B1	1010341	75002010301		RESOLVER, RECEIVER, ONE SPEED			
24	3		1011868-2	54386900331		CLAMP, RIM CLENCHING			
23	1		1011275	52386900570		BRACKET, COUNTER			
22	1		1011744	88237000001		COUNTER, ANGLE			
21	2		1011355-2	57386901331		CLAMP, COLLAR			
20	1		1011357	33386900540		GEAR, BEVEL (31T/48P)			
19	1		1011355-4	57386901333		CLAMP, COLLAR			
18	1		1011356	33386900530		GEAR, BEVEL (30T/48P)			
17	1		1011308	85386900280		PLATE, BEARING, ASSEMBLY OF			
* 16	1		1011608-4	30257700120		BEARING, BALL, ANNULAR (FLANGED)			
15	1		1011276	33386900370		GEARSHAFT (20T/120P, 124T/96P)			
14	1		1011279	33386900400		GEARSHAFT (18T/96P, 99T/96P)			
13	1		1011280	33386900410		GEARSHAFT (22T/96P, 96T/96P)			
* 12	1		1011281	74471370001		DIFFERENTIAL			
* 11	8		1011608-3	30257700082		BEARING, BALL, ANNULAR (FLANGED)			
10	1		1011358	33386900550		GEARSHAFT (104T/120P, 32T/96P)			
* 9	1		1011608-1	30257700080		BEARING, BALL, ANNULAR (FLANGED)			
8	2		1011802	56386900410		PLATE, FLAT			
7	2		1011314	56386900190		HEAT SINK			
6	11	NAS	1352C02LL4	74455.57006		SCREW, CAP, SOC HD			
5	1		1011801	52386900870		BRACKET, HEAT CONDUCTOR			
4	3		1011868-1	54386900330		CLAMP, RIM CLENCHING			
3	6	NAS	1352C03LL4	74455157009		SCREW, CAP, SOC HD			
* 2	1	MG1	1010610	75001010101		SERVO MOTOR-TACHOMETER GENERATOR			
1	1		1011306	52386900610		HOUSING GEAR SCT TRUNNION DRIVE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011999	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
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CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900770

DRAWN R BRUNELLE DATE 6-20-63
CHECKED 7/12/63
APPROVAL 8/1/63
APPROVAL 8-15-63
NASA APPROVAL W J 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCT TRUNNION DRIVE GEARBOX
ASSEMBLY OF

CODE IDENT NO.
SIZE E
NASA NUMBER 1011702
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

PURCHASED ITEM:- SEE SPECIFICATION CONTROL DRAWINGS BEFORE ORDERING

1011702

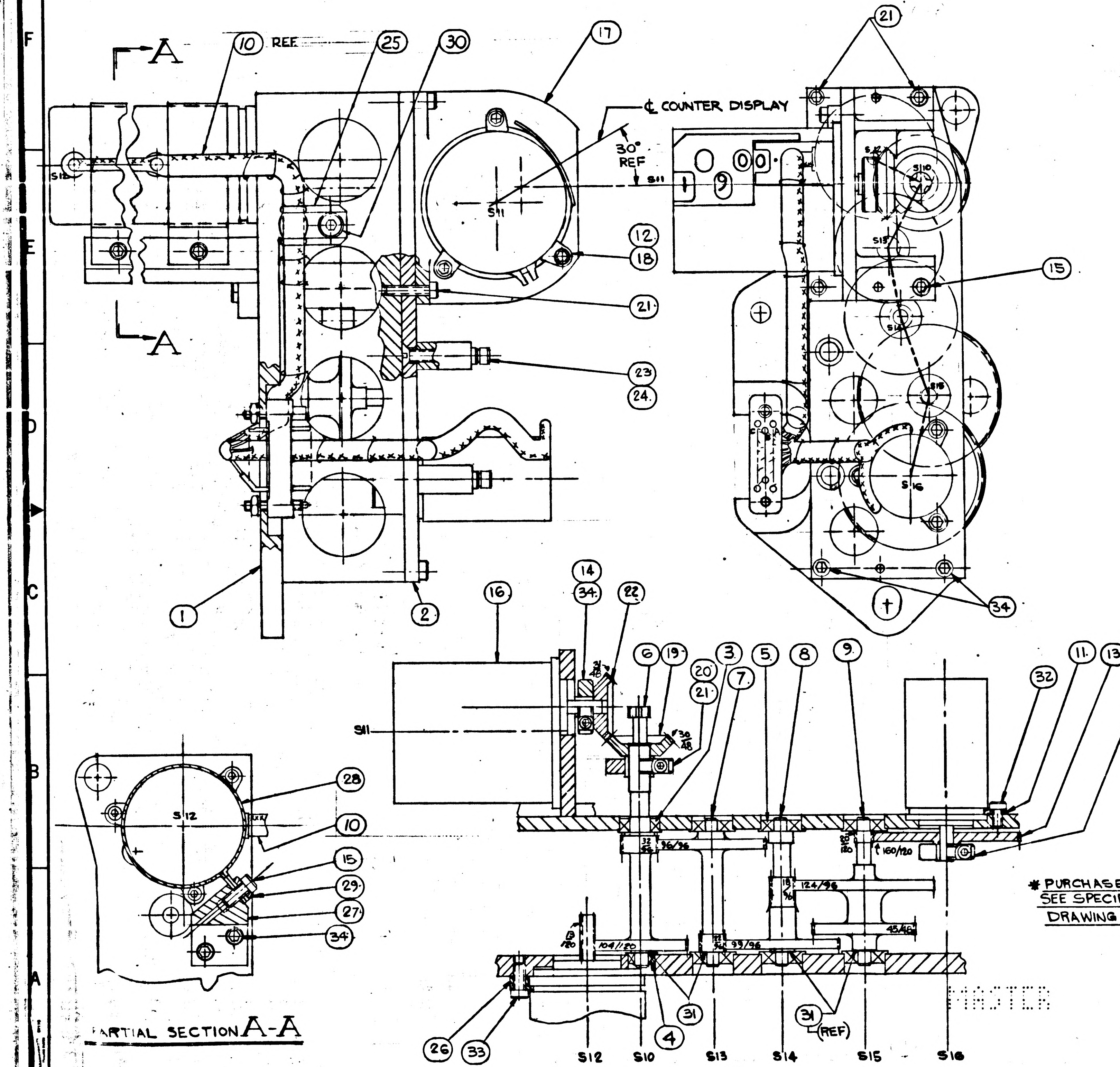
INCHES
PHOTOGRAPHIC SCALE ONLY

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. SHIM SHAFTS TO OBTAIN ZERO ENDPLAY
3. ALIGN BEVEL GEARS (ITEMS 19 & 22) FOR 'ZERO' BACKLASH

5. ASSEMBLE AND TEST IN ACCORDANCE WITH A.T.P. 1011703
6 IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019

REVISIONS TDRR 02624

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A_5		REVISED PER TDRR NO. 03057	9/5/63	10 [illegible] 63 WK



* PURCHASED ITEM
SEE SPECIFICATION CONTROL
DRAWING BEFORE ORDERING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
34	6		1011625-11	7445515101 1		SCREW, CAP, SOC HD			
33	3.		1011625-18	7445515101 8		SCREW, CAP, SOC HD			
32	3		1011625-16	7445515101 6		SCREW, CAP, SOC HD			
31	AS REQ		1011804-	79 38690 0301 0304		WASHER, FLAT			
30	1	NAS	1352C06LL4	7445515701 8		SCREW, CAP, SOC. HD SELF-LOCKING			
29	2		1011802	56 38690 0410		PLATE, FLAT			
28	2		1011314	56 38690 0190		HEAT, SINK			
27	1		1011800	52 38690 0860		BRACKET HEAT CONDUCTOR			
26	3		1011868-1	54 38690 0330		CLAMP, RIM CLENCHING			
25	1		1000220-4			CLAMP, CABLE			
24	2	NAS	1189C04P4L	74 45515 5008		SCREW, 100° FLAT HD			
23	2		1011332	57 38690 0790		POST, SPACER			
22	1		1011357	33 38690 0540		GEAR, BEVEL (31T/48P)			
21	4	NAS	1352C02LL6	74 45515 7007		SCREW CAP, SOCKET HD			
20	1		1011355-4	57 38690 1333		CLAMP, COLLAR			
19	1		1011356	33 38690 0530		GEAR, BEVEL (30T/48P)			
18	3		1011868-2	54 38690 0331		CLAMP, RIM CLENCHING			
17	1		1011274	52 38690 0560		BRACKET, COUNTER			
16	1		1011744	88237000001		COUNTER, ANGLE			
15	3	NAS	1352C02LL4	74 45515 7006		SCREW, CAP, SOCKET HD			
14	2		1011355-2	57 38690 1331		CLAMP, COLLAR			
13	1		1011277	33 38690 0380		GEAR SPUR 160T/120P			
12	3	NAS	1352C03LL4	74 45515 7009		SCREW, CAP, SOCKET HD.			
11	3		1011868-3	54 38690 0332		CLAMP, RIM CLENCHING			
10	1		1011934	80386900050		SCT SHAFT DRIVE HARNESS, ASSY OF			
9	1		1011278	33386900390		GEARSHAFT 20T/120P-124T/96P-45T/48P			
8	1		1011279	33386900400		GEARSHAFT 18T/96P-99T/96P			
7	1		1011280	33386900410		GEARSHAFT 22T/96P-96T/96P			
6	1		1011358	33 38690 0550		GEARSHAFT 104T/120P/32T/96P			
5	6	*	1011608-3	3025770 0082		BEARING, BALL, ANNULAR (FLANGED, PHENOLIC RETAINER)			
4	1	*	1011608-1	3025770 0080		BEARING, BALL, ANNULAR (FLANGED PHENOLIC RETAINER)			
3	1	*	1011608-4	3025770 0120		BEARING, BALL, ANNULAR (FLANGED, PHENOLIC RETAINER)			
2	1		1011333	85386900300		PLATE, BEARING ASSEMBLY OF,			
1	1		1011329	52 38690 0650		HOUSING, GEAR SCT SHAFT DRIVE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
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MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 38690 0780
DRAWN PAUL PAPPACHRISTOU DATE 6-20-63
CHECKED 7/16/63
APPROVAL 8/15/63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL 16 [illegible] 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SHAFT AXIS DRIVE
GEAR BOX, SCT

CODE IDENT NO.
SIZE D
NASA NUMBER 1011703
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011703 A

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

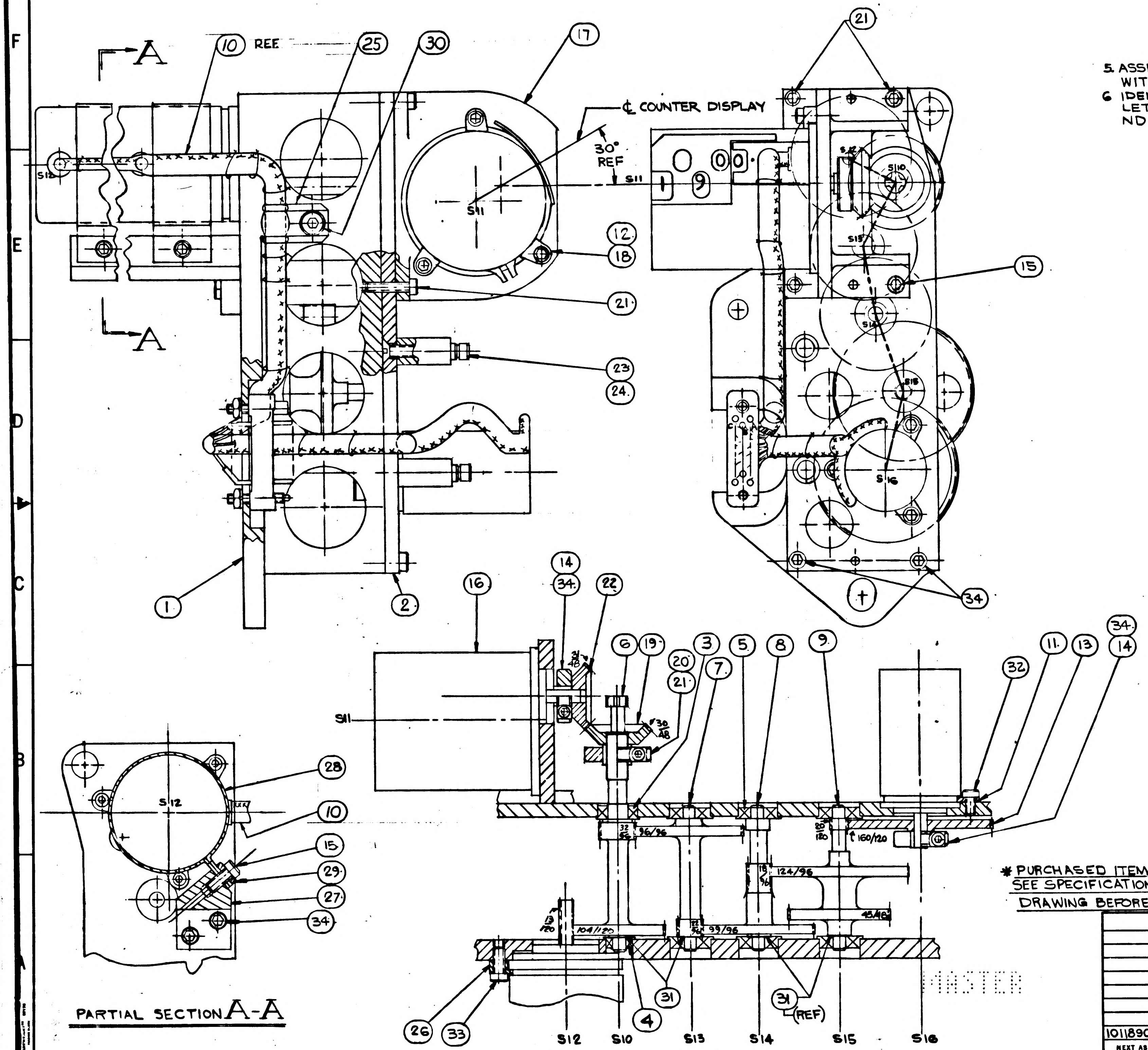
B 1011703

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

5. ASSEMBLE AND TEST IN ACCORDANCE WITH A.T.P. 1011703
6 IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019

REVISIONS TDRR 02624

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A_5		REVISED PER TDRR NO. 03059	9/5/63	10 Jan 63 WK
B_2		REVISED PER TDRR NO. 03988	17 oct 63	WK



*PURCHASED ITEM
SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

ITEM NO.	QTY REQD		GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
34	6		1011625-11	74455151011		SCREW, CAP, SOC HD			
33	3		1011625-18	7445515 1018		SCREW, CAP, SOC HD			
32	3		1011625-16	7445515 1016		SCREW, CAP. SOC HD			
31	AS REQ		1011804-	79 38690 0301 0304		WASHER, FLAT			
30	1	NAS	1352C06LL4	7445515 7018		SCREW, CAP, SOC. HD SELF-LOCKING			
29	2		1011802	56 38690 0410		PLATE, FLAT			
28	2		1011314	56 38690 0190		HEAT, SINK			
27	1		1011 300	52 38690 0860		BRACKET HEAT CONDUCTOR			
26	3		1011868-1	54 38690 0330		CLAMP, RIM CLENCHING			
25	1		1000220-4			CLAMP, CABLE			
24	2	NAS	1189C04P4L	7445515 5008		SCREW, 100° FLAT HD			
23	2		1011332	57 38690 0790		POST, SPACER			
22	1		1011357	33 38690 0540		GEAR, BEVEL (31T/48P)			
21	4	NAS	1352C02LL6	74 45515 7007		SCREW CAP, SOCKET HD			
20	1		1011355-4	57 38690 1333		CLAMP, COLLAR			
19	1		1011356	33 38690 0530		GEAR, BEVEL (30T/48P)			
18	3		1011 868-2	54 38690 0331		CLAMP, RIM CLENCHING			
17	1		1011274	52 38690 0560		BRACKET, COUNTER			
16	1		1011744	88237000001		COUNTER, ANGLE			
15	3	NAS	1352C02LL4	74 45515 7006		SCREW, CAP, SOCKET HD			
14	2		1011355-2	57 38690 1331		CLAMP, COLLAR			
13	1		1011277	33 38690 0380		GEAR SPUR 160T/120P			
12	3	NAS	1352C03LL4	74455157009		SCREW, CAP, SOCKET HD.			
11	3		1011868-3	54 38690 0332		CLAMP, RIM CLENCHING			
10	1		1011934	80386900050		SCT SHAFT DRIVE HARNESS, ASSY OF			
9	1		1011278	33386900390		GEARSHAFT 20T/120P-124T/96P-45T/48P			
8	1		1011279	33386900400		GEARSHAFT 18T/96P-99T/96P			
7	1		1011280	33386900410		GEARSHAFT 22T/96P-96T/96P			
6	1		1011358	33 38690 0550		GEARSHAFT 104T/120P/32T/96P			
5	6	*	1011608-3	3025770 0082		BEARING, BALL, ANNULAR (FLANGED, PHENOLIC RETAINER)			
4	1	*	1011608-1	3025770 0080		BEARING, BALL, ANNULAR (FLANGED, PHENOLIC RETAINER)			
3	1	*	1011608-4	3025770 0120		BEARING, BALL, ANNULAR (FLANGED, PHENOLIC RETAINER)			
2	1		1011333	85 38690 0300		PLATE, BEARING ASSEMBLY OF,			
1	1		1011329	52 38690 0650		HOUSING, GEAR SCT SHAFT DRIVE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 38690 0780
DRAWN PAUL PAPPACHRISTOU DATE 6-20-63
CHECKED 7/16/63
APPROVAL 8/15/63
APPROVAL 8.15.63
NASA APPROVAL W J 8-16-63
MIT APPROVAL 16 Oct 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE SHAFT AXIS DRIVE GEAR BOX, SCT

CODE IDENT NO.
SIZE D
NASA NUMBER 1011703
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

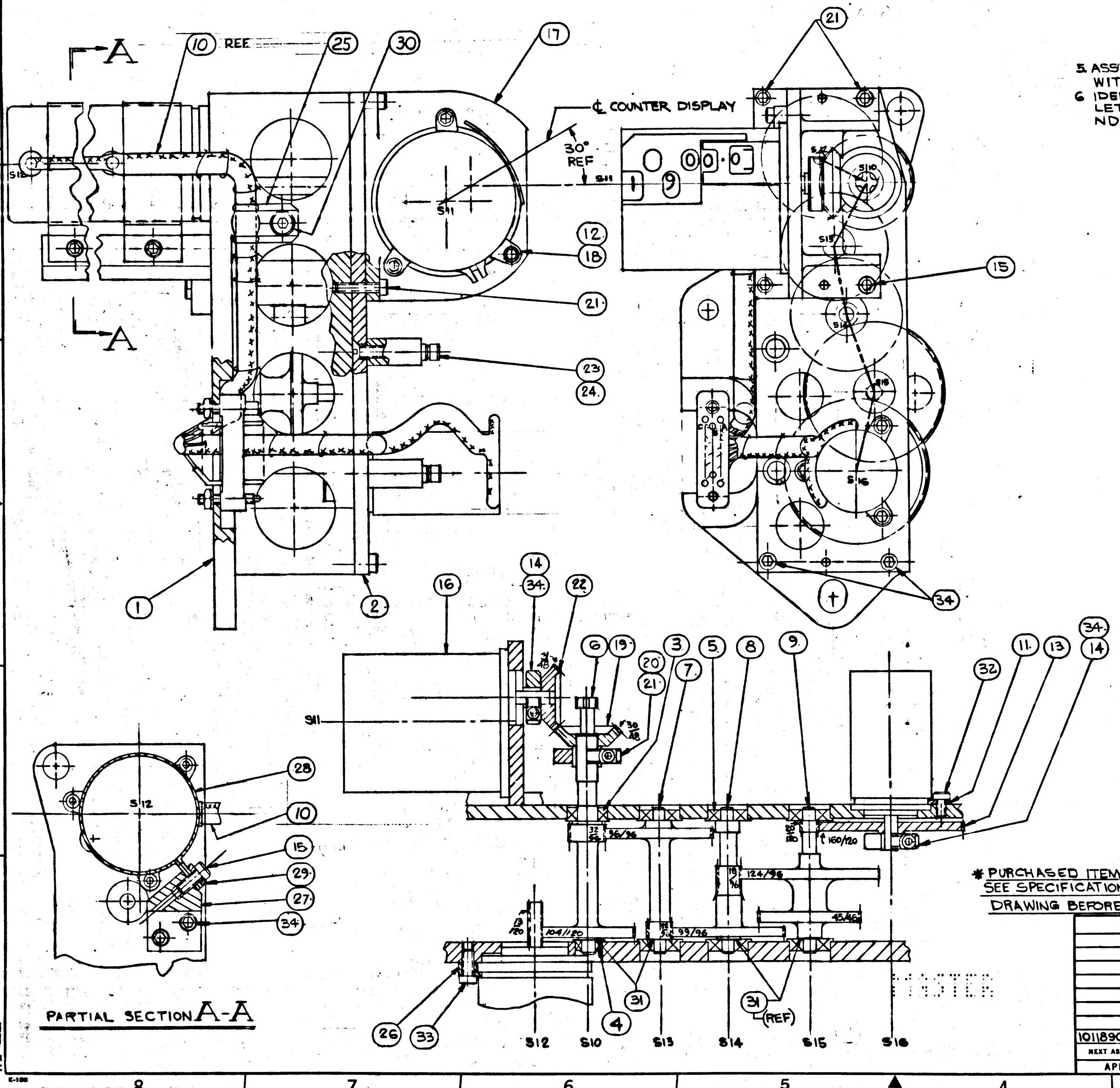
1011703 C

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

5. ASSEMBLE AND TEST IN ACCORDANCE WITH A.T.P. 1011703
6 IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019

REVISIONS TDRR 02624

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A_5		REVISED PER TDRR NO. 03059	9/5/63	10 Jan 63 WK
B_2		REVISED PER TDRR NO. 03988	17 Oct 63	WK
C		REVISED PER TDRR NO. 04834	27 NOV 63	



* PURCHASED ITEM SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

ITEM NO.	QTY REQD		GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
34	6		1011625-11	7445515 1011		SCREW, CAP, SOC HD			
33	3		1011625-18	7445515 1018		SCREW, CAP, SOC HD			
32	3		1011625-16	7445515 1016		SCREW, CAP, SOC HD			
31	AS REQ		1011804-	79 38690 0301 0304		WASHER, FLAT			
30	1	NAS	1352C06LL4	7445515 7018		SCREW, CAP, SOC HD SELF-LOCKING			
29	2		1011802	56 38690 0410		PLATE, FLAT			
28	2		1011314	56 38690 0190		HEAT, SINK			
27	1		1011800	52 38690 0560		BRACKET HEAT CONDUCTOR			
26	3		1011868-1	54 38690 0330		CLAMP, RIM CLENCHING			
25	1		1000220-4			CLAMP, CABLE			
24	2	NAS	1189C04P4L	7445515 5008		SCREW, 100° FLAT HD			
23	2		1011332	57 38690 0790		POST, SPACER			
22	1		1011357	33 38690 0540		GEAR, BEVEL (31T/48P)			
21	4	NAS	1352C02LL6	74 45515 7007		SCREW CAP, SOCKET HD			
20	1		1011355-4	57 38690 1333		CLAMP, COLLAR			
19	1		1011356	33 38690 0530		GEAR, BEVEL (30T/48P)			
18	3		1011868-2	54 38690 0331		CLAMP, RIM CLENCHING			
17	1		1011274	52 38690 0560		BRACKET, COUNTER			
16	1		1011744	88237000001		COUNTER, ANGLE			
15	3	NAS	1352C02LL4	74 45515 7006		SCREW, CAP, SOCKET HD			
14	2		1011355-2	57 38690 1331		CLAMP, COLLAR			
13	1		1011277	33 38690 0380		GEAR SPUR 160T/120P			
12	3	NAS	1352C03LL4	74 45515 7009		SCREW, CAP, SOCKET HD.			
11	3		1011868-3	54 38690 0332		CLAMP, RIM CLENCHING			
10	1		1011934	80386900050		SCT SHAFT DRIVE HARNESS, ASSY OF			
9	1		1011278	33386900390		GEARSHAFT 20T/120P-124T/96P-45T/48P			
8	1		1011279	33386900400		GEARSHAFT 18T/96P-99T/96P			
7	1		1011280	33386900410		GEARSHAFT 22T/96P-96T/96P			
6	1		1011358	33 38690 0550		GEARSHAFT 104T/120P/32T/96P			
5	6	*	1011608-3	3025770 0082		BEARING, BALL, ANNULAR (FLANGED, PHENOLIC RETAINER)			
4	1	*	1011608-1	3025770 0080		BEARING, BALL, ANNULAR (FLANGED, PHENOLIC RETAINER)			
3	1	*	1011608-4	30 25770 0120		BEARING, BALL, ANNULAR (FLANGED, PHENOLIC RETAINER)			
2	1		1011333	85 38690 0300		PLATE, BEARING ASSEMBLY OF,			
1	1		1011329	52 38690 0650		HOUSING, GEAR SCT SHAFT DRIVE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 38690 0780
PAUL PAPPACHRISTOU
DRAWN DATE 6-20-63
CHECKED 7/16/63
APPROVAL 8/15/63
APPROVAL 8.15.63
NASA APPROVAL 8-16-63
MIT APPROVAL 16 [illegible] 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SHAFT AXIS DRIVE
GEAR BOX, SCT

CODE IDENT NO. | SIZE D | NASA NUMBER 1011703
SCALE 2/1 | WEIGHT | CALC ACTUAL | SHEET | OF 1

1011703 C

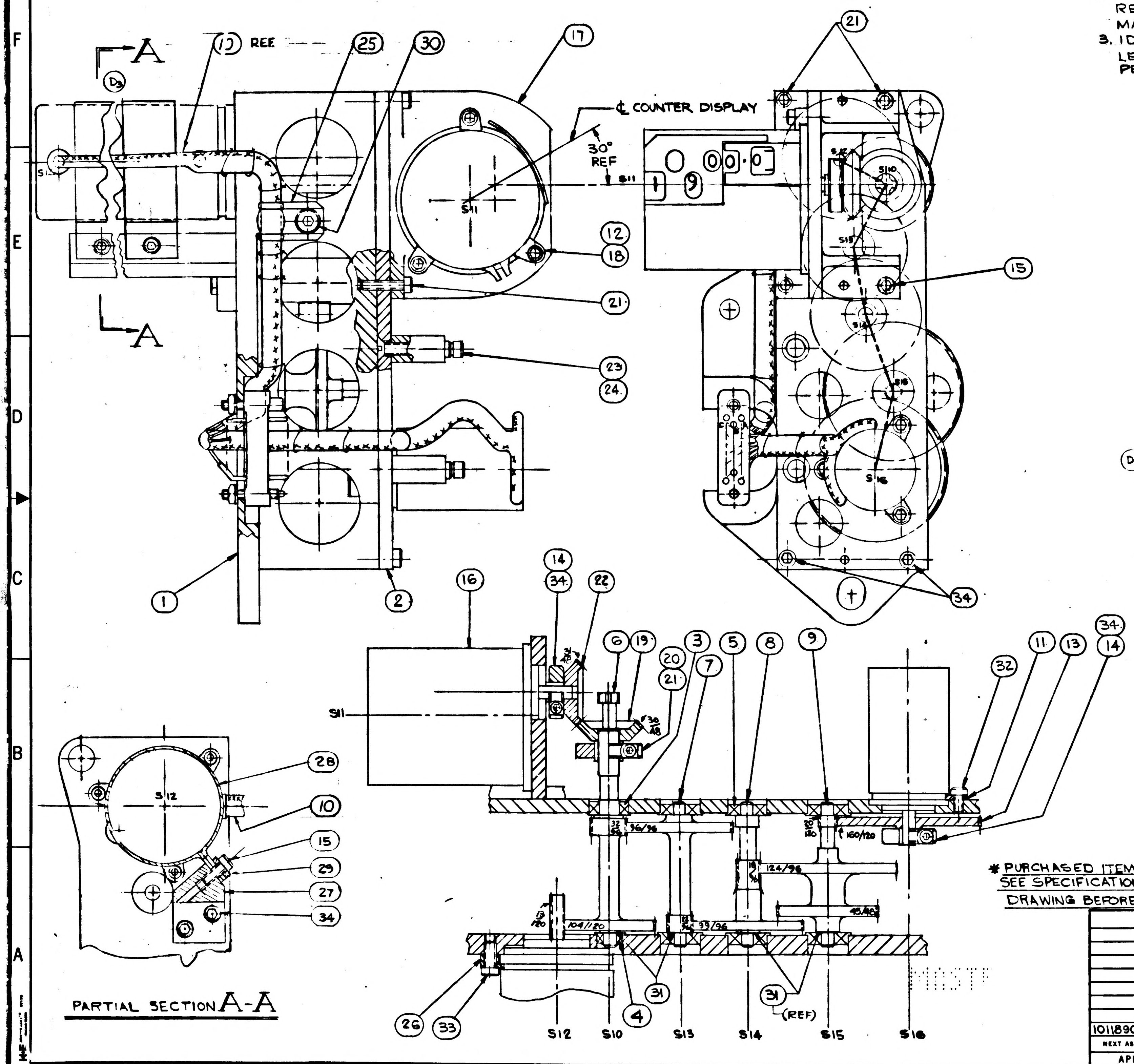
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

D 1011703

Ⓓ1 NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. USE ITEM 31 WHERE SHOWN AND AS REQ'D TO LIMIT END PLAY TO .004 MAX.
3. IDENTIFY USING NASA DWG NO, REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019

REVISIONS TDRR 02624

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A5		REVISED PER TDRR NO. 03059	9/5/63	WH
B2		REVISED PER TDRR NO. 03988	17 oct 63	WH
C		REVISED PER TDRR NO. 04834	27 NOV 63	
D3		REVISED PER TDRR NO. 07827	4-21-64	



Ⓓ2 SEE NOTE 2

ITEM NO.	QTY REQD		GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
34	6	*	1011625-11	7445151011		SCREW, CAP, SOC HD			
33	3	*	1011625-18	7445151018		SCREW, CAP, SOC HD			
32	3	*	1011625-16	7445151016		SCREW, CAP, SOC HD			
31	AS REQD		1011804-	7938690 0301 0304		WASHER, FLAT			
30	1	NAS	1352C06LL4	7445515 7018		SCREW, CAP, SOC. HD SELF-LOCKING			
29	2		1011802	5638690 0410		PLATE, FLAT			
28	2		1011314	56386900190		HEAT, SINK			
27	1		1011800	52386900860		BRACKET, HEAT CONDUCTOR			
26	3		1011868-1	5438690 0330		CLAMP, RIM CLENCHING			
25	1	*	1000220-4			CLAMP, CABLE			
24	2	NAS	1189C04P4L	7445515 5008		SCREW, 100° FLAT HD			
23	2		1011332	5738690 0790		POST, SPACER			
22	1		1011357	3338690 0540		GEAR, BEVEL (31T/48P)			
21	4	NAS	1352C02LL6	7445515 7007		SCREW CAP, SOCKET HD			
20	1		1011355-4	5738690 1333		CLAMP, COLLAR			
19	1		1011356	3338690 0530		GEAR, BEVEL (30T/48P)			
18	3		1011868-2	5438690 0331		CLAMP, RIM CLENCHING			
17	1		1011274	52386900560		BRACKET, COUNTER			
16	1	*	1011744	88237000001		COUNTER, ANGLE			
15	3	NAS	1352C02LL4	7445515 7006		SCREW, CAP, SOCKET HD			
14	2		1011355-2	5738690 1331		CLAMP, COLLAR			
13	1		1011277	3338690 0380		GEAR SPUR 160T/120P			
12	3	NAS	1352C03LL4	7445515 7009		SCREW, CAP, SOCKET HD.			
11	3		1011868-3	5438690 0332		CLAMP, RIM CLENCHING			
10	1		1011934	80386900050		SCT SHAFT DRIVE HARNESS, ASSY OF			
9	1		1011278	33386900390		GEARSHAFT 20T/120P-124T/96P-45T/48P			
8	1		1011279	3338690 0400		GEAR SHAFT 18T/96P-99T/96P			
7	1		1011280	33386900410		GEARSHAFT 22T/96P-96T/96P			
6	1		1011358	3338690 0550		GEARSHAFT 104T/120P/32T/96P			
5	6	*	1011608-3	3025770 0082		BEARING, BALL, ANNULAR (FLANGED, PHENOLIC RETAINER)			
4	1	*	1011608-1	3025770 0080		BEARING, BALL ANNULAR (FLANGED PHENOLIC RETAINER)			
3	1	*	1011608-4	3025770 0120		BEARING, BALL, ANNULAR (FLANGED, PHENOLIC RETAINER)			
2	1		1011333	8538690 0300		PLATE, BEARING ASSEMBLY OF.			
1	1		1011329	5238690 0650		HOUSING, GEAR SCT SHAFT DRIVE			

LIST OF PARTS AND MATERIALS

*PURCHASED ITEM
SEE SPECIFICATION CONTROL
DRAWING BEFORE ORDERING

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS + - DECIMALS + - ANGLES + -
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 8538690 0780
PAUL PAPPACHRISTOU
DRAWN DATE 6-20-63
CHECKED 7/16/63
APPROVAL 8/1/63
APPROVAL 8 15 63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SHAFT AXIS DRIVE
GEAR BOX, SCT

CODE IDENT NO.
SIZE D
NASA NUMBER 1011703
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

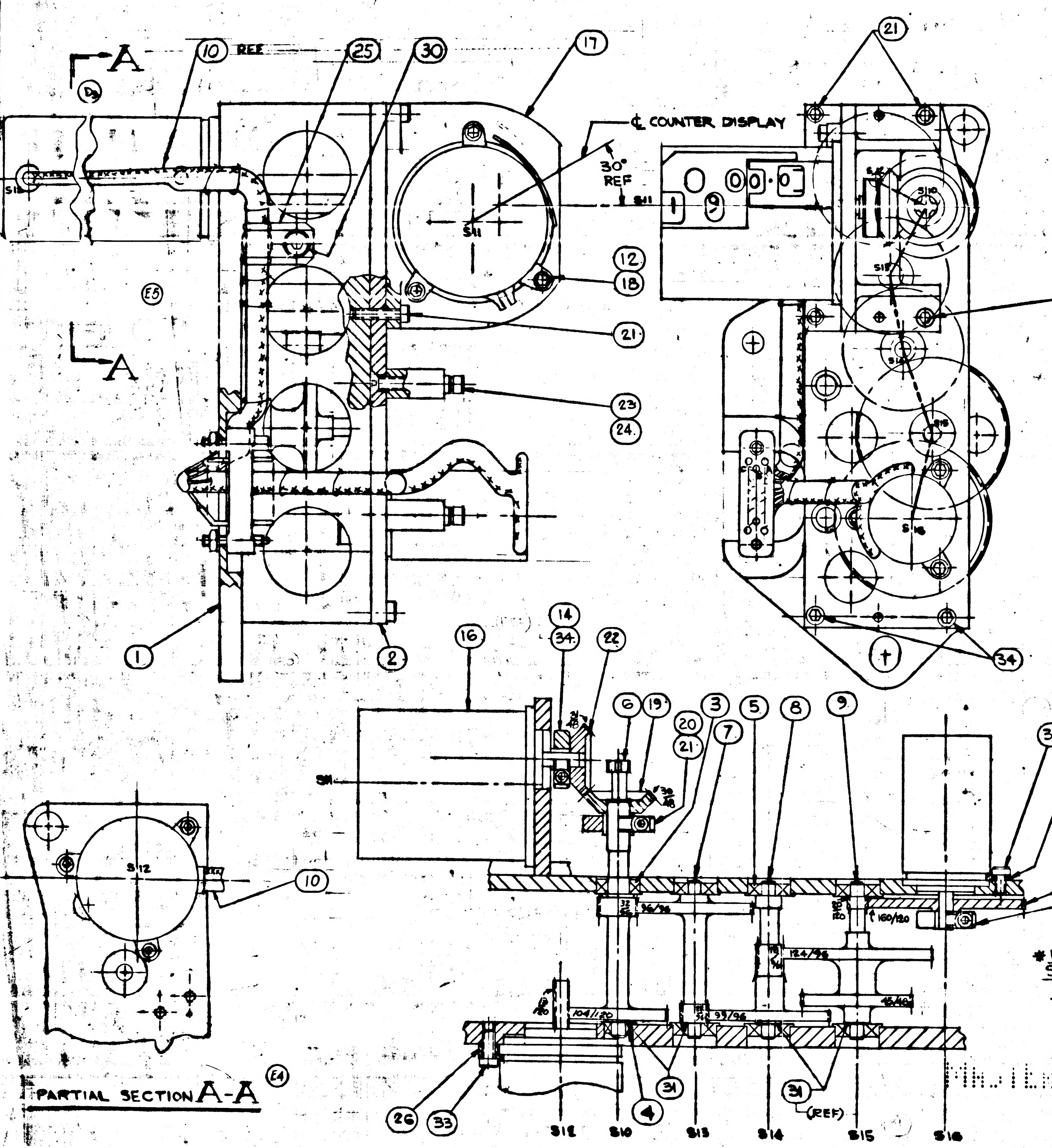
1011703 D

1011703 E

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. USE ITEM 31 WHERE SHOWN AND AS REQ'D TO LIMIT END PLAY TO .004 MAX.
3. IDENTIFY USING NASA DWG NO, REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019

REVISIONS TDRR 02434

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A_5		REVISED PER TDRR NO. 03057	9/5/63	10/4/63
B_2		REVISED PER TDRR NO. 03788	17 Oct 63	
C		REVISED PER TDRR NO. 04834	27 NOV 63	
D_2		REVISED PER TDRR NO. 07827	4-21-64	
E_5		REVISED PER TDRR NO. 08031	4-28-64	



PARTIAL SECTION A-A

✱ PURCHASED ITEM SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

	ITEM NO.	QTY REQD		GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
(E1)	34	4	✱	1011625-11	7445515 1011		SCREW, CAP, SOC HD			
	33	3	✱	1011625-18	7445515 1018		SCREW, CAP, SOC HD			
	32	3	✱	1011625-16	7445515 1016		SCREW, CAP, SOC HD			
(D2) SEE NOTE 2	31	AS REQ'D		1011804-	79 38690 0301 0304		WASHER, FLAT			
	30	1	NAS	1352C06LL4	7445515 7018		SCREW, CAP SOC HD SELF-LOCKING			
(E3)	29									
	28									
	27									
	26	3		1011868-1	54 38690 0330		CLAMP, RIM CLENCHING			
	25	1	✱	1000220-4			CLAMP, CABLE			
	24	2	NAS	1189 C04P4L	7445515 5008		SCREW, 100° FLAT HD			
	23	2		1011332	57 38690 0790		POST, SPACER			
	22	1		1011357	33 38690 0540		GEAR, BEVEL (31T/48P)			
	21	4	NAS	1352C02LL6	74 45515 7007		SCREW CAP, SOCKET HD.			
	20	1		1011355-4	57 38690 1333		CLAMP, COLLAR			
	19	1		1011356	33 38690 0530		GEAR, BEVEL (30T/48P)			
	18	3		1011868-2	54 38690 0331		CLAMP, RIM CLENCHING			
	17	1		1011274	52 38690 0560		BRACKET, COUNTER			
	16	1	✱	1011744	88237000001		COUNTER, ANGLE			
(E2)	15	1	NAS	1352C02LL4	74 45515 7006		SCREW, CAP, SOCKET HD			
	14	2		1011355-2	57 38690 1331		CLAMP, COLLAR			
	13	1		1011277	33 38690 0380		GEAR SPUR 160T/120P			
	12	3	NAS	1352 C03LL4	7445515 7009		SCREW, CAP, SOCKET HD.			
	11	3		1011868-3	54 38690 0332		CLAMP, RIM CLENCHING			
	10	1		1011934	80 38690 0050		SCT SHAFT DRIVE HARNESS, ASSY OF			
	9	1		1011278	33 38690 0390		GEARSHAFT 20T/120P-124T/96P-45T/48P			
	8	1		1011279	33 38690 0400		GEARSHAFT 18T/96P-99T/96P			
	7	1		1011280	33 38690 0410		GEARSHAFT 22T/96P-96T/96P			
	6	1		1011358	33 38690 0550		GEARSHAFT 104T/120P/32T/96P			
	5	6	✱	1011608-3	30 25770 0082		BEARING, BALL, ANNULAR (FLANGED, PHENOLIC RETAINER)			
	4	1	✱	1011608-1	30 25770 0080		BEARING, BALL ANNULAR (FLANGED, PHENOLIC RETAINER)			
	3	1	✱	1011608-4	30 25770 0120		BEARING, BALL, ANNULAR (FLANGED, PHENOLIC RETAINER)			
	2	1		1011333	85 38690 0300		PLATE, BEARING ASSEMBLY OF,			
	1	1		1011329	52 38690 0650		HOUSING, GEAR SCT SHAFT DRIVE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 38690 0780
DRAWN PAUL PAPPACHRISTOU DATE 6-20-63
CHECKED 7/10/63
APPROVAL 8/15/63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL

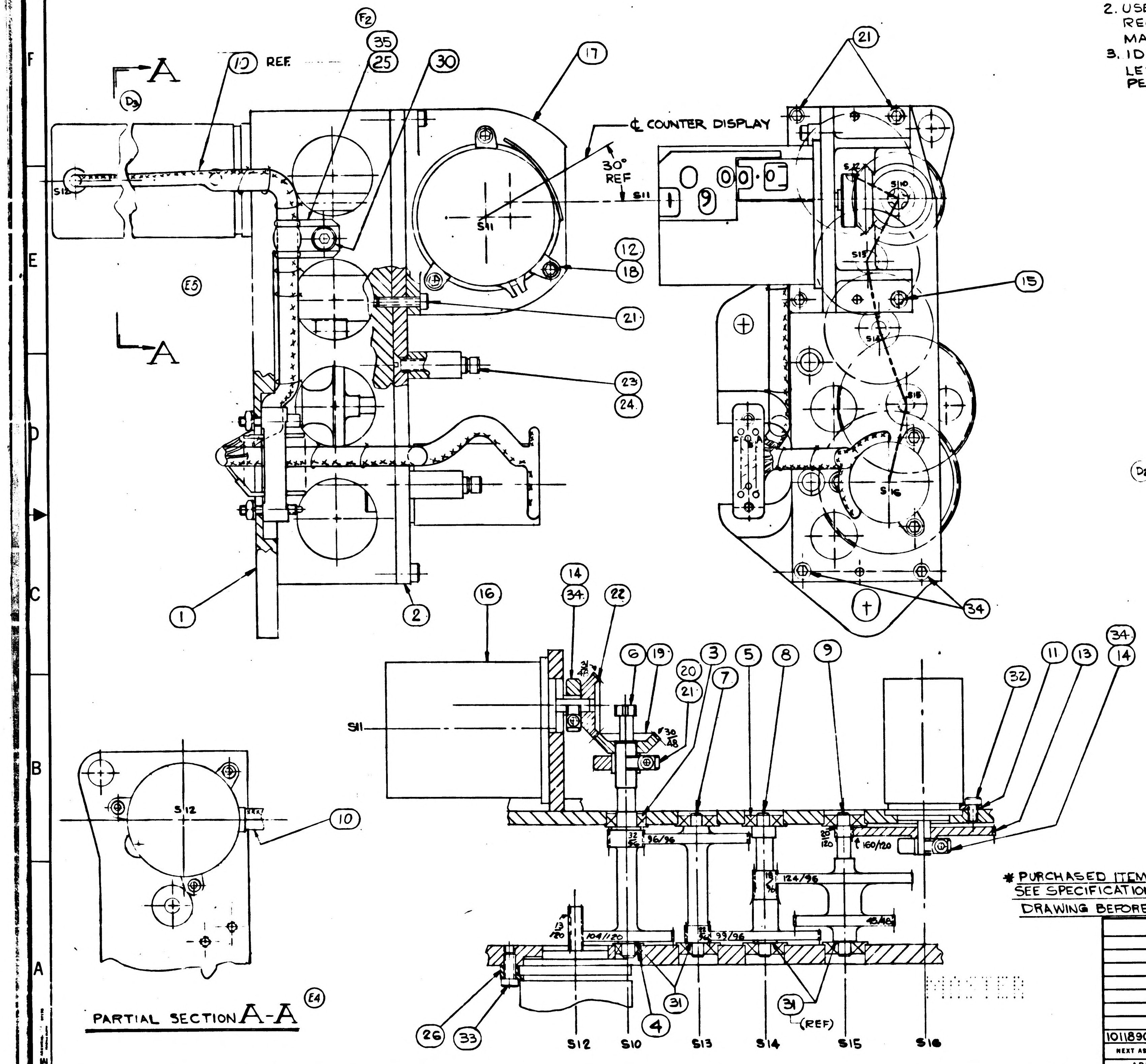
MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SHAFT AXIS DRIVE
GEAR BOX, SCT

CODE IDENT NO.
SIZE D
NASA NUMBER 1011703
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011703 E

1011703	F



NOTES:-

(D1) 1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.

2. USE ITEM 31 WHERE SHOWN AND AS REQ'D TO LIMIT END PLAY TO .004 MAX.

3. IDENTIFY USING NASA DWG NO, REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019

REVISIONS TDRR 02624

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A_5		REVISED PER TDRR NO. 03059	9/5/63	WK
B_2		REVISED PER TDRR NO. 03988	17 oct 63	WK
C		REVISED PER TDRR NO. 04834	27 NOV 63	
D_3		REVISED PER TDRR No. 07827	4-21-64	JWB
E_5		REVISED PER TDRR NO. 08031	4-28-64	JWB
F_2		REVISED PER TDRR NO. 08032	4/28/64	JWB

	ITEM NO.	QTY REQD		GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
(F1)	35	1		1011918-3			WASHER, CABLE CLAMP			
(E1)	34	4	*	1011625-11	7445515 1011		SCREW, CAP, SOC HD			
	33	3	*	1011625-18	7445515 1018		SCREW, CAP, SOC HD			
	32	3	*	1011625-16	7445515 1016		SCREW, CAP, SOC HD			
(D2) SEE NOTE 2	31	AS REQ		1011804-	79 38690 0301 0304		WASHER, FLAT			
	30	1	NAS	1352C06LL4	74455157018		SCREW, CAP, SOC. HD SELF-LOCKING			
	29									
(E3)	28									
	27									
	26	3		1011868-1	54 38690 0330		CLAMP, RIM CLENCHING			
	25	1	*	1000220-4			CLAMP, CABLE			
	24	2	NAS	1189C04P4L	7445515 5008		SCREW, 100° FLAT HD			
	23	2		1011332	57 38690 0790		POST, SPACER			
	22	1		1011357	33 38690 0540		GEAR, BEVEL (31T/48P)			
	21	4	NAS	1352C02LL6	74 45515 7007		SCREW CAP, SOCKET HD			
	20	1		1011355-4	57 38690 1333		CLAMP, COLLAR			
	19	1		1011356	33 38690 0530		GEAR, BEVEL (30T/48P)			
	18	3		1011868-2	54 38690 0331		CLAMP, RIM CLENCHING			
	17	1		1011274	52 38690 0560		BRACKET, COUNTER			
	16	1	*	1011744	88237000001		COUNTER, ANGLE			
(E2)	15	1	NAS	1352C02LL4	74 45515 7006		SCREW, CAP, SOCKET HD			
	14	2		1011355-2	57 38690 1331		CLAMP, COLLAR			
	13	1		1011277	33 38690 0380		GEAR SPUR 160T/120P			
	12	3	NAS	1352C03LL4	74455157009		SCREW, CAP, SOCKET HD.			
	11	3		1011868-3	54 38690 0332		CLAMP, RIM CLENCHING			
	10	1		1011934	80386900050		SCT SHAFT DRIVE HARNESS, ASSY OF			
	9	1		1011278	33386900390		GEARSHAFT 20T/120P-124T/96P-45T/48P			
	8	1		1011279	33386900400		GEARSHAFT 18T/96P-99T/96P			
	7	1		1011280	33386900410		GEARSHAFT 22T/96P-96T/96P			
	6	1		1011358	33 38690 0550		GEARSHAFT 104T/120P/32T/96P			
	5	6	*	1011608-3	3025770 0082		BEARING, BALL ANNULAR (FLANGED, PHENOLIC RETAINER)			
	4	1	*	1011608-1	3025770 0080		BEARING, BALL ANNULAR (FLANGED, PHENOLIC RETAINER)			
	3	1	*	1011608-4	3025770 0120		BEARING, BALL, ANNULAR (FLANGED, PHENOLIC RETAINER)			
	2	1		1011333	85 38690 0300		PLATE, BEARING ASSEMBLY OF,			
	1	1		1011329	52 38690 0650		HOUSING, GEAR SCT SHAFT DRIVE			

LIST OF PARTS AND MATERIALS

* PURCHASED ITEM
SEE SPECIFICATION CONTROL
DRAWING BEFORE ORDERING

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ -	+ -	+ -

DO NOT SCALE THIS DRAWING

MATERIAL

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 38690 0780

DRAWN PAUL PAPPACHRISTOU DATE 6-20-63
CHECKED 7/16/63
APPROVAL 8-1-63
APPROVAL 8 15 63
NASA APPROVAL W J 8-16-63
MIT APPROVAL 16 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

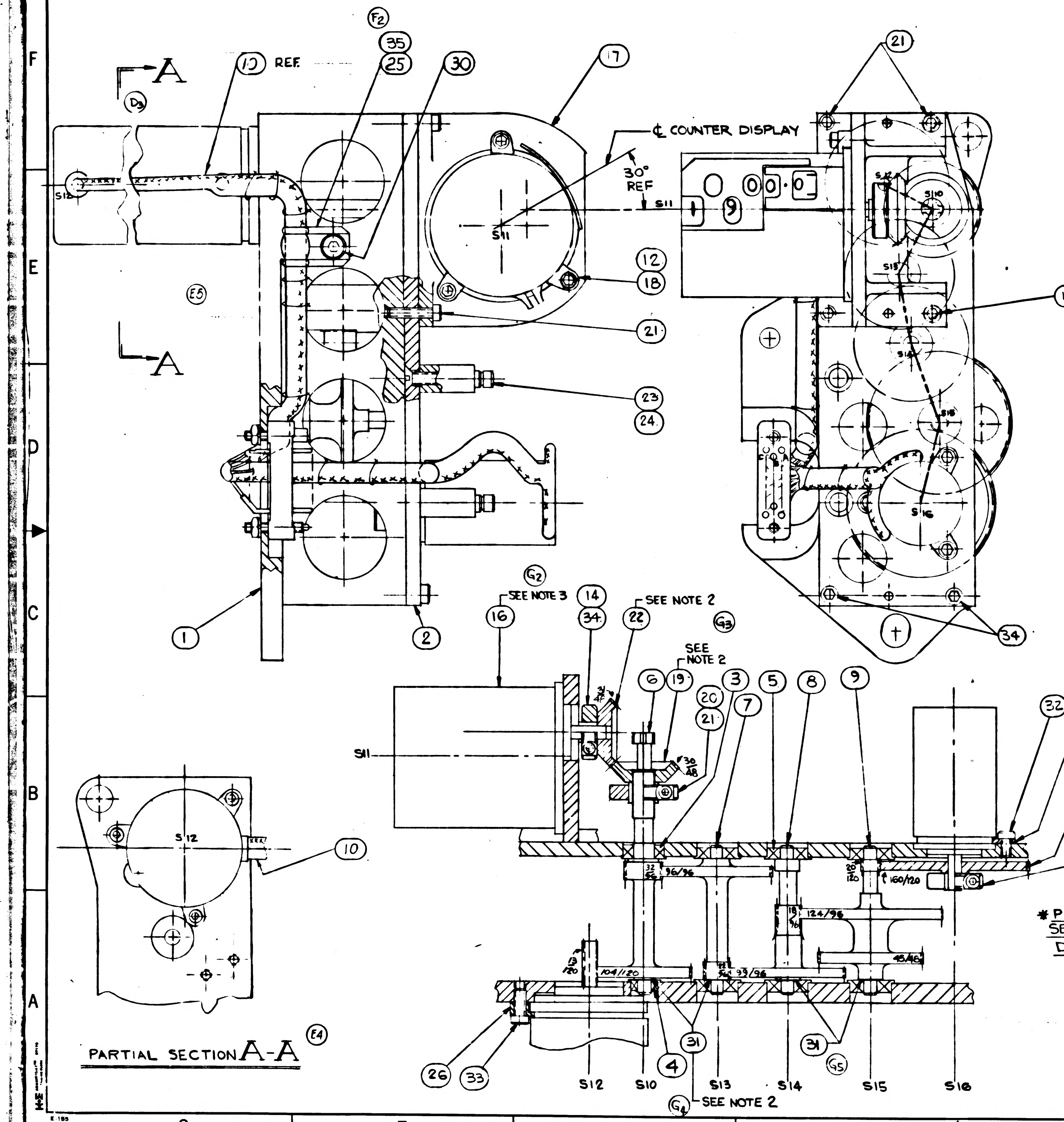
TITLE
SHAFT AXIS DRIVE
GEAR BOX, SCT

CODE IDENT NO.
SIZE D
NASA NUMBER 1011703

SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011703 F

G 1011703



(G1) (D1) NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. FLAT WASHERS (ITEM 31) OF INCREMENTAL THICKNESS SHALL BE SELECTED AND INSERTED BETWEEN GEARSHAFT SHOULDERS AND BEARINGS TO LIMIT END PLAY TO .004 IN. MAX. AT SHAFTS S10, S13, S14 AND S15.
3. COUNTER (ITEM 16) SHALL REGISTER ZERO WHEN THE RESOLVER B2 IS AT ITS NULL SETTING INDICATED BY MARKING ON SHAFT AND BODY.
4. BEVEL GEARS (ITEMS 19 AND 22) SHALL BE ALIGNED FOR MINIMUM BACKLASH COMPATIBLE WITH NOTE 5.
5. COMPLETE ASSEMBLY SHALL START WHEN THE MOTOR MG2 IS ENERGIZED WITH 4.0 VOLTS, 400 C.P.S. MAX AND RUN CONTINUOUSLY AT 2.0 VOLTS. MAX., IN EITHER DIRECTION, THROUGH 360° COUNTER ROTATION EXCEPT AT 0° AND 180° POINTS WHERE THE STARTING AND RUNNING VOLTAGE MAY BE 8.0 VOLTS MAX. STARTING VOLTAGE TO BE CHECKED AT POINTS WHERE DRIVE APPEARS TO SLOW DOWN.
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.

REVISIONS TDRR 02624

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A5		REVISED PER TDRR NO. 03059	9/5/63	WH
B2		REVISED PER TDRR NO. 03588	17 oct 63	WH
C		REVISED PER TDRR NO. 04834	27 NOV 63	[illegible]
D3		REVISED PER TDRR No. 07827	4-21-64	JWB
E5		REVISED PER TDRR NO. 08031	4-28-64	JWB
F2		REVISED PER TDRR NO. 08032	4/28/64	JWB
G5		REVISED PER TDRR NO. 08033	4/28/64	[illegible]

	ITEM NO.	QTY REQD		GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
(F1)	35	1		1011918-3			WASHER, CABLE CLAMP			
(E1)	34	4	*	1011625-11	74455151011		SCREW, CAP, SOC HD			
	33	3	*	1011625-18	7445515I018		SCREW, CAP, SOC HD			
	32	3	*	1011625-16	7445515I016		SCREW, CAP, SOC HD			
(D2) SEE NOTE 2	31	AS REQ		1011804-	79 38690 0301 0304		WASHER, FLAT			
	30	1	NAS	1352C06LL4	74455157018		SCREW, CAP, SOC. HD SELF-LOCKING			
	29									
(E3)	28									
	27									
	26	3		1011868-1	54 38690 0330		CLAMP, RIM CLENCHING			
	25	1	*	1000220-4			CLAMP, CABLE			
	24	2	NAS	1189C04P4L	7445515 5008		SCREW, 100° FLAT HD			
	23	2		1011332	57386900790		POST, SPACER			
	22	1		1011357	33386900540		GEAR, BEVEL (31T/48P)			
	21	4	NAS	1352C02LL6	74 45515 7007		SCREW CAP, SOCKET HD			
	20	1		1011355-4	5738690 1333		CLAMP, COLLAR			
	19	1		1011356	33386900530		GEAR BEVEL (30T/48P)			
	18	3		1011868-2	54 38690 0331		CLAMP, RIM CLENCHING			
	17	1		1011274	52386900560		BRACKET, COUNTER			
	16	1	*	1011744	88237000001		COUNTER, ANGLE			
(E2)	15	1	NAS	1352C02LL4	74 45515 7006		SCREW, CAP, SOCKET HD			
	14	2		1011355-2	5738690 1331		CLAMP, COLLAR			
	13	1		1011277	33386900380		GEAR SPUR 160T/120P			
	12	3	NAS	1352C03LL4	74455157009		SCREW, CAP, SOCKET HD.			
	11	3		1011868-3	5438690 0332		CLAMP, RIM CLENCHING			
	10	1		1011934	8C386900050		SCT SHAFT DRIVE HARNESS, ASSY OF			
	9	1		1011278	33386900390		GEARSHAFT 20T/120P-124T/96P-45T/48P			
	8	1		1011279	3338690 0400		GEARSHAFT 18T/96P-99T/96P			
	7	1		1011280	33386900410		GEARSHAFT 22T/96P-96T/96P			
	6	1		1011358	33386900550		GEARSHAFT 104T/120P/32T/96P			
	5	6	*	1011608-3	3025770 0082		BEARING, BALL ANNULAR (FLANGED, PHENOLIC RETAINER)			
	4	1	*	1011608-1	3025770 0080		BEARING, BALL ANNULAR (FLANGED, PHENOLIC RETAINER)			
	3	1	*	1011608-4	3025770 0120		BEARING, BALL, ANNULAR (FLANGED, PHENOLIC RETAINER)			
	2	1		1011333	85386900300		PLATE, BEARING ASSEMBLY OF.			
	1	1		1011329	5238690 0650		HOUSING, GEAR SCT SHAFT DRIVE			

LIST OF PARTS AND MATERIALS

* PURCHASED ITEM
SEE SPECIFICATION CONTROL
DRAWING BEFORE ORDERING

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

	FRACTIONS	DECIMALS	ANGLES
TOL ON	+ -	+ -	+ -

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 8538690 0780
PAUL PAPPACHRISTOU
DRAWN DATE 6-20-63
CHECKED 7/16/63
APPROVAL 3
APPROVAL 8-5-63
NASA APPROVAL W J 8-16-63
MIT APPROVAL

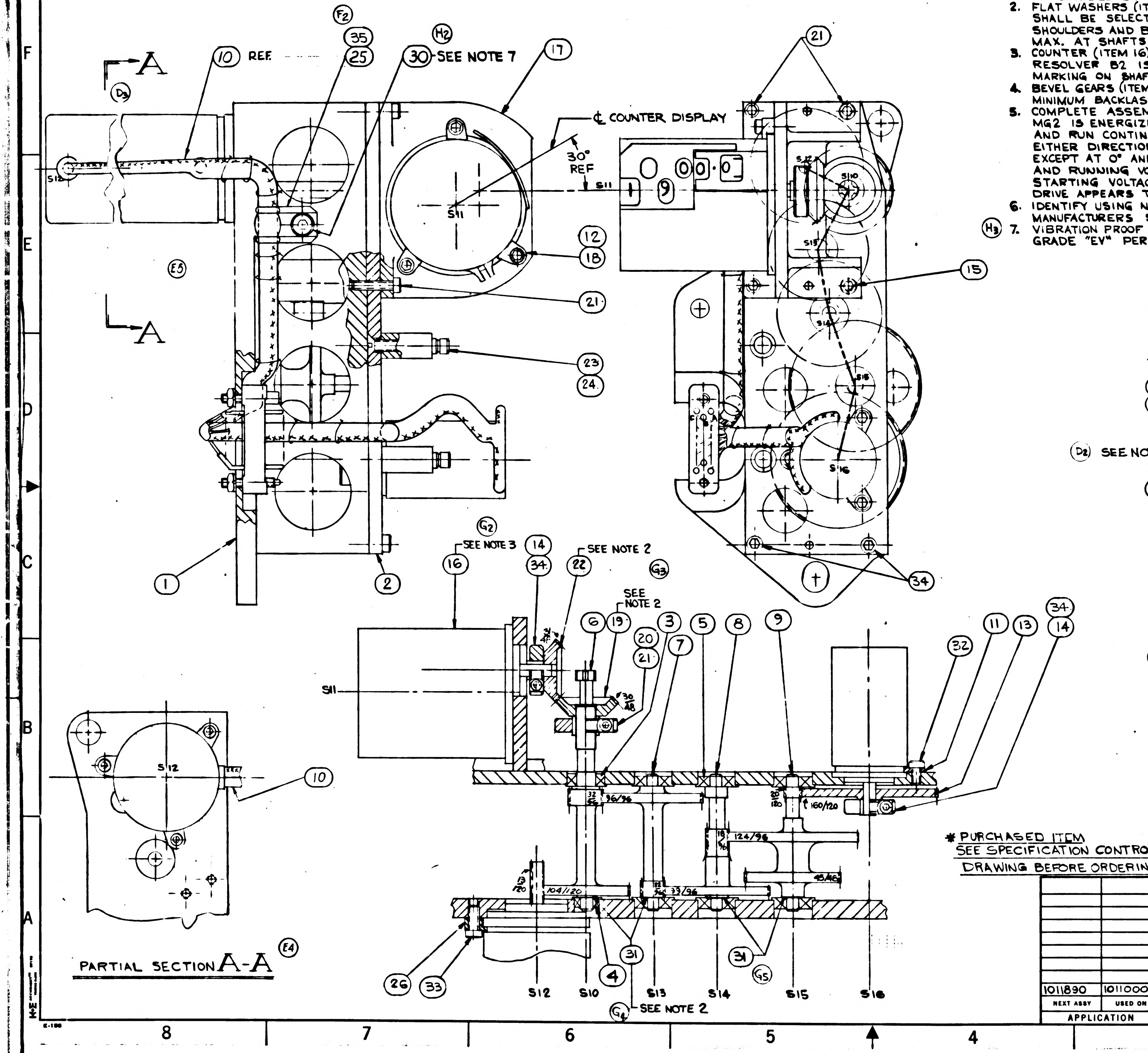
MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SHAFT AXIS DRIVE
GEAR BOX, SCT

CODE IDENT NO.
SIZE D
NASA NUMBER 1011703
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011703 G

H	1011703



(G1)(D1) NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. FLAT WASHERS (ITEM 31) OF INCREMENTAL THICKNESS SHALL BE SELECTED AND INSERTED BETWEEN GEARSHAFT SHOULDERS AND BEARINGS TO LIMIT END PLAY TO .004 IN. MAX. AT SHAFTS S10, S13, S14 AND S15.
3. COUNTER (ITEM 16) SHALL REGISTER ZERO WHEN THE RESOLVER B2 IS AT ITS NULL SETTING INDICATED BY MARKING ON SHAFT AND BODY.
4. BEVEL GEARS (ITEMS 19 AND 22) SHALL BE ALIGNED FOR MINIMUM BACKLASH COMPATIBLE WITH NOTE 5.
5. COMPLETE ASSEMBLY SHALL START WHEN THE MOTOR MG2 IS ENERGIZED WITH 4.0 VOLTS, 400 C.P.S. MAX AND RUN CONTINUOUSLY AT 2.0 VOLTS MAX., IN EITHER DIRECTION, THROUGH 360° COUNTER ROTATION EXCEPT AT 0° AND 180° POINTS WHERE THE STARTING AND RUNNING VOLTAGE MAY BE 8.0 VOLTS MAX. STARTING VOLTAGE TO BE CHECKED AT POINTS WHERE DRIVE APPEARS TO SLOW DOWN.
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.
7. (H3) VIBRATION PROOF ITEM 30 USING LOCKING COMPOUND GRADE "EV" PER MIL-S-22473.

REVISIONS TDRR 02624

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A5		REVISED PER TDRR NO. 03059	9/5/63	WK
B2		REVISED PER TDRR NO. 03988	17 oct 63	WK
C		REVISED PER TDRR NO. 04834	27 NOV 63	
D3		REVISED PER TDRR NO. 07827	4-21-64	
E5		REVISED PER TDRR NO. 08031	4-28-64	
F2		REVISED PER TDRR NO. 08032	4/28/64	
G5		REVISED PER TDRR NO. 08033	4/28/64	
H3		REVISED PER TDRR NO. 08618	5/19/64	

	ITEM NO.	QTY REQD		GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
(F1)	35	1		1011918-3			WASHER, CABLE CLAMP			
(E1)	34	4	*	1011625-11	74455151011		SCREW, CAP, SOC HD			
	33	3	*	1011625-18	74455151018		SCREW, CAP, SOC HD			
	32	3	*	1011625-16	74455151016		SCREW, CAP, SOC HD			
(D2) SEE NOTE 2	31	AS REQ		1011804-	79 38690 0301 0304		WASHER FLAT			
(H1)	30	1	NAS	1352C06-6			SCREW, CAP, SOC. HD			
	29									
(E3)	28									
	27									
	26	3		1011868-1	54 38690 0330		CLAMP, RIM CLENCHING			
	25	1	*	1000220-4			CLAMP, CABLE			
	24	2	NAS	1189C04P4L	74 45515 5008		SCREW, 100° FLAT HD			
	23	2		1011332	57 38690 0790		POST, SPACER			
	22	1		1011357	33 38690 0540		GEAR, BEVEL (31T/48P)			
	21	4	NAS	1352C02LL6	74 45515 7007		SCREW CAP, SOCKET HD			
	20	1		1011355-4	57 38690 1333		CLAMP, COLLAR			
	19	1		1011356	33 38690 0530		GEAR BEVEL (30T/48P)			
	18	3		1011868-2	54 38690 0331		CLAMP, RIM CLENCHING			
	17	1		1011274	52 38690 0560		BRACKET, COUNTER			
	16	1	*	1011744	88237000001		COUNTER, ANGLE			
(E2)	15	1	NAS	1352C02LL4	74 45515 7006		SCREW, CAP, SOCKET HD			
	14	2		1011355-2	57 38690 1331		CLAMP, COLLAR			
	13	1		1011277	33 38690 0380		GEAR SPUR 160T/120P			
	12	3	NAS	1352C03LL4	74 45515 7009		SCREW, CAP, SOCKET HD.			
	11	3		1011868-3	54 38690 0332		CLAMP, RIM CLENCHING			
	10	1		1011934	80386900050		SCT SHAFT DRIVE HARNESS, ASSY OF			
	9	1		1011278	33386900390		GEARSHAFT 20T/120P-124T/96P-45T/48P			
	8	1		1011279	33386900400		GEARSHAFT 18T/96P-99T/96P			
	7	1		1011280	33386900410		GEARSHAFT 22T/96P-96T/96P			
	6	1		1011358	33 38690 0550		GEARSHAFT 104T/120P/32T/96P			
	5	6	*	1011608-3	3025770 0082		BEARING, BALL ANNULAR (FLANGED, PHENOLIC RETAINER)			
	4	1	*	1011608-1	3025770 0080		BEARING, BALL ANNULAR (FLANGED, PHENOLIC RETAINER)			
	3	1	*	1011608-4	3025770 0120		BEARING, BALL, ANNULAR (FLANGED, PHENOLIC RETAINER)			
	2	1		1011333	85 38690 0300		PLATE, BEARING ASSEMBLY OF,			
	1	1		1011329	52 38690 0650		HOUSING, GEAR SCT SHAFT DRIVE			

LIST OF PARTS AND MATERIALS

* PURCHASED ITEM SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ -	+ -	+ -

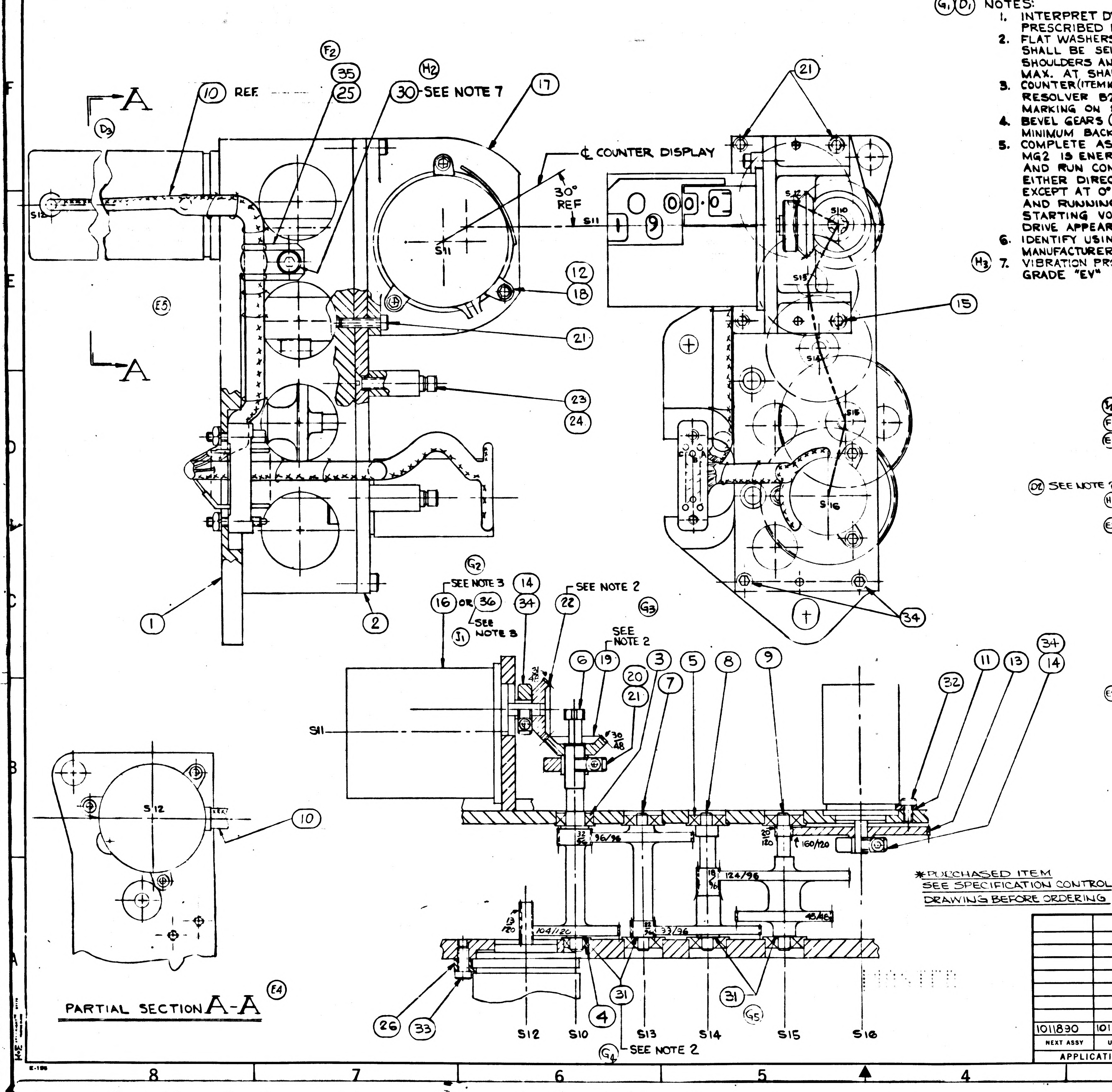
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 38690 0780
PAUL PAPPACHRISTOU
DRAWN DATE 6-20-63
CHECKED 7/16/63
APPROVAL
APPROVAL 8 15 63
NASA APPROVAL 8-16-63 W J
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SHAFT AXIS DRIVE
GEAR BOX, SCT

CODE IDENT NO.
SIZE D
NASA NUMBER 1011703
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1



PARTIAL SECTION A-A

(G1)(D1) NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. FLAT WASHERS (ITEM 31) OF INCREMENTAL THICKNESS SHALL BE SELECTED AND INSERTED BETWEEN GEARSHAFT SHOULDERS AND BEARINGS TO LIMIT END PLAY TO .004 IN. MAX. AT SHAFTS S10, S13, S14 AND S15.
3. COUNTER (ITEM 16 OR 36) SHALL REGISTER ZERO WHEN THE RESOLVER B2 IS AT ITS NULL SETTING INDICATED BY MARKING ON SHAFT AND BODY.
4. BEVEL GEARS (ITEMS 19 AND 22) SHALL BE ALIGNED FOR MINIMUM BACKLASH COMPATIBLE WITH NOTE 5.
5. COMPLETE ASSEMBLY SHALL START WHEN THE MOTOR MG2 IS ENERGIZED WITH 4.0 VOLTS, 400 C.P.S. MAX AND RUN CONTINUOUSLY AT 2.0 VOLTS. MAX., IN EITHER DIRECTION, THROUGH 360° COUNTER ROTATION EXCEPT AT 0° AND 180° POINTS WHERE THE STARTING AND RUNNING VOLTAGE MAY BE 8.0 VOLTS MAX. STARTING VOLTAGE TO BE CHECKED AT POINTS WHERE DRIVE APPEARS TO SLOW DOWN.
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.
7. (H3) VIBRATION PROOF ITEM 30 USING LOCKING COMPOUND GRADE "EV" PER MIL-S-22473.

REVISIONS TDRR 02624

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A5		REVISED PER TDRR NO. 03359	9/5/63	WH
B2		REVISED PER TDRR NO. 03938	17 oct 63	WK
C		REVISED PER TDRR NO. 04834	27 NOV 63	
D3		REVISED PER TDRR No. 07827	4-21-64	JNB
E5		REVISED PER TDRR NO. 08031	4-28-64	JNB
F2		REVISED PER TDRR NO. 08032	4/28/64	JNB
G5		REVISED PER TDRR NO. 08033	4/28/64	JNB
H3		REVISED PER TDRR NO. 08618	5/19/64	JNB
J2		REVISED PER TDRR NO. 15346	1/4/69	JNB

	001 QTY	000 REQD	ITEM NO.			GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
J1	1	0	36		*	1012512	15005006801		COUNTER, ANGLE			
F1	1	1	35			1011918-3			WASHER, CABLE CLAMP			
E1	4	4	34		*	1011625-11	7445515 1011		SCREW, CAP, SOC HD			
	3	3	33		*	1011625-18	7445515 1018		SCREW, CAP, SOC HD			
	3	3	32		*	1011625-16	7445515 1016		SCREW, CAP, SOC HD			
D2 SEE NOTE 2	AS REQ	AS REQ	31			1011804-	79 38690 0301 0304		WASHER, FLAT			
H1	1	1	30		NAS	1352C06-6			SCREW, CAP, SOC. HD			
			29									
E3			28									
			27									
	3	3	26			1011868-1	54 38690 0330		CLAMP, RIM CLENCHING			
	1	1	25		*	1000220-4			CLAMP, CABLE			
	2	2	24		NAS	1189C04P4L	74 45515 5008		SCREW, 100° FLAT HD			
	2	2	23			1011332	57 38690 0790		POST, SPACER			
	1	1	22			1011357	33 38690 0540		GEAR, BEVEL (31T/48P)			
	4	4	21		NAS	1352C02LL6	74 45515 7007		SCREW CAP, SOCKET HD			
	1	1	20			1011355-4	57 38690 1333		CLAMP, COLLAR			
	1	1	19			1011356	33 38690 0530		GEAR BEVEL (30T/48P)			
	3	3	18			1011868-2	54 38690 0331		CLAMP, RIM CLENCHING			
	1	1	17			1011274	52 38690 0560		BRACKET, COUNTER			
	0	1	16		*	1011744	88237000001		COUNTER, ANGLE			
E2	1	1	15		NAS	1352C02LL4	74 45515 7006		SCREW, CAP, SOCKET HD			
	2	2	14			1011355-2	57 38690 1331		CLAMP, COLLAR			
	1	1	13			1011277	33 38690 0380		GEAR SPUR 160T/120P			
	3	3	12		NAS	1352C03LL4	74 45515 7009		SCREW, CAP, SOCKET HD.			
	3	3	11			1011868-3	54 38690 0332		CLAMP, RIM CLENCHING			
	1	1	10			1011934	80 38690 0050		SCT SHAFT DRIVE HARNESS, ASSY OF			
	1	1	9			1011278	33 38690 0390		GEARSHAFT 20T/120P-124T/96P-45T/48P			
	1	1	8			1011279	33 38690 0400		GEARSHAFT 18T/96P-99T/96P			
	1	1	7			1011280	33 38690 0410		GEARSHAFT 22T/96P-96T/96P			
	1	1	6			1011358	33 38690 0550		GEARSHAFT 104T/120P/32T/96P			
	6	6	5		*	1011608-3	30 25770 0082		BEARING, BALL ANNULAR (FLANGED, PHENOLIC RETAINER)			
	1	1	4		*	1011608-1	30 25770 0080		BEARING, BALL ANNULAR (FLANGED PHENOLIC RETAINER)			
	1	1	3		*	1011608-4	30 25770 0120		BEARING, BALL, ANNULAR (FLANGED, PHENOLIC RETAINER)			
	1	1	2			1011333	85 38690 0300		PLATE, BEARING ASSEMBLY OF.			
	1	1	1			1011329	52 38690 0650		HOUSING, GEAR SCT SHAFT DRIVE			

LIST OF PARTS AND MATERIALS

*PURCHASED ITEM
SEE SPECIFICATION CONTROL
DRAWING BEFORE ORDERING

1011830	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

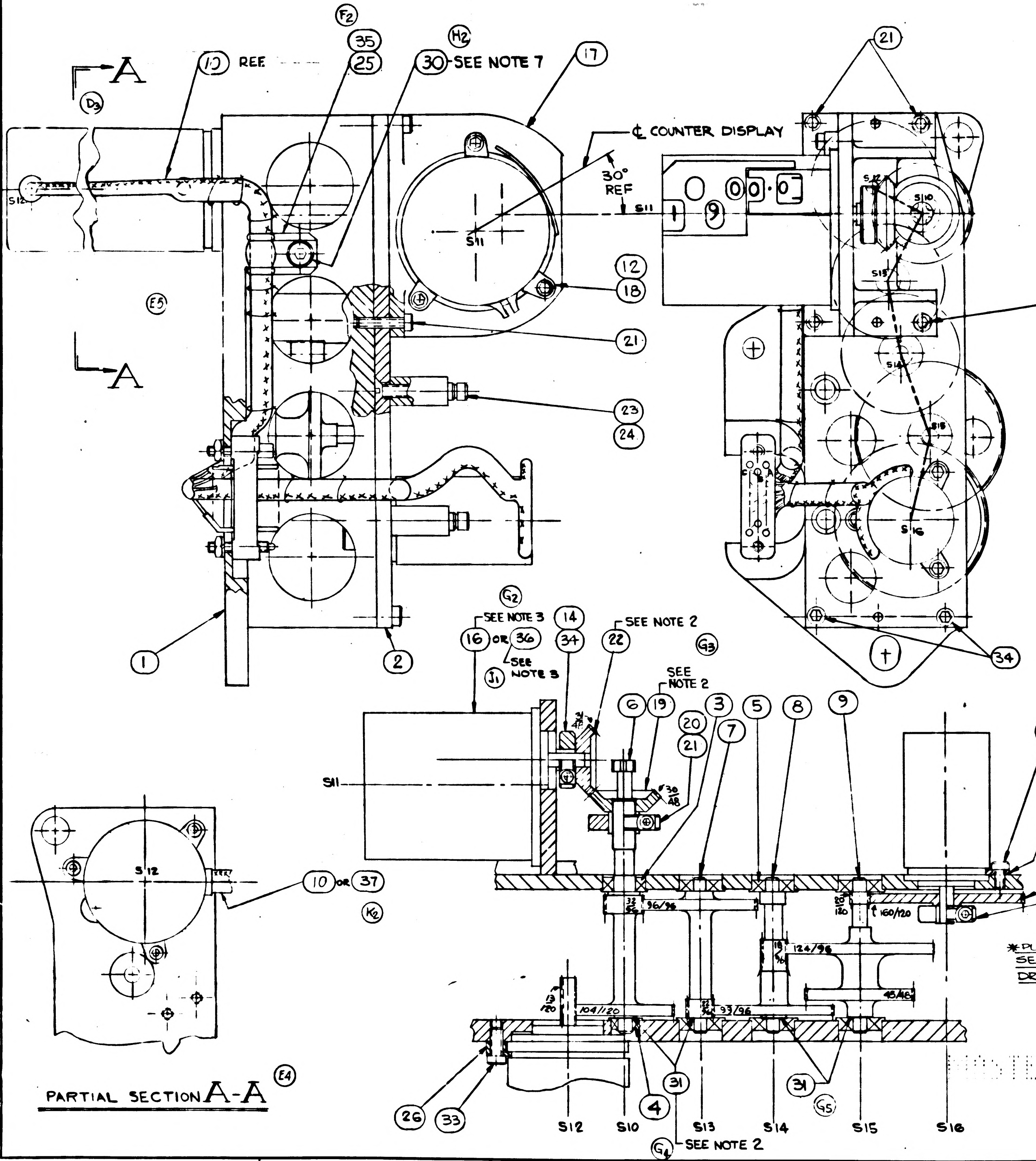
KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 38690 0780
DRAWN PAUL PAPPACHRISTOU DATE 6-20-63
CHECKED 7/16/63
APPROVAL 8/16/63
APPROVAL 9-5-63
NASA APPROVAL W J 8-16-63
MIT APPROVAL 16-6-63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SHAFT AXIS DRIVE
GEAR BOX, SCT

CODE IDENT NO. SIZE D NASA NUMBER 1011703
SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

1011703 K



*PURCHASED ITEM
SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

(G1)(D1) NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. FLAT WASHERS (ITEM 31) OF INCREMENTAL THICKNESS SHALL BE SELECTED AND INSERTED BETWEEN GEARSHAFT SHOULDERS AND BEARINGS TO LIMIT END PLAY TO .004 IN. MAX. AT SHAFTS S10, S13, S14 AND S15.
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6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.
7. (H3) VIBRATION PROOF ITEM 30 USING LOCKING COMPOUND GRADE "EV" PER MIL-S-22473.

REVISIONS TDRR C2624

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A5		REVISED PER TDRR NO. 03059	9/5/63	WK
B2		REVISED PER TDRR NO. 03988	17 Oct 63	WK
C		REVISED PER TDRR NO. 04834	27 NOV 63	
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E5		REVISED PER TDRR NO. 08031	4-28-64	JEB
F2		REVISED PER TDRR NO. 08032	4/28/64	
G5		REVISED PER TDRR NO. 08033	4/28/64	
H3		REVISED PER TDRR NO. 08618	5/19/64	
J2		REVISED PER TDRR NO. 15346	1/6/64	
K2		REVISED PER TDRR NO. 16888	4/26/65	JMB

LIST OF PARTS AND MATERIALS

QTY REQD 002	QTY REQD 001	QTY REQD 000	ITEM NO.			GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
1	1	0	37			1011934-001			SCT SHAFT HARNESS, ASSY OF			
0	1	0	36		*	1012512	1300500680l		COUNTER, ANGLE			
1	1	1	35			1011918-3			WASHER, CABLE CLAMP			
4	4	4	34		*	1011625-11	7445515l011		SCREW, CAP, SOC HD			
3	3	3	33		*	1011625-18	7445515l018		SCREW, CAP, SOC HD			
3	3	3	32		*	1011625-16	7445515l016		SCREW, CAP, SOC HD			
AS REQ	AS REQ	AS REQ	31			1011804-	79 38690 0301 0304		WASHER, FLAT			
1	1	1	30		NAS	1352C06-6			SCREW, CAP, SOC. HD			
			29									
			28									
			27									
3	3	3	26			1011868-1	54 38690 0330		CLAMP, RIM CLENCHING			
1	1	1	25		*	1000220-4			CLAMP, CABLE			
2	2	2	24		NAS	1189C04P4L	7445515 5008		SCREW, 100° FLAT HD			
2	2	2	23			1011332	5738690 0790		POST, SPACER			
1	1	1	22			1011357	3338690 0540		GEAR, BEVEL (31T/48P)			
4	4	4	21		NAS	1352C02LL6	74 45515 7007		SCREW CAP, SOCKET HD			
1	1	1	20			1011355-4	5738690 1333		CLAMP, COLLAR			
1	1	1	19			1011356	3338690 0530		GEAR BEVEL (30T/48P)			
3	3	3	18			1011868-2	54 38690 0331		CLAMP, RIM CLENCHING			
1	1	1	17			1011274	52 38690 0560		BRACKET, COUNTER			
1	0	1	16		*	1011744	8823700000l		COUNTER, ANGLE			
1	1	1	15		NAS	1352C02LL4	7445515 7006		SCREW, CAP, SOCKET HD			
2	2	2	14			1011355-2	5738690 1331		CLAMP, COLLAR			
1	1	1	13			1011277	3338690 0380		GEAR SPUR 160T/120P			
3	3	3	12		NAS	1352C03LL4	7445515 7009		SCREW, CAP, SOCKET HD.			
3	3	3	11			1011868-3	5438690 0332		CLAMP, RIM CLENCHING			
0	0	1	10			1011934-000	8C38690 0050		SCT SHAFT DRIVE HARNESS, ASSY OF			
1	1	1	9			1011278	3338690 0390		GEARSHAFT 20T/120P-124T/96P-45T/48P			
1	1	1	8			1011279	3338690 0400		GEARSHAFT 18T/96P-99T/96P			
1	1	1	7			1011280	3338690 0410		GEARSHAFT 22T/96P-96T/96P			
1	1	1	6			1011358	3338690 0550		GEARSHAFT 104T/120P/32T/96P			
6	6	6	5		*	1011608-3	3025770 0082		BEARING, BALL ANNULAR (FLANGED, PHENOLIC RETAINER)			
1	1	1	4		*	1011608-1	3025770 0080		BEARING, BALL ANNULAR (FLANGED, PHENOLIC RETAINER)			
1	1	1	3		*	1011608-4	3025770 0120		BEARING, BALL, ANNULAR (FLANGED, PHENOLIC RETAINER)			
1	1	1	2			1011333	8538690 0300		PLATE, BEARING ASSEMBLY OF.			
1	1	1	1			1011329	5238690 0650		HOUSING, GEAR SCT SHAFT DRIVE			

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 38690 0780
DRAWN PAUL PAPPACHRISTOU DATE 6-20-63
CHECKED 7/16/63
APPROVAL
APPROVAL
NASA APPROVAL W J 8-16-63
MIT APPROVAL

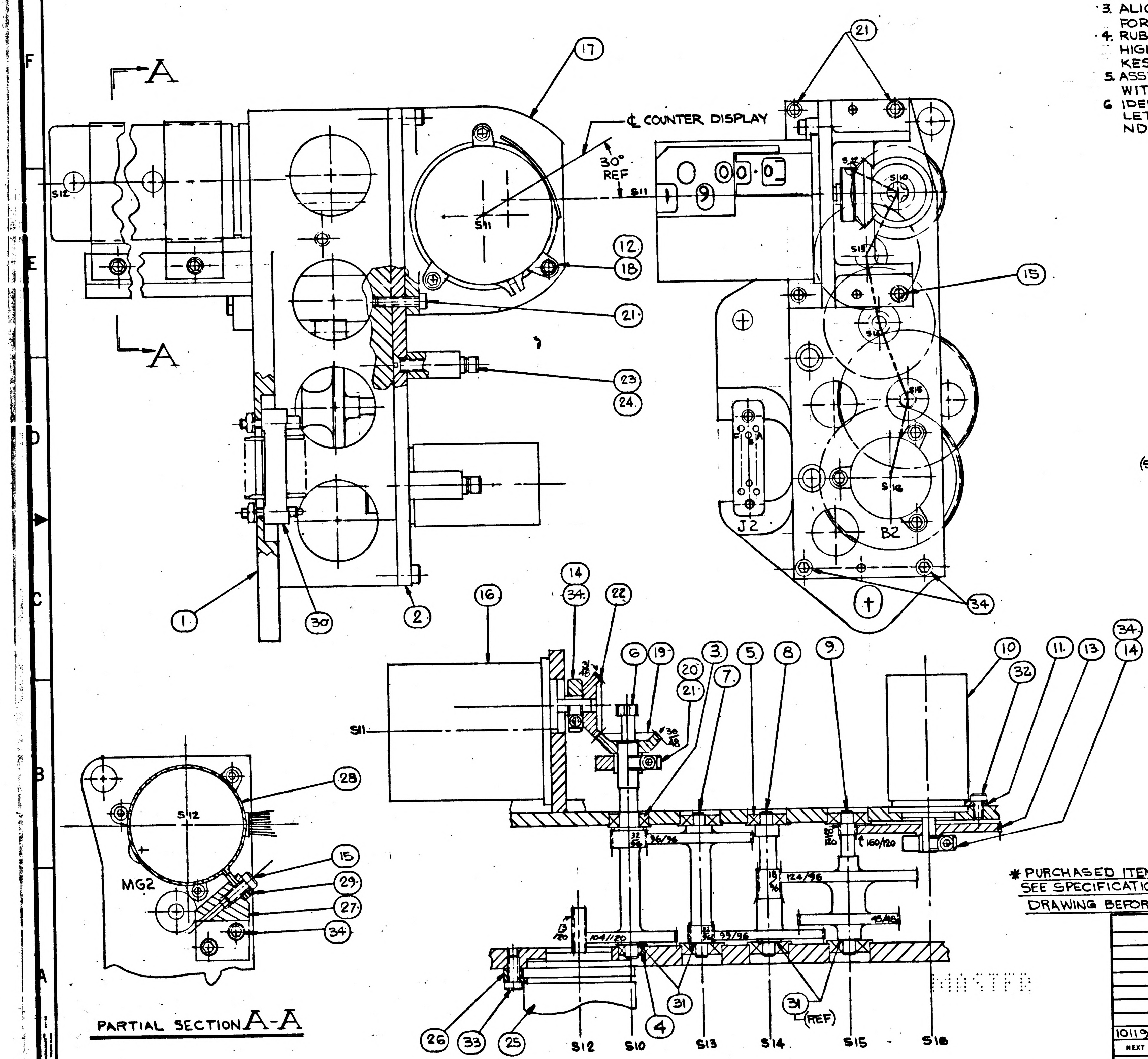
MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SHAFT AXIS DRIVE
GEAR BOX, SCT

CODE IDENT NO. | SIZE D | NASA NUMBER 1011703
SCALE 2/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

REVISIONS TDRR 02624				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. SHIM SHAFTS TO OBTAIN ZERO ENDPLAY
3. ALIGN BEVEL GEARS (ITEMS 19 & 22) FOR 'ZERO' BACKLASH
4. RUBBER STAMP COMPONENT SYMBOLS 3/32 HIGH AS SHOWN IN ACCORDANCE WITH KES-4A.1
5. ASSEMBLE AND TEST IN ACCORDANCE WITH A.T.P. 1011703
6. IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019



(SEE NOTE 2)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
34	6		1011625-11	7445515 1011		SCREW, CAP, SOC HD			
33	3		1011625-18	7445515 1018		SCREW, CAP, SOC HD			
32	3		1011625-16	7445515 1016		SCREW, CAP, SOC HD			
31	AS REQ		1011804-	79 38690 0301 0304		WASHER, FLAT			
* 30	1	J2	1011740	68 50201 6801		CONNECTOR, ELECTRICAL			
29	2		1011802	56 38690 0410		PLATE, FLAT			
28	2		1011314	56 38690 0190		HEAT, SINK			
27	1		1011800	52 38690 0860		BRACKET HEAT CONDUCTOR			
26	3		1011868-1	54 38690 0330		CLAMP, RIM CLENCHING			
* 25	1	MG2	1010610	7500101 0101		SERVO MOTOR TACHOMETER, GENERATOR			
24	2	NAS	1189C04P4L	7445515 5008		SCREW, 100° FLAT HD			
23	2		1011332	57 38690 0790		POST, SPACER			
22	1		1011357	33 38690 0540		GEAR, BEVEL (31T/48P)			
21	4	NAS	1352C02LL6	74 45515 7007		SCREW CAP, SOCKET HD.			
20	1		1011355-4	57 38690 1333		CLAMP, COLLAR			
19	1		1011356	33 38690 0530		GEAR, BEVEL (30T/48P)			
18	3		1011868-2	54 38690 0331		CLAMP, RIM CLENCHING			
17	1		1011274	52 38690 0560		BRACKET, COUNTER			
16	1		1011744	88237000001		COUNTER, ANGLE			
15	3	NAS	1352C02LL4	74 45515 7006		SCREW, CAP, SOCKET HD			
14	2		1011355-2	57 38690 1331		CLAMP, COLLAR			
13	1		1011277	33 38690 0380		GEAR SPUR 160T/120P			
12	3	NAS	1352C03LL4	7445515 7009		SCREW, CAP, SOCKET HD.			
11	3		1011868-3	54 38690 0332		CLAMP, RIM CLENCHING			
* 10	1	B2	1010341	7500201 0301		RESOLVER, RECEIVER ONE SPEED			
9	1		1011278	33 38690 0390		GEARSHAFT 20T/120P-124T/96P-45T/48P			
8	1		1011279	33 38690 0400		GEARSHAFT 18T/96P-99T/96P			
7	1		1011280	33 38690 0410		GEARSHAFT 22T/96P-96T/96P			
6	1		1011358	33 38690 0550		GEARSHAFT 104T/120P/32T/96P			
* 5	6		1011608-3	30 25770 0082		BEARING, BALL, ANNULAR (FLANGED, PHENOLIC RETAINER)			
* 4	1		1011608-1	30 25770 0080		BEARING, BALL, ANNULAR (FLANGED PHENOLIC RETAINER)			
* 3	1		1011608-4	30 25770 0120		BEARING, BALL, ANNULAR (FLANGED, PHENOLIC RETAINER)			
2	1		1011333	85 38690 0300		PLATE, BEARING ASSEMBLY OF,			
1	1		1011329	52 38690 0650		HOUSING, GEAR SCT SHAFT DRIVE			

LIST OF PARTS AND MATERIALS

* PURCHASED ITEM SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

NEXT ASSY	USED ON
1011902	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOLERANCES ON	FRACTIONS	DECIMALS	ANGLES
	+ -	+ -	+ -

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 38690 0780
DRAWN PAUL PAPPACHRISTOU DATE 6-20-63
CHECKED 7/16/63
APPROVAL 8/15/63
APPROVAL 8-15-63
NASA APPROVAL W. J. 8-16-63
MIT APPROVAL 16 Aug 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE SHAFT AXIS DRIVE GEAR BOX, SCT

CODE IDENT NO.
SIZE D
NASA NUMBER 1011703
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

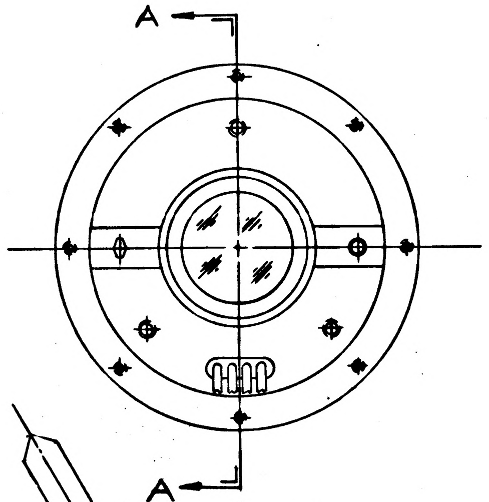
1011703

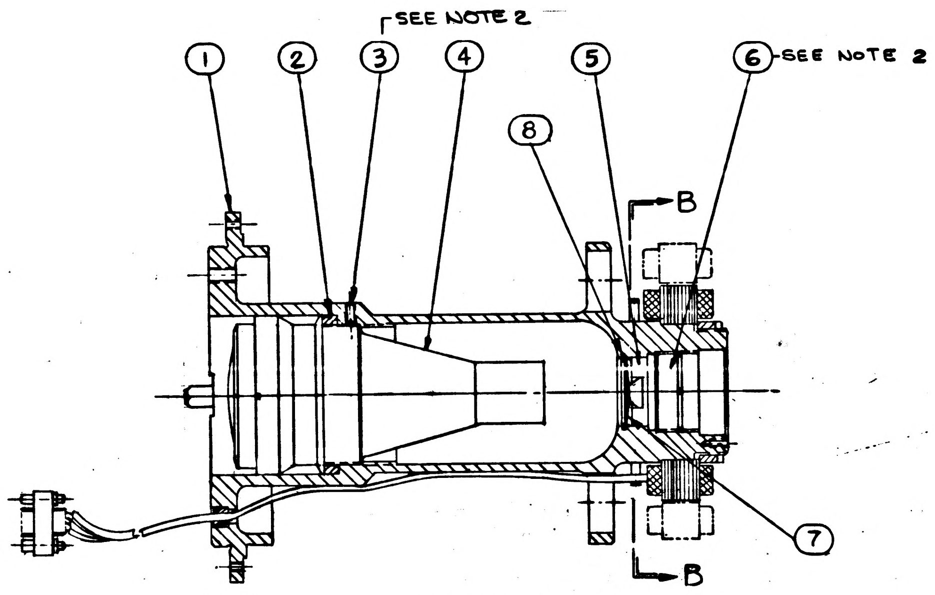
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011704 A

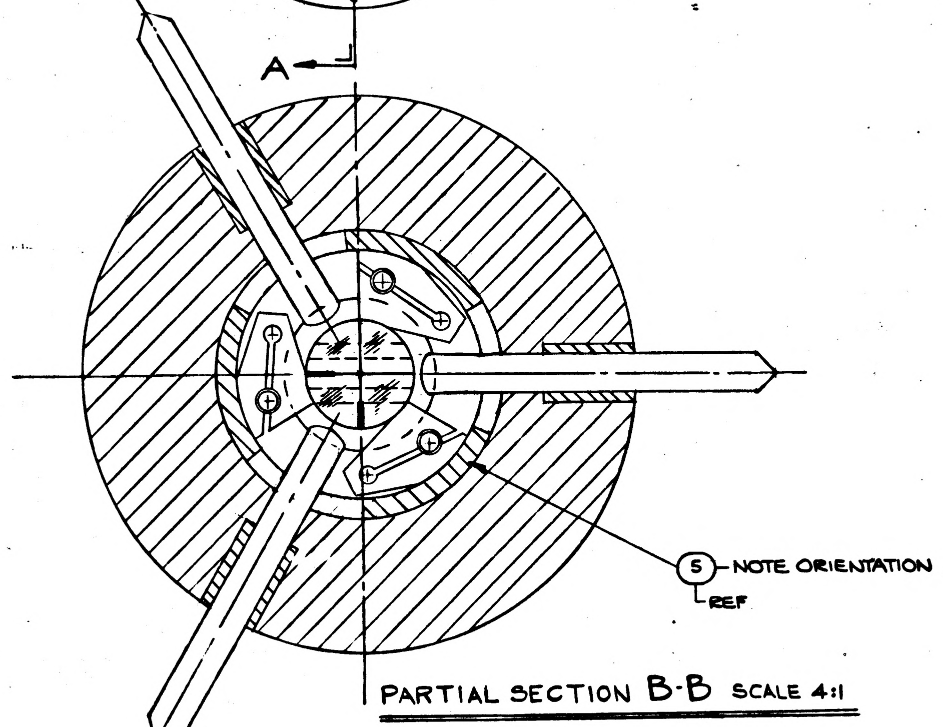
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS 02623				
A_2		REVISED PER TORR NO. 03370	9/25/63	9/26

NOTES:
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327
2. VIBRATION PROOF PER MIL-E-5400 (PAR 3.1.17e) ITEM NO. 3 & 6
3. ASSEMBLE PER ATP 1011704.
4 IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND1002019





SECTION A-A



PARTIAL SECTION B-B SCALE 4:1

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
8	1		MS16625-90			RING, RETAINING, INTERNAL, BASIC			
7	1		1011944	56386900600		WASHER, SPRING			
6	1		1011305	57386900710		RING, LOCKING OUTER			
5	1		1011716	85386900400		RETICLE ASSY OF,			
4	1		1011796	85386900630		LENS HOLDER ASSY, SEXTANT TELESCOPE			
3	1	*	1011773-2			SET SCREW, FLAT (NYLON) POINT, HEX. SOCK.			
2	1		1011304	57386900700		SPACER			
1	1		1011797	85386900650		TELESCOPE TUBE ASSY			

Ⓐ₁ Ⓐ₂

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

MASTER

NEXT ASSY	USED ON
1011889	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTION + − DECIMALS + − ANGLES + −
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 38690 0690
DRAWN PAUL PAPPACHRISTOU DATE 6-13-63
CHECKED Paul Pappachristou
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL W J Rhine 8-26-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SHAFT AXIS ASSY, SEXTANT

CODE IDENT NO. SIZE D NASA NUMBER 1011704
SCALE 1/1 & 4/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

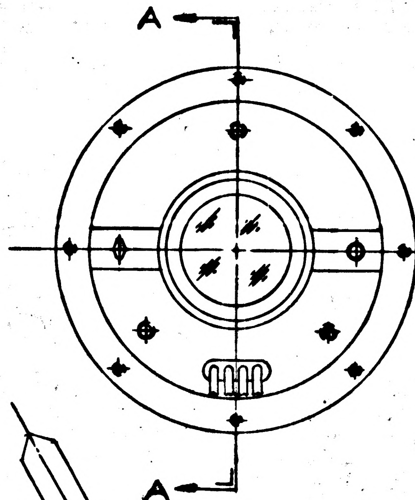
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

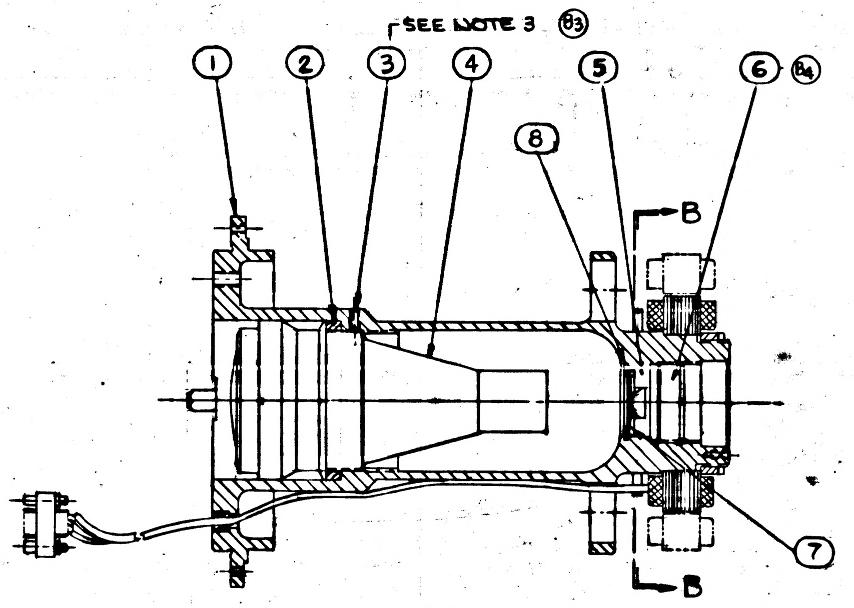
B	1011704

REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A_2		REVISED PER TDRR NO. 03370	9/25/63	9/26
B_4		REVISED PER TDRR NO. 08467	5/14/64	

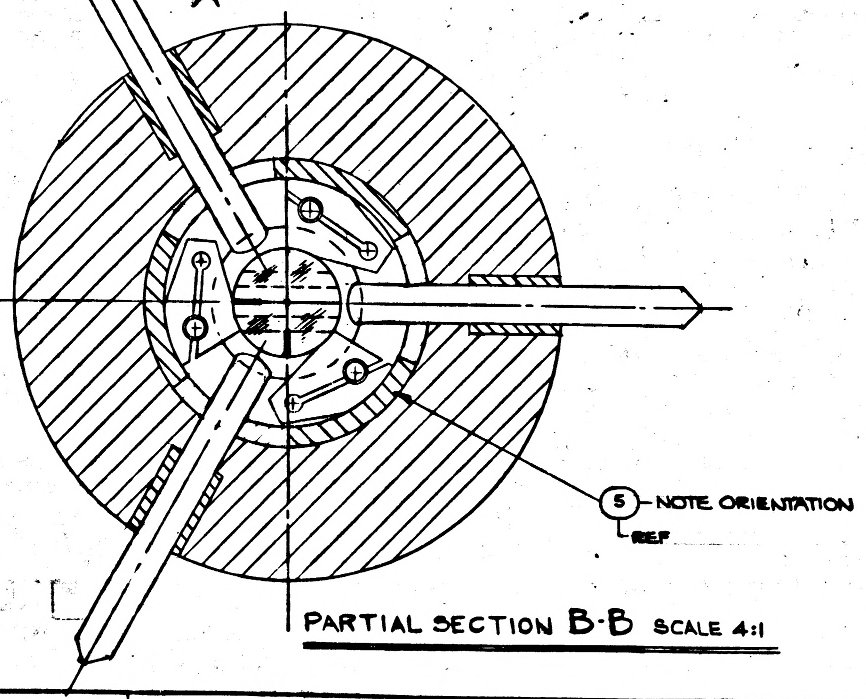
NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327. (B1)
2. ITEM 2 SHALL BE MACHINED AT ASSEMBLY TO FOCUS AN IMAGE OF A COLLIMATED TARGET THROUGH ITEM 4 AT THE RETICLE PLANE OF ITEM 5 WITH NO APPARENT PARALLAX. ITEM 2 SHALL REQUIRE PASSIVATION AFTER FINAL MACHINING.
3. SECURE ITEM 3 WITH LOCKING COMPOUND PER ND1002211 USING GRADE "E" PER MIL-S-22473
4. IDENTIFY USING NASA DWG NO. REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019.





SECTION A-A



PARTIAL SECTION B-B SCALE 4:1

	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
(A1)	8	1		MS16625-90			RING, RETAINING, INTERNAL, BASIC			
(A2)	7	1		1011944	56386900600		WASHER, SPRING			
	6	1		1011305	57386900710		RING, LOCKING OUTER			
	5	1		1011716	85386900400		RETICLE ASSY OF,			
	4	1		1011796	85386900630		LENS HOLDER ASSY, SEXTANT TELESCOPE			
	3	1	*	1011773-2			SET SCREW, FLAT (NYLON) POINT, HEX. SOCK.			
(B2) SEE NOTE 2	2	1		1011304	57386900700		SPACER			
	1	1		1011797	85386900680		TELESCOPE TUBE ASSY			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

NEXT ASSY	USED ON
1011889	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ −	+ −	+ −

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MATERIAL

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK

KIC PN 85 38690 0690

DRAWN PAUL PAPPACHRISTOU DATE 6-13-63
CHECKED P. Pappachristou
APPROVAL G. [illegible] 8-15-63
APPROVAL [illegible] 8-13-63
NASA APPROVAL W. J. [illegible] 8-16-63
MIT APPROVAL [illegible]

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SHAFT AXIS ASSY, SEXTANT

CODE IDENT NO.	SIZE	NASA NUMBER
	D	1011704

SCALE 1/1 & 4/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

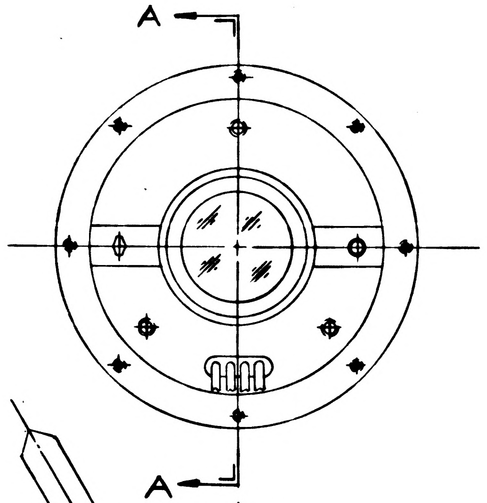
1011704 B

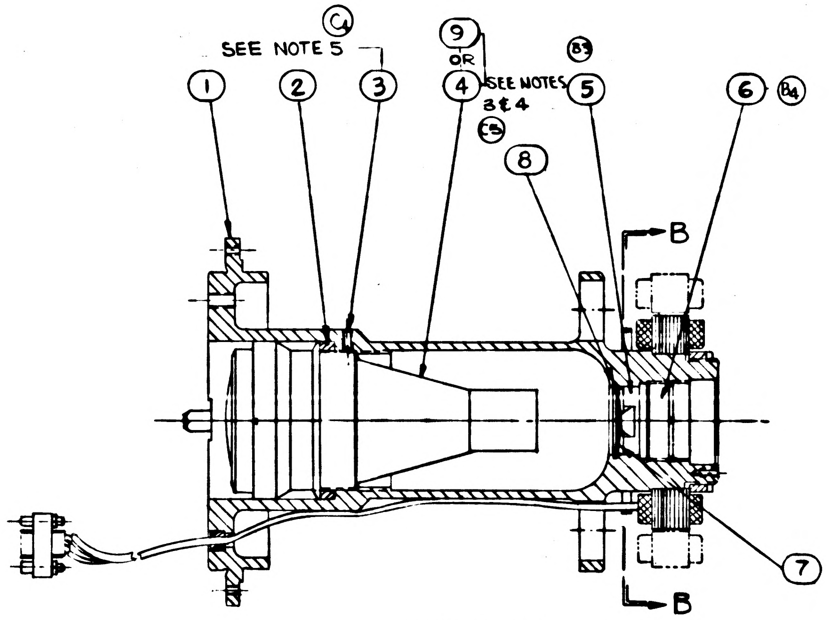
1011704 C

NOTES:

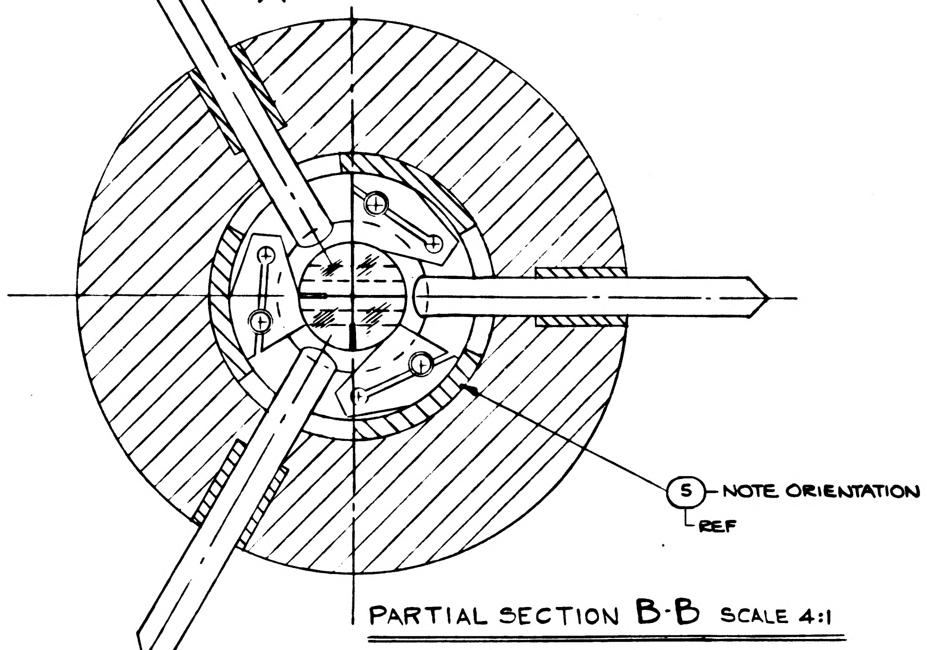
1. INTERPRET DWG IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327. (B1)
2. ITEM 2 SHALL BE MACHINED AT ASSEMBLY TO FOCUS AN IMAGE OF A COLLIMATED TARGET THROUGH ITEM 4 AT THE RETICLE PLANE OF ITEM 5 WITH NO APPARENT PARALLAX. ITEM 2 SHALL REQUIRE PASSIVATION AFTER FINAL MACHINING.
3. SECURE ITEM 4 TO ITEM 1 USING 4 DROPS OF SEALING COMPOUND, GRADE "A" OF MIL-S-22473 PER ND 1002211.
4. ITEM 4 TO BE THREADED TO ITEM 1 WITH A TORQUE BETWEEN 180 TO 240 IN/LB. (C2)
5. SECURE ITEM 3 WITH LOCKING COMPOUND PER ND 1002211 USING GRADE "E" PER MIL-S-22473.
6. IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURES SYMBOL PER ND 1002019. (C3)

REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A 2		REVISED PER TDRR NO. 03370	9/25/63	9/26
B 4		REVISED PER TDRR NO. 08467	5/14/64	
C 5		REVISED PER TDRR NO. 13428	1/7/65	





SECTION A-A



PARTIAL SECTION B-B SCALE 4:1

(C1)	1	0	10			1011797-001			TELESCOPE TUBE ASSY, SEXTANT TELESCOPE			
	1	0	9			1011976-001			LENS HOLDER ASSY			
(A1)	1	1	8			MS16625-90			RING, RETAINING, INTERNAL, BASIC			
(A2)	1	1	7			1011944	56386900600		WASHER, SPRING			
	1	1	6			1011305	57386900710		RING, LOCKING OUTER			
	1	1	5			1011716	85386900400		RETICLE ASSY OF,			
	0	1	4			1011796	85386900630		LENS HOLDER ASSY, SEXTANT TELESCOPE			
	0	1	3		*	1011773 2			SET SCREW, FLAT (NYLON) POINT, HEX. SOCK.			
(B2) SEE NOTE 2	1	1	2			1011304	57386900700		SPACER			
	0	1	1			1011797	85386900650		TELESCOPE TUBE ASSY			
	001 QTY	000 REQ	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

*PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

NEXT ASSY	USED ON
1011889	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	±	±	±

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CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 38690 0690
DRAWN PAUL PAPPACHRISTOU DATE 6-13-63
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APPROVAL 8-12-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SHAFT AXIS ASSY, SEXTANT

CODE IDENT NO.
SIZE D
NASA NUMBER 1011704
SCALE 1/1 & 4/1
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

1011704 C

MASTER

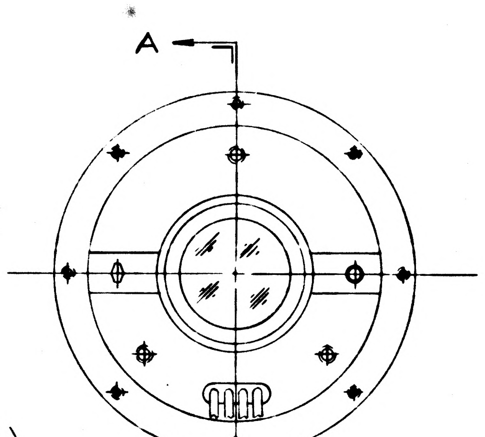
D 1011704

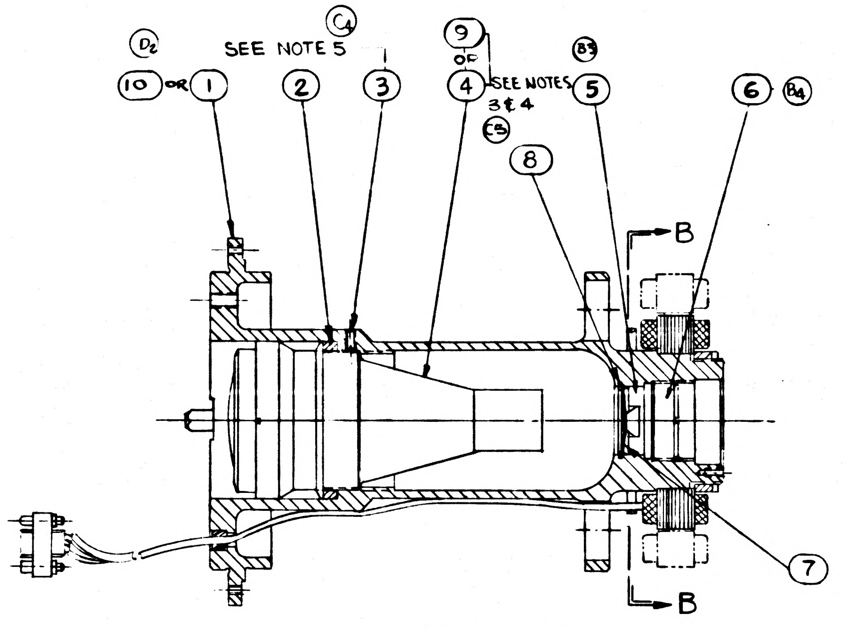
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A_2		REVISED PER TORR NO. 03370	9/25/63	
B_4		REVISED PER TDRR NO. 08467	5/14/64	
C5		REVISED PER TORR NO. 15423	1/7/65	
D_2		REVISED PER TORR No. 18012	4/6/65	

REVISIONS 02623

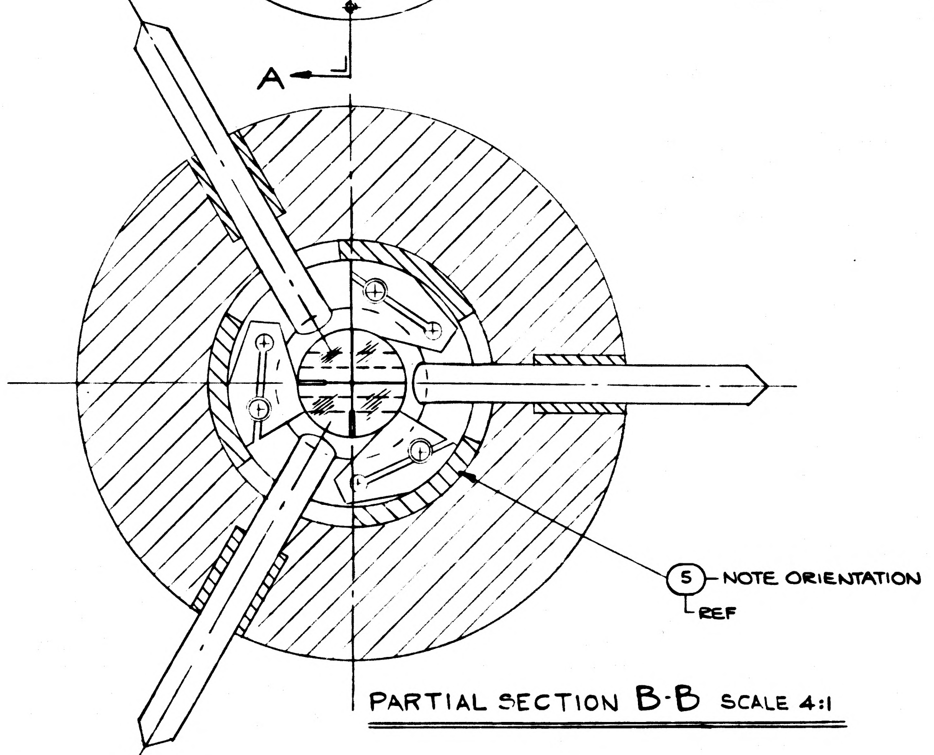
NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327. (B1)
2. ITEM 2 SHALL BE MACHINED AT ASSEMBLY TO FOCUS AN IMAGE OF A COLLIMATED TARGET THROUGH ITEM 4 AT THE RETICLE PLANE OF ITEM 5 WITH NO APPARENT PARALLAX. ITEM 2 SHALL REQUIRE PASSIVATION AFTER FINAL MACHINING.
3. SECURE ITEM 4 OR ITEM 9 TO ITEM 1 OR ITEM 10 USING 4 DROPS OF SEALING COMPOUND, GRADE "A" OF MIL-S-22473 PER ND 1002211. (D1)
4. ITEM 4 OR ITEM 9 TO BE THREADED TO ITEM 1 OR 10 WITH A TORQUE BETWEEN 180 TO 240 IN/LB. (C2)
5. SECURE ITEM 3 WITH LOCKING COMPOUND PER ND 1002211 USING GRADE "E" PER MIL-S-22473.
6. IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURES SYMBOL PER ND 1002019. (C3)





SECTION A-A



PARTIAL SECTION B-B SCALE 4:1

	QTY REQ 001	QTY REQ 000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT.
(C1)	1	0	10			1011797-001			TELESCOPE TUBE ASSY, SEXTANT TELESCOPE			
	1	0	9			1011976-001			LENS HOLDER ASSY			
(A1)	1	1	8			MS16625-90			RING, RETAINING, INTERNAL, BASIC			
(A2)	1	1	7			1011944	56386900600		WASHER, SPRING			
	1	1	6			1011305	57386900710		RING, LOCKING OUTER			
	1	1	5			1011716	85386900400		RETICLE ASSY OF,			
	0	1	4			1011796	85386900630		LENS HOLDER ASSY, SEXTANT TELESCOPE			
	0	1	3		*	1011773 2			SET SCREW, FLAT (NYLON) POINT, HEX. SOCK			
(B2) SEE NOTE 2	1	1	2			1011304	57386900700		SPACER			
	0	1	1			1011797	85386900650		TELESCOPE TUBE ASSY			

LIST OF PARTS AND MATERIALS

*PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

NEXT ASSY	USED ON
1011889	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 38690 0690
PAUL PAPPACHRISTOU
DRAWN DATE 6-13-63
CHECKED Paul Pappachristou
APPROVAL
APPROVAL
NASA APPROVAL 7-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SHAFT AXIS ASSY, SEXTANT

CODE IDENT NO.
SIZE D
NASA NUMBER 1011704
SCALE 1/1 & 4/1
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

1011704 D B

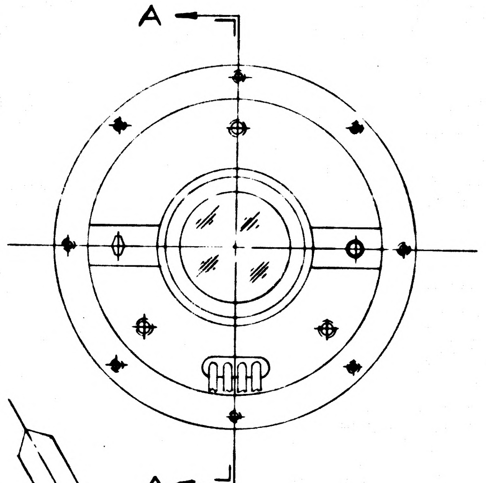
NOTES:

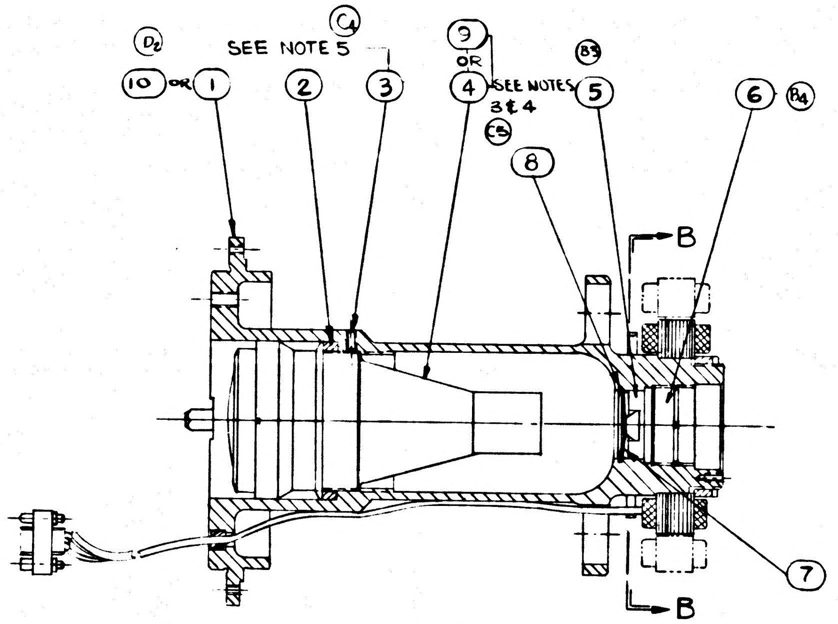
1. INTERPRET DWG IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. ITEM 2 SHALL BE MACHINED AT ASSEMBLY TO FOCUS AN IMAGE OF A COLLIMATED TARGET THROUGH ITEM 4 AT THE RETICLE PLANE OF ITEM 5 WITH NO APPARENT PARALLAX. ITEM 2 SHALL REQUIRE PASSIVATION AFTER FINAL MACHINING. (B1)
3. SECURE ITEM 4 OR ITEM 9 TO ITEM 1 OR ITEM 10 USING 4 DROPS OF SEALING COMPOUND, GRADE "A" OF MIL-S-22473 PER ND 1002211. (D1)
4. ITEM 4 OR ITEM 9 TO BE THREADED TO ITEM 1 OR 10 WITH A TORQUE BETWEEN 180 TO 240 IN/LB. (C2)
5. SECURE ITEM 3 WITH LOCKING COMPOUND PER ND 1002211 USING GRADE "E" PER MIL-S-22473.
6. IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURES SYMBOL PER ND 1002019. (C3)

1011704 E

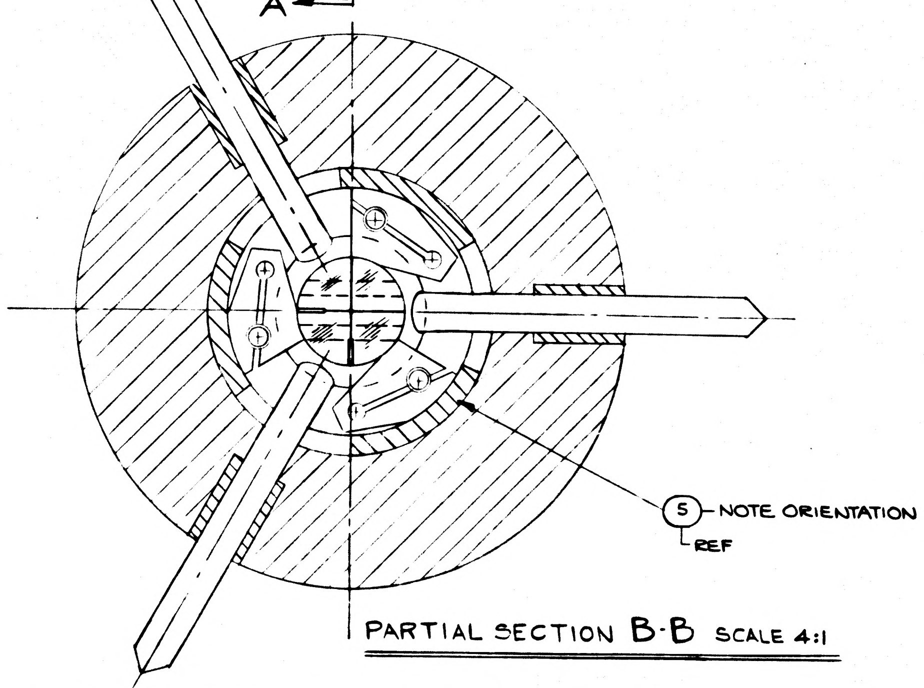
REVISIONS 02223

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A2		REVISED PER TDRR NO. 03373	9/25/63	
B4		REVISED PER TDRR NO. 08467	5/14/64	
C5		REVISED PER TDRR NO. 15423	1/7/65	
D2		REVISED PER TDRR NO. 18012	4/6/65	
E		REVISED PER TDRR NO 19829	6/2/65	Jnb





SECTION A-A



PARTIAL SECTION B-B SCALE 4:1

(B2) SEE NOTE 2

001 QTY	000 REQ	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
1	0	10			1011797-001			TELESCOPE TUBE ASSY, SEXTANT TELESCOPE			
1	0	9			1011796-001			LENS HOLDER ASSY			
1	1	8			MS16625-90			RING, RETAINING, INTERNAL, BASIC			
1	1	7			1011944	56386900600		WASHER, SPRING			
1	1	6			1011305	57386900710		RING, LOCKING OUTER			
1	1	5			1011716	85386900400		RETICLE ASSY OF,			
0	1	4			1011796	85386900630		LENS HOLDER ASSY, SEXTANT TELESCOPE			
0	1	3		*	1011773 2			SET SCREW, FLAT (NYLON) POINT, HEX. SOCK			
1	1	2			1011304	57386900700		SPACER			
0	1	1			1011797	85386900650		TELESCOPE TUBE ASSY			

(C1) (A1) (A2)

LIST OF PARTS AND MATERIALS

*PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

1011889	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ −	+ −	+ −

DO NOT SCALE THIS DRAWING

MATERIAL

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 38690 0690

PAUL PAPPACHRISTOU
DRAWN DATE 6-13-63
CHECKED Paul Pappachristou
APPROVAL
APPROVAL 63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SHAFT AXIS ASSY, SEXTANT

CODE IDENT NO. | SIZE D | NASA NUMBER 1011704
SCALE 1/1 & 4/1 | WEIGHT CALC ACTUAL | SHEET 1 OF

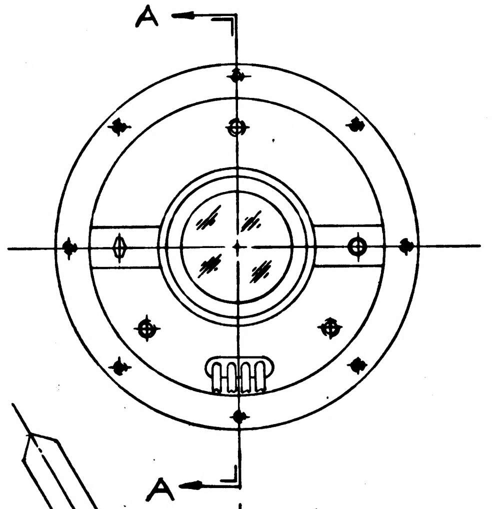
1011704 E

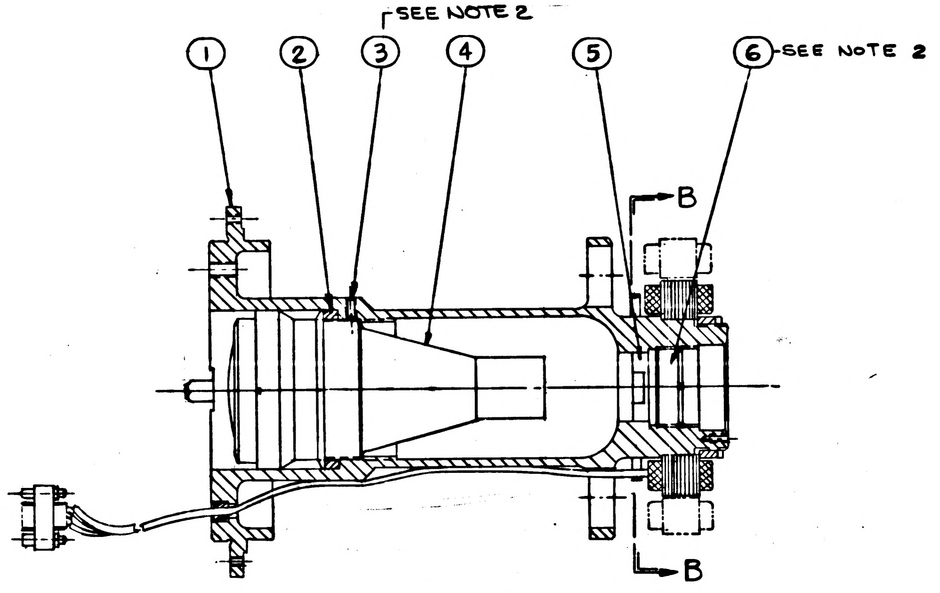
1011704

SYM	ZONE	REVISIONS 02623 DESCRIPTION	DATE	APPROVAL

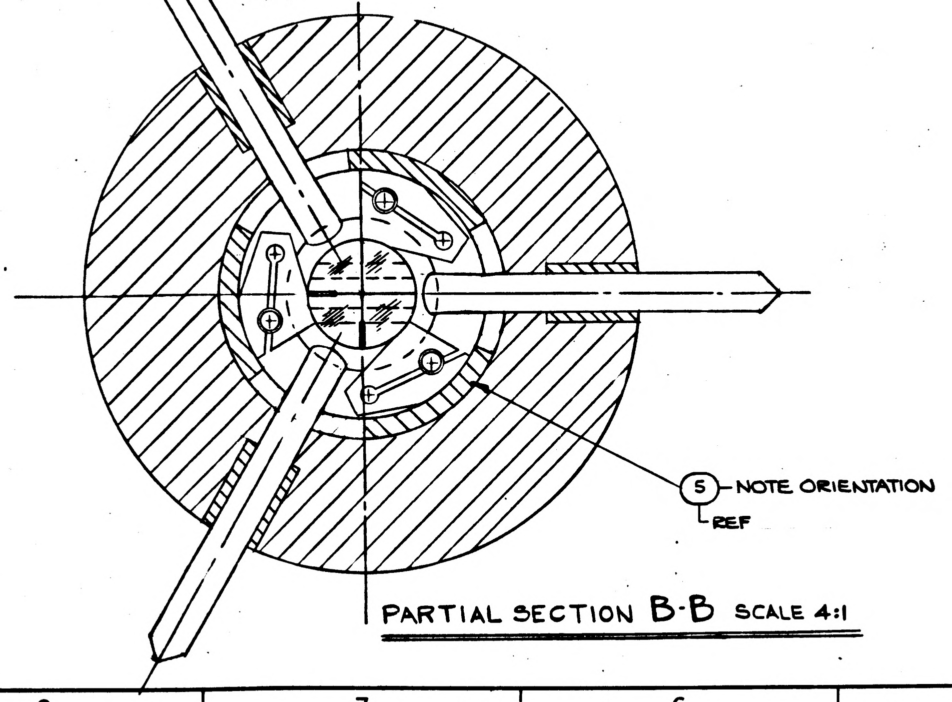
NOTES:

1. INTERPRET DWG IN ACCORD WITH MIL-D-70327
2. VIBRATION PROOF PER MIL-E-5400 (PAR 3.1.17c) ITEM NO. 3 & 6
3. ASSEMBLE PER ATP 1011704.
4. IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND1002019





SECTION A-A



PARTIAL SECTION B-B SCALE 4:1

★ PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
6	1		1011305	57386900710		RING, LOCKING OUTER			
5	1		1011716	85386900400		RETICLE ASSY OF,			
4	1		1011796	85386900630		LENS HOLDER ASSY, SEXTANT TELESCOPE			
3	1	★	1011773-2			SET SCREW, FLAT (NYLON) POINT, HEX. SOCK.			
2	1		1011304	57386900700		SPACER			
1	1		1011797	85386900650		TELESCOPE TUBE ASSY			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011889	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS + − DECIMALS + − ANGLES + −
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 38690 0690
DRAWN PAUL PAPPACHRISTOU DATE 6-13-63
CHECKED Paul Pappachristou
APPROVAL G. Vandemeer 8-13-63
APPROVAL E.J. Sciaco 8-15-63
NASA APPROVAL W.J. Rhine 8-15-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SHAFT AXIS ASSY, SEXTANT

CODE IDENT NO.
SIZE D
NASA NUMBER 1011704
SCALE 1/1 & 4/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

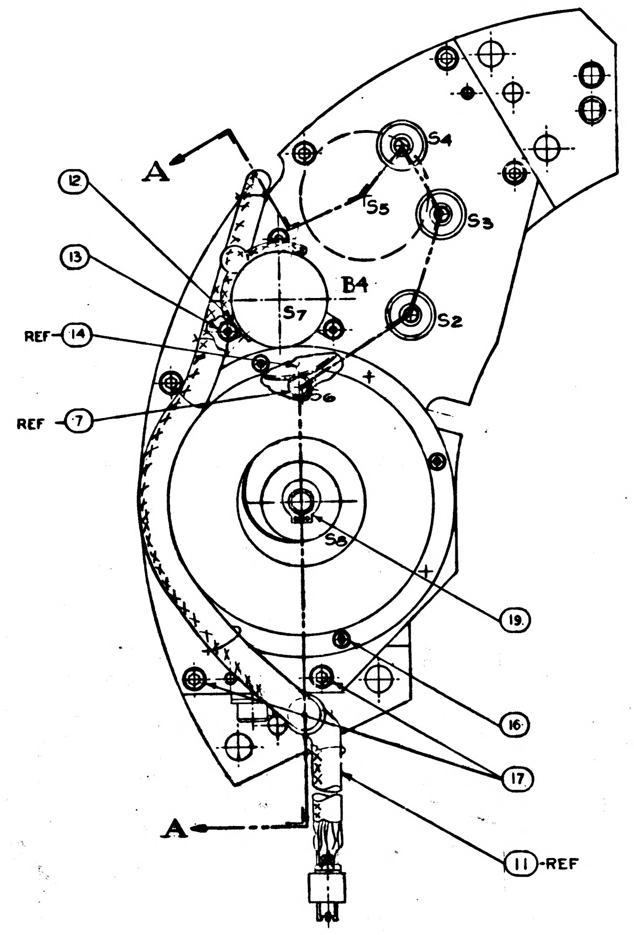
1011704

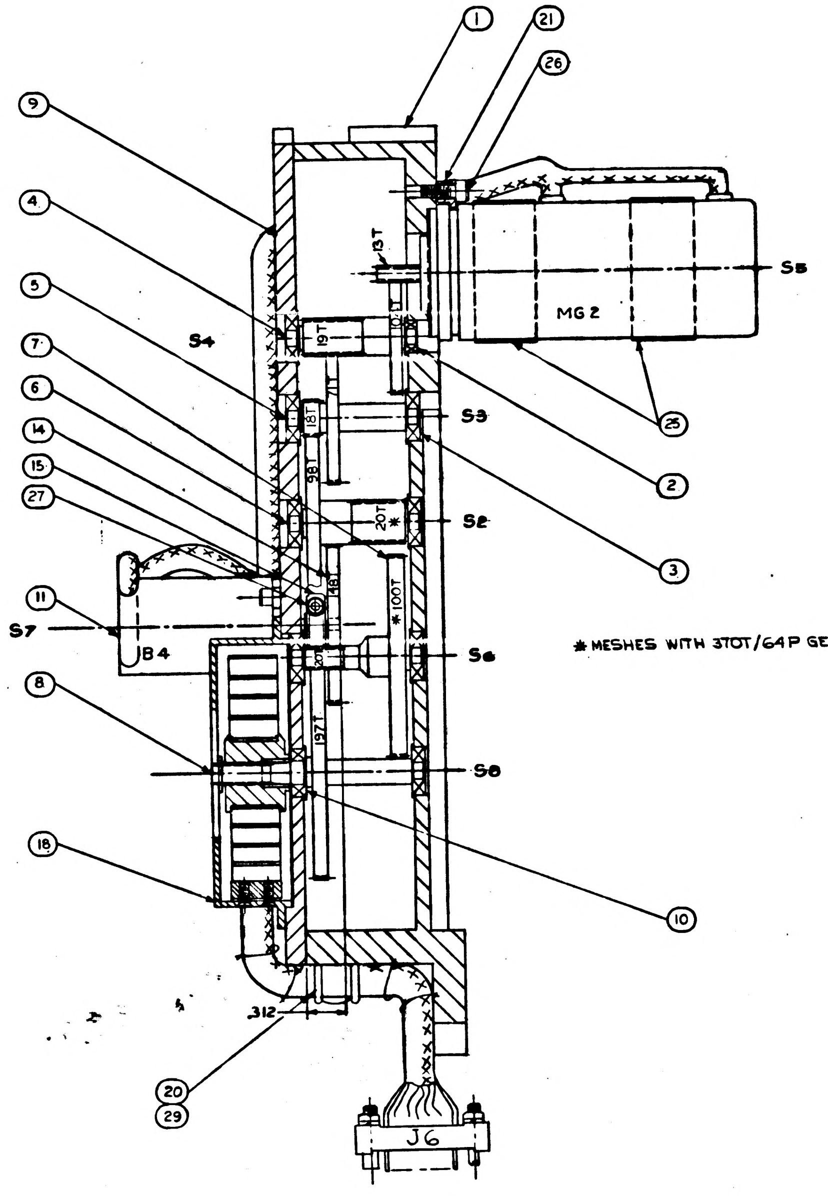
INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

A	1011705

REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A5		REVISED PER TDRR NO 03060	5-9-63	

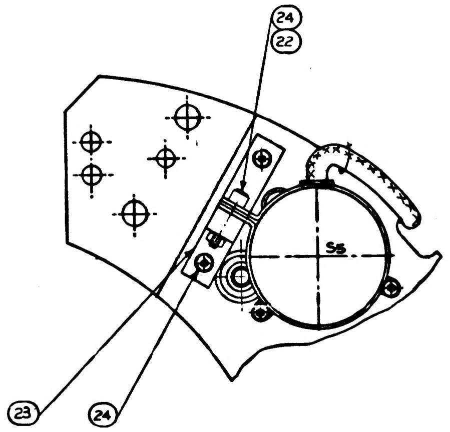
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. LIMIT [illegible] DPLAY OF S2, S3, S4 AND S6 TO .002±.001 USING 1011804- (ITEM 28).
3. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019





SECTION A-A

*MESHES WITH 370T/64P GEAR



SEE NOTE 2

29	1	NAS	1352C06LL4	74455157018		SCREW, CAP, SOC HD, SELF LOCKING			
28	AS REQD		1011804-	7938690 0301 0304		WASHER, FLAT			
27	1		1011625-11	74455151011		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
26	3		1011625-18	74455151018		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
25	2		1011314	56386900190		HEAT SINK			
24	3	NAS	1352C02LL6	74455157007		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
23	1		1011313	52386900630		BRACKET, HEAT SINK			
22	1		AN340C2			NUT PLAIN, HEX.			
21	3		1011868-1	54386900330		CLAMP, RIM CLENCHING			
20	1		1000220-4			CLAMP, CABLE			
19	1		MS16624-18			RING, RETAINING (WALDES TRUARC 5100-18)			
18	1		1011911	85386900980		HOUSING AND SPRING ASSEMBLY			
17	6		1011625-28	74455151028		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
16	4	NAS	1352C02LL4	74455157006		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
15	1		1011355-2	57386901331		CLAMP, COLLAR			
14	1		1011297	33386900440		GEAR, SPUR (148T-120P)			
13	3		1011625-16	74455151016		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
12	3		1011868-3	54386900332		CLAMP, RIM CLENCHING			
11	1		1011933	80386900040		SXT SHAFT DRIVE HARNESS, ASSY OF			
10	1		1011608-4	30025770120		BEARING, BALL, ANNULAR			
9	1		1011715	85386900660		PLATE BEARING AND PIN ASSY			
8	1		1011309	33386900470		GEARSHAFT (197T-120P)			
7	1		1011299	33386900460		GEARSHAFT (20T-120P, 100T-64P)			
6	1		1011298	33386900450		GEARSHAFT (20T-64P, 98T-72P)			
5	1		1011296	33386900430		GEARSHAFT (18T-72P, 71T-72P)			
4	1		1011295	33386900420		GEARSHAFT (19T-72P, 104T-120P)			
3	8		1011608-3	30025770082		BEARING, BALL, ANNULAR			
2	1		1011608-1	30025770080		BEARING, BALL, ANNULAR			
1	1		1011897	85386900820		HOUSING, GEAR (SEXTANT SHAFT DRIVE) ASSY OF			
ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

*PURCHASED ITEM SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

MASTER

1011890	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900790

DRAWN W CABAU DATE 6-20-63
CHECKED 7/19/63
APPROVAL 8-5-63
APPROVAL 9-15-63
NASA APPROVAL W.J.
MIT APPROVAL 11 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SXT SHAFT DRIVE GEARBOX ASSEMBLY

CODE IDENT NO.
SIZE E
NASA NUMBER 1011705
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011705 A

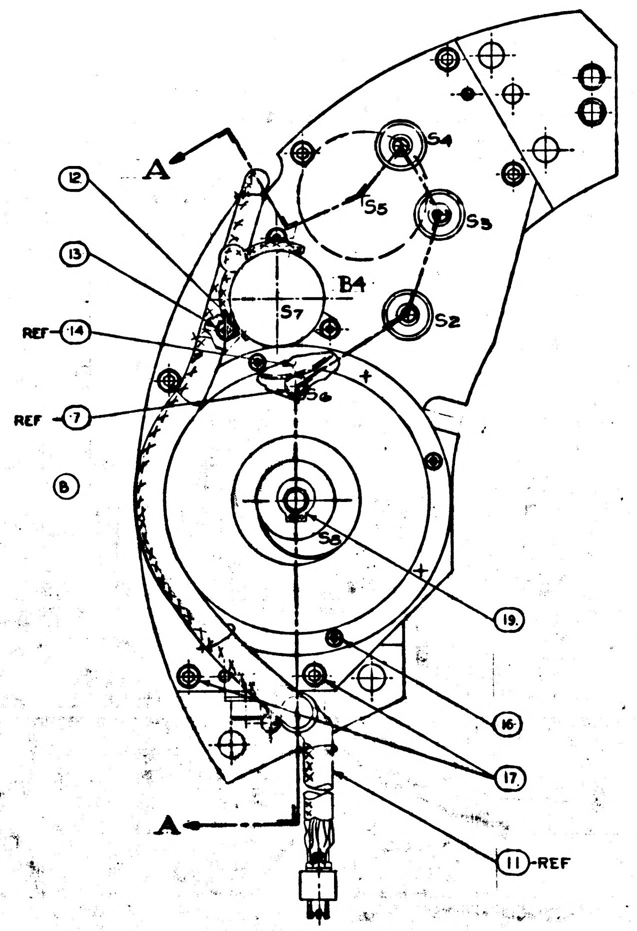
INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

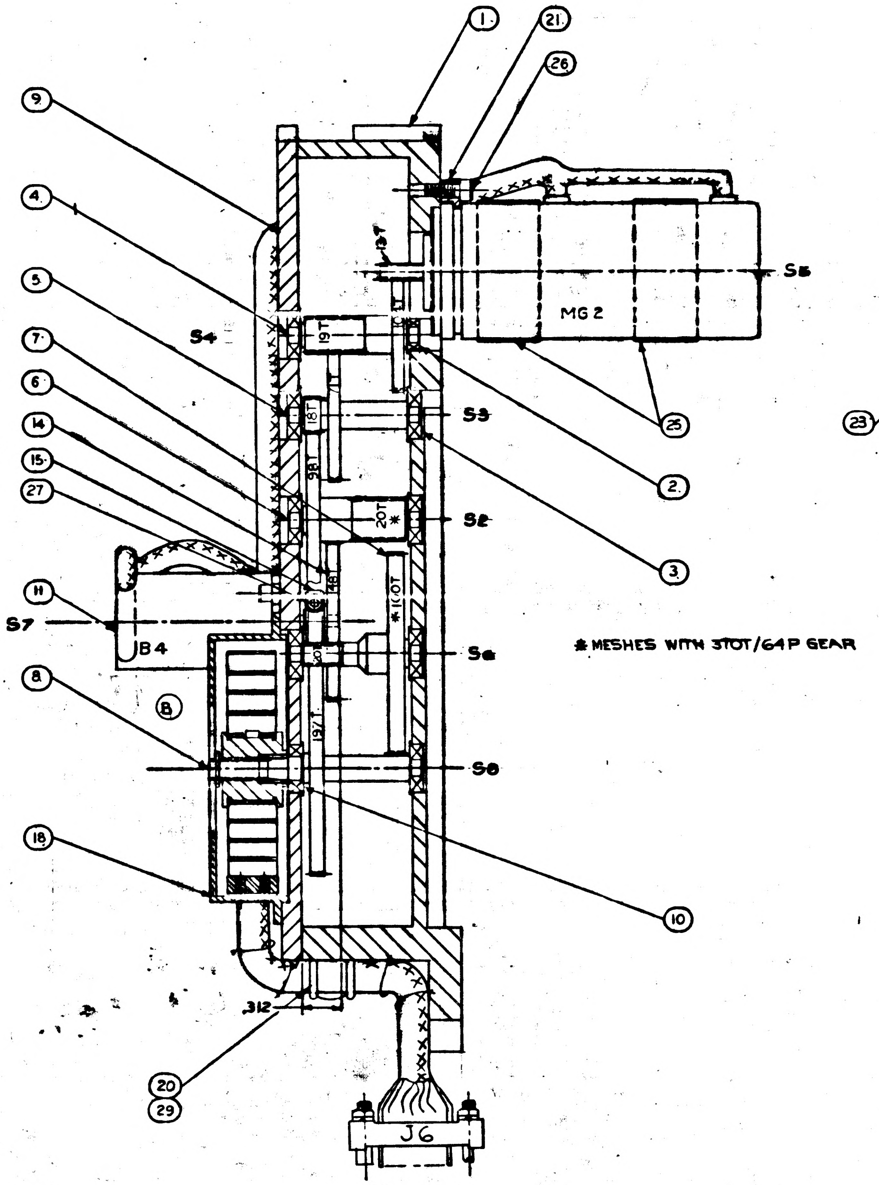
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. LIMIT ENDPLAY OF S2, S3, S4 AND S6 TO .002±.001 USING 1011804- (ITEM 28).
3. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019

B	1011705

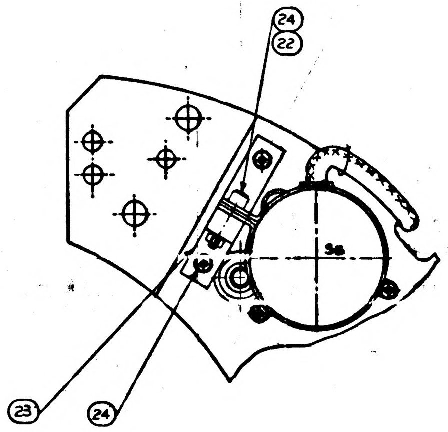
REVISIONS 02623

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A5		REVISED PER TDRR NO 03060	5-9-63	
B		REVISED PER TDRR NO 05738	14 JAN 64	





SECTION A-A



SEE NOTE 2

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
29	1	NAS	1352C06LL4	74455157018		SCREW, CAP, SOC HD, SELF LOCKING			
28	AS REQD		1011804-	7938690 0301 0304		WASHER, FLAT			
27	1		1011625-11	74455151011		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
26	3		1011625-18	74455151018		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
25	2		1011314	56386900190		HEAT SINK			
24	3	NAS	1352C02LL6	74455157007		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
23	1		1011313	52386900630		BRACKET, HEAT SINK			
22	1		AN340C2			NUT PLAIN, HEX.			
21	3		1011868-1	54386900330		CLAMP, RIM CLENCHING			
20	1		1000220-4			CLAMP, CABLE			
19	1		MS16624-18			RING, RETAINING (WALDES TRUARC 5100-18)			
18	1		1011911	85386900980		HOUSING AND SPRING ASSEMBLY			
17	6		1011625-28	74455151028		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
16	4	NAS	1352C02LL4	74455157006		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
15	1		1011355-2	57386901331		CLAMP, COLLAR			
14	1		1011297	33386900440		GEAR, SPUR (148T-120P)			
13	3		1011625-16	74455151016		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
12	3		1011868-3	54386900332		CLAMP, RIM CLENCHING			
11	1		1011933	80386900040		SXT SHAFT DRIVE HARNESS, ASSY OF			
10	1		1011608-4	30025770120		BEARING, BALL, ANNULAR			
9	1		1011715	85386900660		PLATE BEARING AND PIN ASSY			
8	1		1011309	33386900470		GEARSHAFT (197T-120P)			
7	1		1011299	33386900460		GEARSHAFT (20T-120P, 100T-64P)			
6	1		1011298	33386900450		GEARSHAFT ([illegible]T-64P, 98T-72P)			
5	1		1011296	33386900430		GEARSHAFT (18T-72P, 71T-72P)			
4	1		1011295	33386900420		GEARSHAFT (19T-72P, 104T-120P)			
3	8		1011608-3	30025770082		BEARING, BALL, ANNULAR			
2	1		1011608-1	30025770080		BEARING, BALL, ANNULAR			
1	1		1011897	85386900820		HOUSING, GEAR (SEXTANT SHAFT DRIVE) ASSY OF			

LIST OF PARTS AND MATERIALS

*PURCHASED ITEM SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

MASTER

1011890	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ± .005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900790
DRAWN W CABAU DATE 6-20-63
CHECKER 7/19/63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL W.J. Rhine
MIT APPROVAL 1 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SXT SHAFT DRIVE GEARBOX ASSEMBLY

CODE IDENT NO.
SIZE E
NASA NUMBER 1011705
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

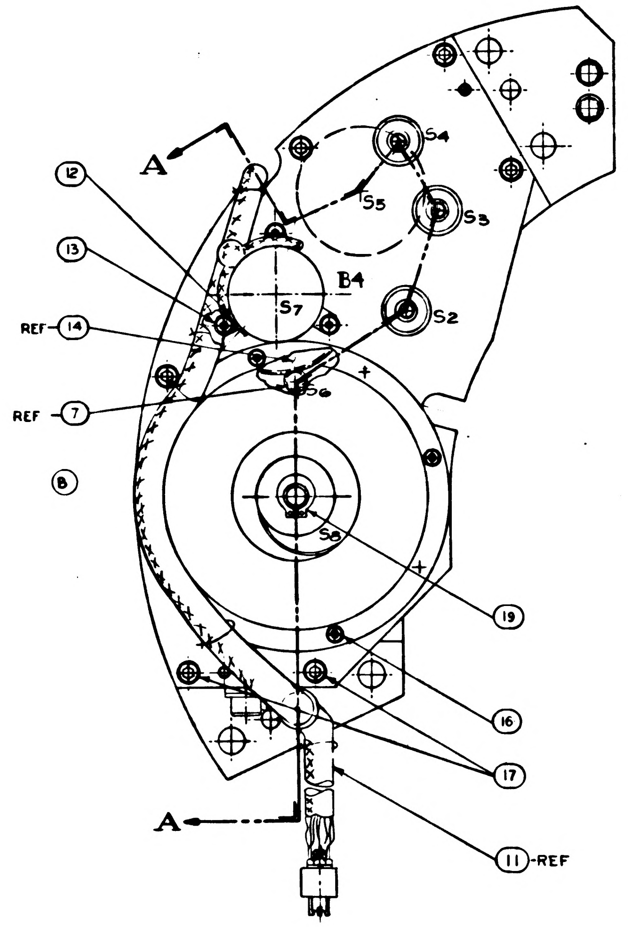
1011705 B

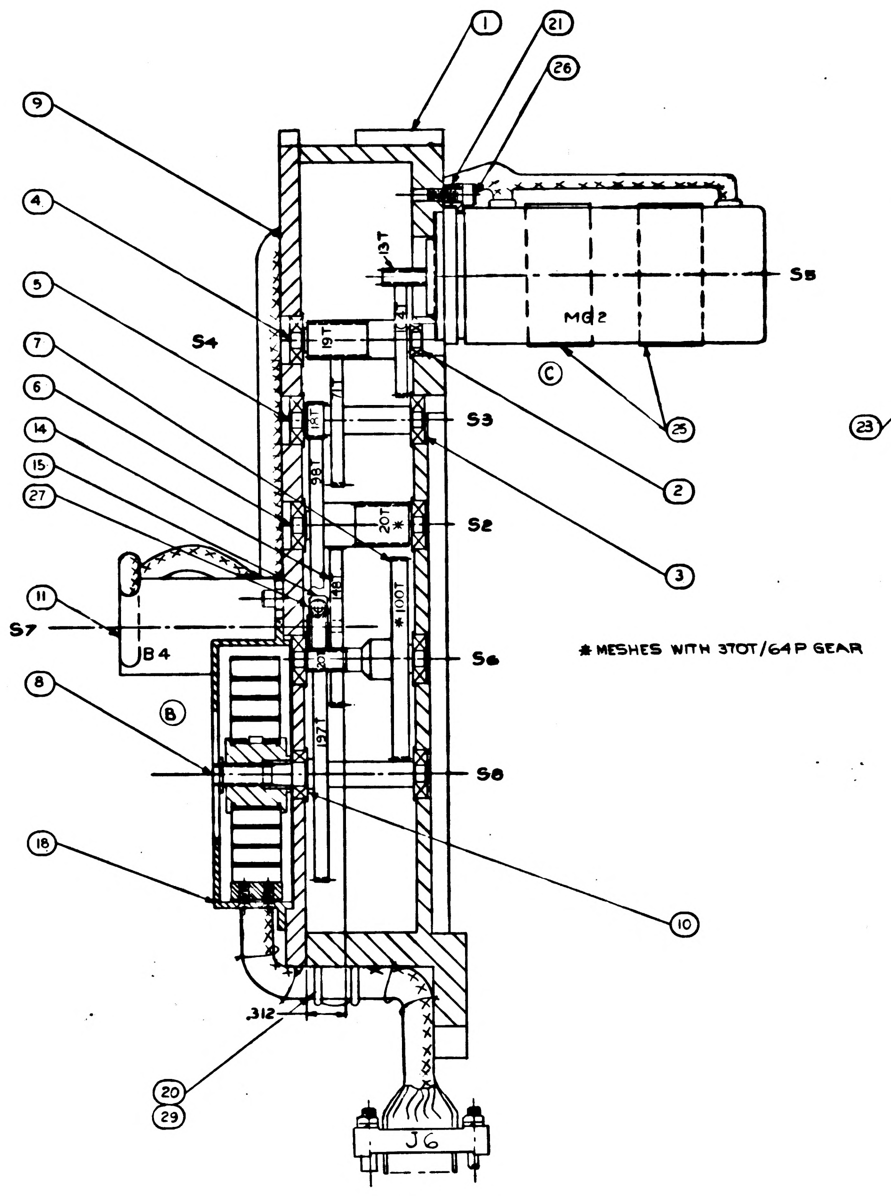
1011705 C

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. LIMIT ENDPLAY OF S2, S3, S4 AND S6 TO .002±.001 USING 1011804- (ITEM 28).
3. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019

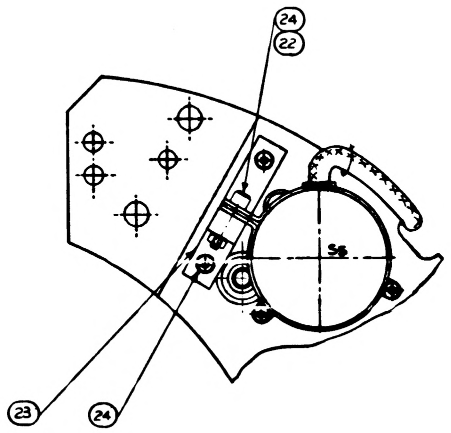
REVISIONS 02623

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A5		REVISED PER TDRR NO 03060	5-9-63	ek.
B		REVISED PER TDRR NO 05738	14 JAN 64	
C		REVISED PER TDRR NO. 07828		





SECTION A-A



SEE NOTE 2

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
29	1	NAS	1352C06LL4	74455157018		SCREW, CAP, SOC HD, SELF LOCKING			
28	AS REQD		1011804-	7938690 0301 0304		WASHER, FLAT			
27	1	*	1011625-11	74455151011		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
26	3	*	1011625-18	74455151018		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
25	2		1011314	56386900190		HEAT SINK			
24	3	NAS	1352C02LL6	74455157007		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
23	1		1011313	52386900630		BRACKET, HEAT SINK			
22	1		AN340C2			NUT PLAIN, HEX.			
21	3		1011868-1	54386900330		CLAMP, RIM CLENCHING			
20	1	*	1000220-4			CLAMP, CABLE			
19	1		MS16624-18			RING, RETAINING (WALDES TRUARC 5100-18)			
18	1		1C11911	85386900980		HOUSING AND SPRING ASSEMBLY			
17	6	*	1011625-28	74455151028		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
16	4	NAS	1352C02LL4	74455157006		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
15	1		1011355-2	57386901331		CLAMP, COLLAR			
14	1		1011297	33386900440		GEAR, SPUR (148T-120P)			
13	3	*	1011625-16	74455151016		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
12	3		1011868-3	54386900332		CLAMP, RIM CLENCHING			
11	1		1011933	80386900040		SXT SHAFT DRIVE HARNESS, ASSY OF			
10	1	*	1011608-4	30025770120		BEARING, BALL, ANNULAR			
9	1		1011715	85386900660		PLATE BEARING AND PIN ASSY			
8	1		1011309	33386900470		GEARSHAFT (197T-120P)			
7	1		1011299	33386900460		GEARSHAFT (20T-120P, 100T-64P)			
6	1		1011298	33386900450		GEARSHAFT (20T-64P, 98T-72P)			
5	1		1011296	33386900430		GEARSHAFT (18T-72P, 71T-72P)			
4	1		1011295	33386900420		GEARSHAFT (19T-72P, 104T-120P)			
3	8	*	1011608-3	30025770082		BEARING, BALL, ANNULAR			
2	1	*	1011608-1	30025770080		BEARING, BALL, ANNULAR			
1	1		1011897	85386900820		HOUSING, GEAR (SEXTANT SHAFT DRIVE) ASSY OF			

LIST OF PARTS AND MATERIALS

* PURCHASED ITEM SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — ; DECIMALS ± .005 ; ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900790

DRAWN W CABAU DATE 6-20-63
CHECKED 7/19/63
APPROVAL 7-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-26-63
MIT APPROVAL 14 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SXT SHAFT DRIVE GEARBOX
ASSEMBLY

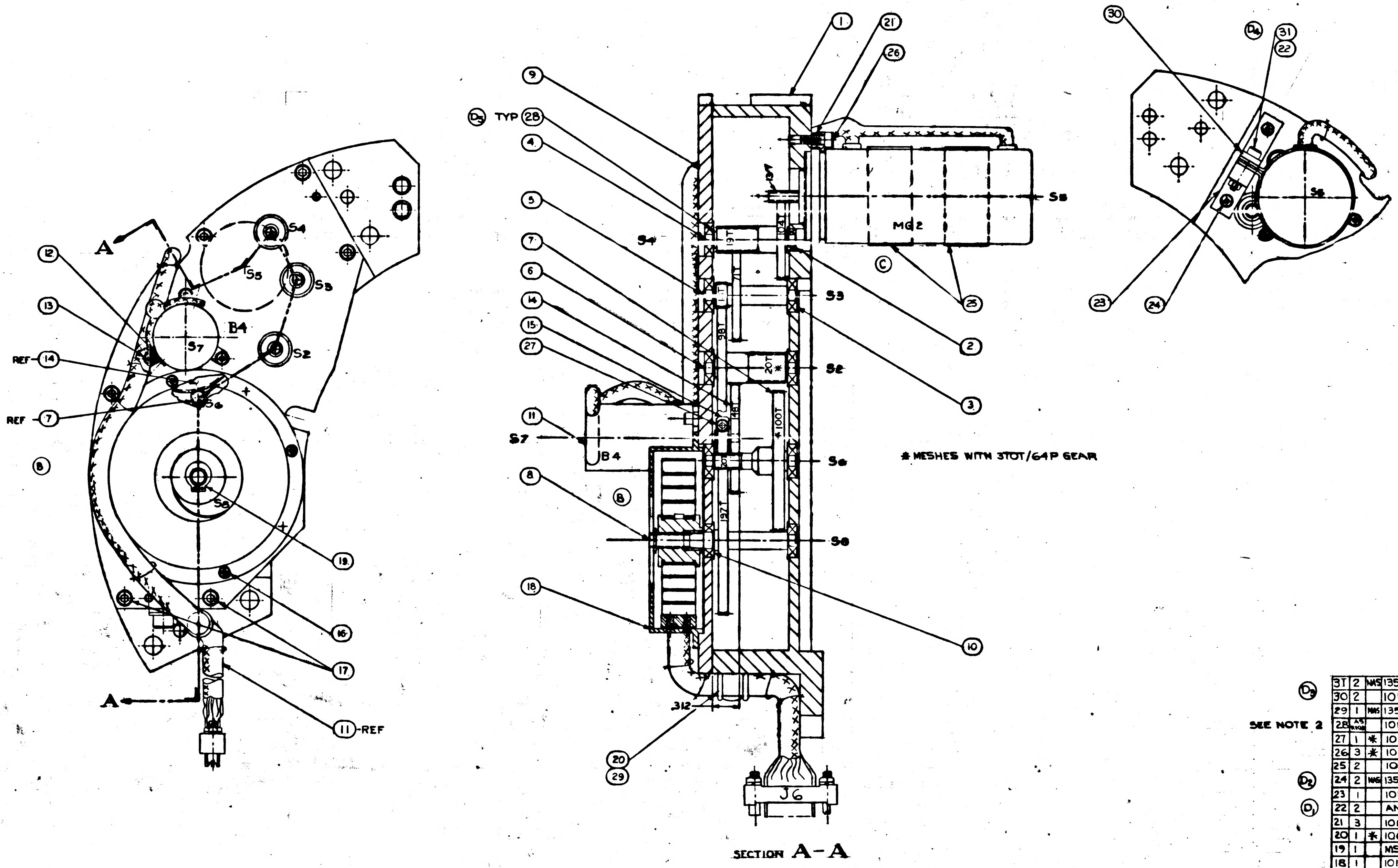
CODE IDENT NO. | SIZE E | NASA NUMBER 1011705
SCALE 2/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

1011705 C

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. LIMIT ENDPLAY OF S2, S3, S4 AND S6 TO .002±.001 USING 1011804- (ITEM 28).
3. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019

D 1011705

REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A5		REVISED PER TDRR NO 03060	5-9-63	EK.
B		REVISED PER TDRR NO. 05738	14 JAN 64	
C		REVISED PER TDRR NO. 07828		
D5		REVISED PER TDRR NO. 08034	4/20/64	



MESHES WITH 310T/64P GEAR

	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
D5	31	2	NAS	1352C02LL8			SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
	30	2		1011802	56386900410		PLATE, FLAT			
	29	1	NAS	1352C06LL4	74455157018		SCREW, CAP, SOC HD, SELF LOCKING			
SEE NOTE 2	28	AS REQD		1011804-	7938690 0301 0304		WASHER, FLAT			
	27	1	*	1011625-11	74455151011		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
	26	3	*	1011625-18	74455151018		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
	25	2		1011314	56386900190		HEAT SINK			
D2	24	2	NAS	1352C02LL6	74455157007		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
	23	1		1011313	52386900630		BRACKET, HEAT SINK			
D1	22	2		AN340C2			NUT PLAIN, HEX.			
	21	3		1011868-1	54386900330		CLAMP, RIM CLENCHING			
	20	1	*	1000220-4			CLAMP, CABLE			
	19	1		MS16624-18			RING, RETAINING (WALDES TRUARC 5100-18)			
	18	1		1011911	85386900980		HOUSING AND SPRING ASSEMBLY			
	17	6	*	1011625-28	74455151028		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
	16	4	NAS	1352C02LL4	74455157006		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
	15	1		1011355-2	57386901331		CLAMP, COLLAR			
	14	1		1011297	33386900440		GEAR, SPUR (148T-120P)			
	13	3	*	1011625-16	74455151016		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
	12	3		1011868-3	54386900332		CLAMP, RIM CLENCHING			
	11	1		1011933	80386900040		SXT SHAFT DRIVE HARNESS, ASSY OF			
	10	1	*	1011608-4	30025770120		BEARING, BALL, ANNULAR			
	9	1		1011715	85386900660		PLATE BEARING AND PIN ASSY			
	8	1		1011309	33386900470		GEARSHAFT (197T-120P)			
	7	1		1011299	33386900460		GEARSHAFT (20T-120P, 100T-64P)			
	6	1		1011298	33386900450		GEARSHAFT (20T-64P, 98T-72P)			
	5	1		1011296	33386900430		GEARSHAFT (18T-72P, 71T-72P)			
	4	1		1011295	33386900420		GEARSHAFT (19T-72P, 104T-120P)			
	3	8	*	1011608-3	30025770082		BEARING, BALL, ANNULAR			
	2	1	*	1011608-1	30025770080		BEARING, BALL, ANNULAR			
	1	1		1011897	85386900820		HOUSING, GEAR (SEXTANT SHAFT DRIVE) ASSY OF			

LIST OF PARTS AND MATERIALS

* PURCHASED ITEM SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

MASTER

1011890	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± .005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION ELMHURST NEW YORK
KIC PN 85386900790
DRAWN W CABAU DATE 6-20-63
CHECKED 7/19/63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL

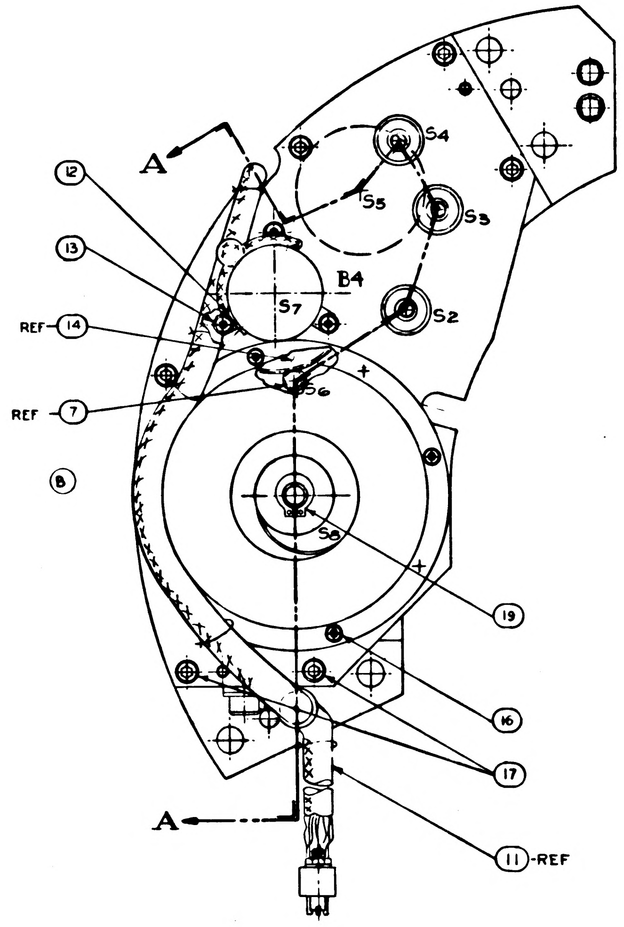
MANNED SPACECRAFT CENTER HOUSTON, TEXAS
TITLE SXT SHAFT DRIVE GEARBOX ASSEMBLY
CODE IDENT NO.
SIZE E
NASA NUMBER 1011705
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

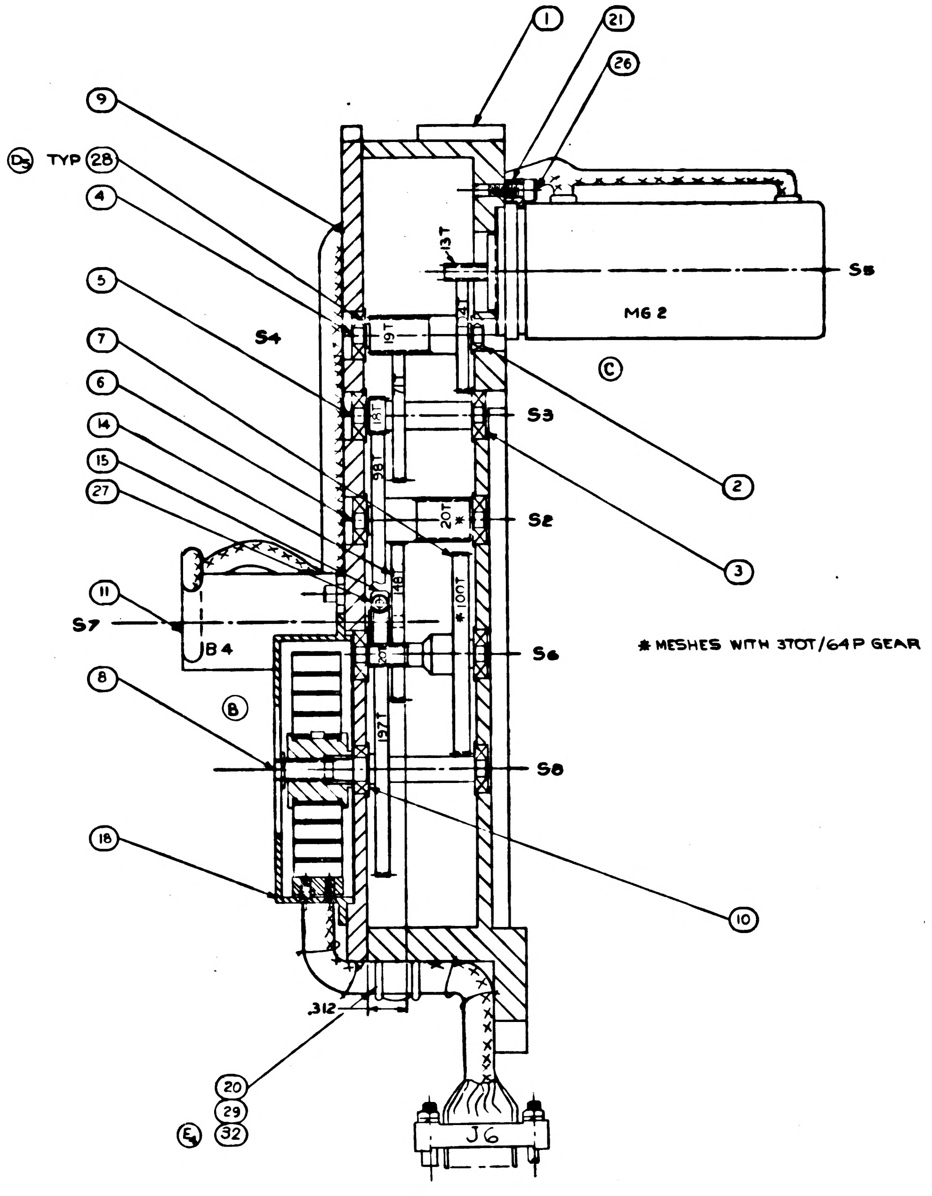
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. LIMIT ENDPLAY OF S2, S3, S4 AND S6 TO .002±.001 USING 1011804- (ITEM 28).
3. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019

1011705 E

REVISIONS D26-3

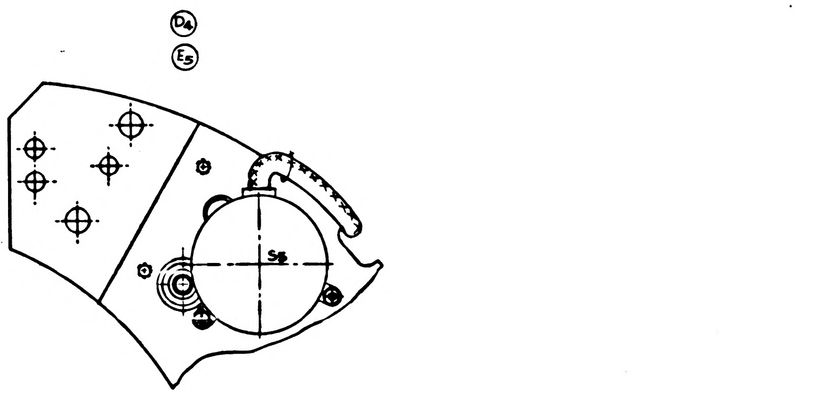
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A5		REVISED PER TDRR NO 03060	5-9-63	
B		REVISED PER TDRR NO. 05736	14 JAN 64	
C		REVISED PER TDRR NO. 07828		
D5		REVISED PER TDRR NO. 08034	4/20/64	
E5		REVISED PER TDRR NO. 08035	4/20/64	





SECTION A-A

* MESHES WITH 3TOT/64P GEAR



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
32	1		1011918-3			WASHER, CABLE CLAMP			
31									
30									
29	1	NAS	1352C06LL4	74455157018		SCREW, CAP, SOC HD, SELF LOCKING			
28	AS REQD		1011804-	7938690 0301 0304		WASHER, FLAT			
27	1	*	1011625-11	74455151011		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
26	3	*	1011625-18	74455151018		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
25									
24									
23									
22									
21	3		1011868-1	54386900330		CLAMP, RIM CLENCHING			
20	1	*	1000220-4			CLAMP, CABLE			
19	1		MS16624-18			RING, RETAINING (WALDES TRUARC 5100-18)			
18	1		1011911	85386900980		HOUSING AND SPRING ASSEMBLY			
17	6	*	1011625-28	74455151028		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
16	4	NAS	1352C02LL4	74455157006		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
15	1		1011355-2	57386901331		CLAMP, COLLAR			
14	1		1011297	33386900440		GEAR, SPUR (148T-120P)			
13	3	*	1011625-16	74455151016		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
12	3		1011868-3	54386900332		CLAMP, RIM CLENCHING			
11	1		1011933	80386900040		SXT SHAFT DRIVE HARNESS, ASSY OF			
10	1	*	1011608-4	30025770120		BEARING, BALL, ANNULAR			
9	1		1011715	85386900660		PLATE BEARING AND PIN ASSY			
8	1		1011309	33386900470		GEARSHAFT (197T-120P)			
7	1		1011299	33386900460		GEARSHAFT (20T-120P, 100T-64P)			
6	1		1011298	33386900450		GEARSHAFT (20T-64P, 98T-72P)			
5	1		1011296	33386900430		GEARSHAFT (18T-72P, 7 T-72P)			
4	1		1011295	33386900420		GEARSHAFT (19T-72P, 104T-120P)			
3	8	*	1011608-3	30025770082		BEARING, BALL, ANNULAR			
2	1	*	1011608-1	30025770080		BEARING, BALL, ANNULAR			
1	1		1011897	85386900820		HOUSING, GEAR (SEXTANT SHAFT DRIVE) ASSY OF			

LIST OF PARTS AND MATERIALS

SEE NOTE 2

E2 E3 D2 E1 D1

*PURCHASED ITEM SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ± .005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900790

DRAWN DATE 6-20-63
CHECKED 7/19/63
APPROVAL
APPROVAL 63
NASA APPROVAL W J 8-26-63
MIT APPROVAL 1 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SXT SHAFT DRIVE GEARBOX
ASSEMBLY

CODE IDENT NO.
SIZE E
NASA NUMBER 1011705
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011705 E

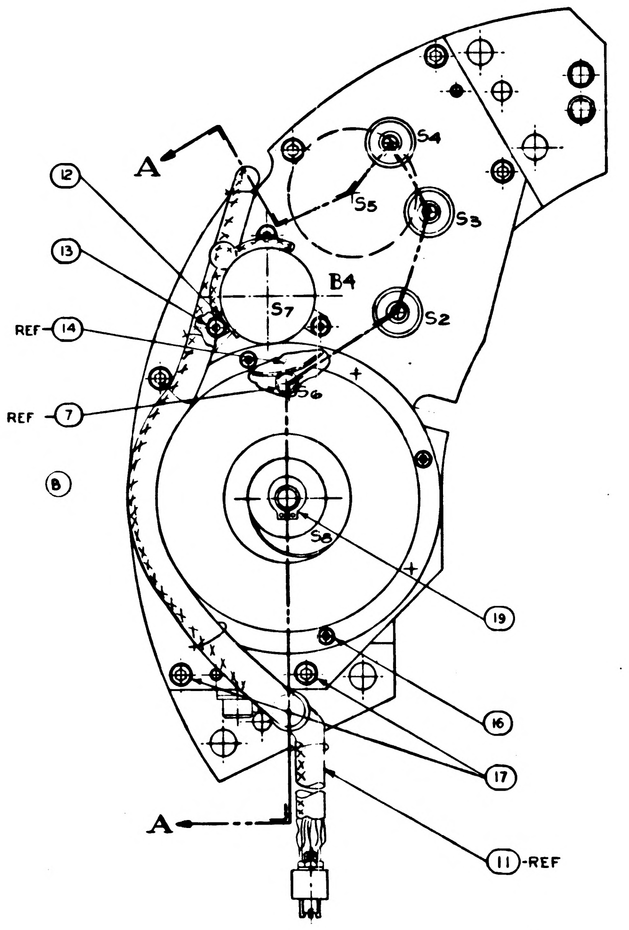
E-100

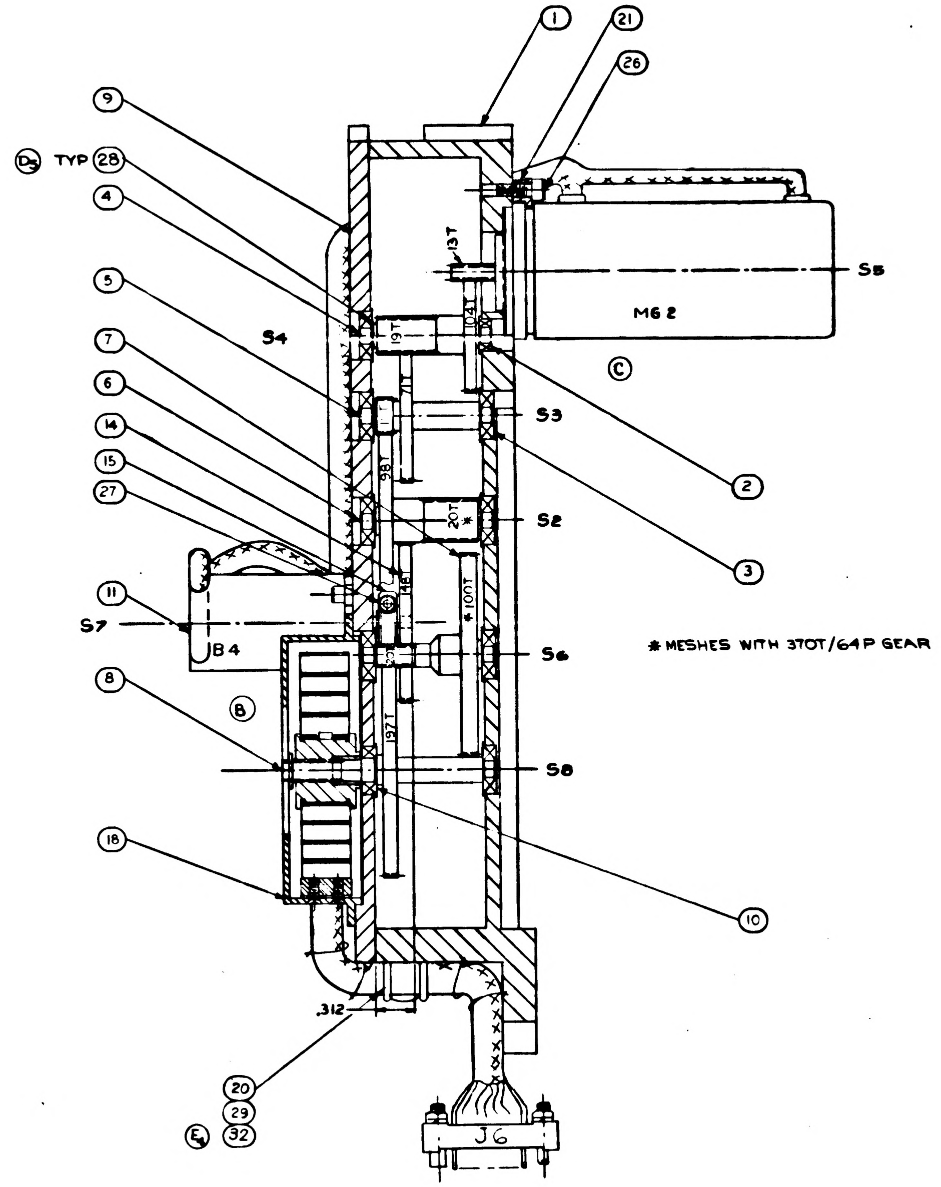
1011705 F

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-7C327
2. FLAT WASHERS (ITEM 28) OF INCREMENTAL THICKNESS SHALL BE SELECTED AND INSERTED BETWEEN GEARSHAFT SHOULDERS AND BEARINGS TO LIMIT ENDPLAY TO .004 IN. MAX. AT SHAFTS S2, S3, S4, S6 AND S8. WHEN REQUIRED, THE FLAT WASHERS SHALL BE APPLIED ON THE PLATE END OF GEARSHAFTS.
3. RESOLVER B4 SHALL BE ADJUSTED TO ITS NULL SETTING (AS INDICATED BY MARKING ON RESOLVER SHAFT AND BODY) WHEN THE SPRING, OF THE HOUSING & SPRING ASSY (ITEM 18), IS IN THE UNLOADED ATTITUDE.
4. COMPLETE ASSEMBLY SHALL START WHEN THE MOTOR MG2 IS ENERGIZED WITH 4.0 VOLTS, 400 C.P.S. MAX AND RUN CONTINUOUSLY AT 2.0 VOLTS MAX., IN EITHER DIRECTION, THROUGH 360° ROTATION OF ITEM 6.
5. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002015.

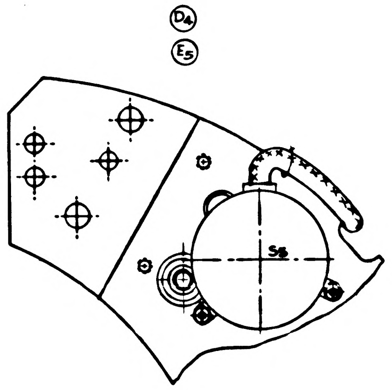
Ⓕ

REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A5		REVISED PER TDRR NO C3060	5-9-63	
B		REVISED PER TDRR NO. 05738	14 JAN 64	
C		REVISED PER TDRR NO. 07828		
D5		REVISED PER TDRR NO. 08034	4/20/64	
E5		REVISED PER TDRR NO. 08035	4/20/64	
F		REVISED PER TDRR NO. C8036	4/20/64	





SECTION A-A



E2	32	1		1011918-3			WASHER, CABLE CLAMP			
E3	31									
	30									
	29	1	NAS	1352C06LL4	74455157018		SCREW, CAP, SOC HD, SELF LOCKING			
SEE NOTE 2	28	AS REQD		1011804-	7938690 0301 0304		WASHER, FLAT			
	27	1	*	1011625-11	74455151011		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
	26	3	*	1011625-18	74455151018		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
	25									
D2 E1	24									
	23									
D1	22									
	21	3		1011868-1	54386900330		CLAMP, RIM CLENCHING			
	20	1	*	1000220-4			CLAMP, CABLE			
	19	1		MS16624-18			RING, RETAINING (WALDES TRUARC 5100-18)			
	18	1		1011911	85386900980		HOUSING AND SPRING ASSEMBLY			
	17	6	*	1011625-28	74455151028		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
	16	4	NAS	1352C02LL4	74455157006		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
	15	1		1011355-2	57386901331		CLAMP, COLLAR			
	14	1		1011297	33386900440		GEAR, SPUR (148T-120P)			
	13	3	*	1011625-16	74455151016		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
	12	3		1011868-3	54386900332		CLAMP, RIM CLENCHING			
	11	1		1011933	80386900040		SXT SHAFT DRIVE HARNESS, ASSY OF			
	10	1	*	1011608-4	30025770120		BEARING, BALL, ANNULAR			
	9	1		1011715	85386900660		PLATE BEARING AND PIN ASSY			
	8	1		1011309	33386900470		GEARSHAFT (197T-120P)			
	7	1		1011299	33386900460		GEARSHAFT (20T-120P, 100T-64P)			
	6	1		1011298	33386900450		GEARSHAFT (20T-64P, 98T-72P)			
	5	1		1011296	33386900430		GEARSHAFT (18T-72P, 71T-72P)			
	4	1		1011295	33386900420		GEARSHAFT (19T-72P, 104T-120P)			
	3	8	*	1011608-3	30025770082		BEARING, BALL, ANNULAR			
	2	1	*	1011608-1	30025770080		BEARING, BALL, ANNULAR			
	1	1		1011897	85386900820		HOUSING, GEAR (SEXTANT SHAFT DRIVE) ASSY OF			
	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

*PURCHASED ITEM SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

APPLICATION	
1011890	1011000
NEXT ASSY	USED ON

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ± .005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900790
DRAWN L. CABAU DATE 6-20-63
CHECKED 7-19-63
APPROVAL 7-15-63
APPROVAL 7-63
NASA APPROVAL 8-6-63
MIT APPROVAL 14 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SXT SHAFT DRIVE GEARBOX ASSEMBLY

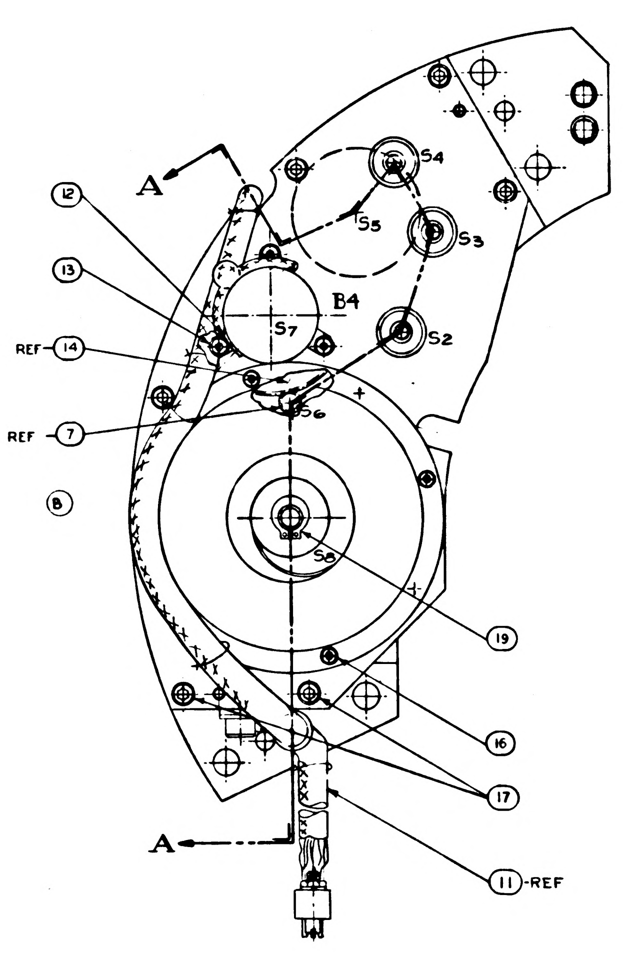
CODE IDENT NO. SIZE E NASA NUMBER 1011705
SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

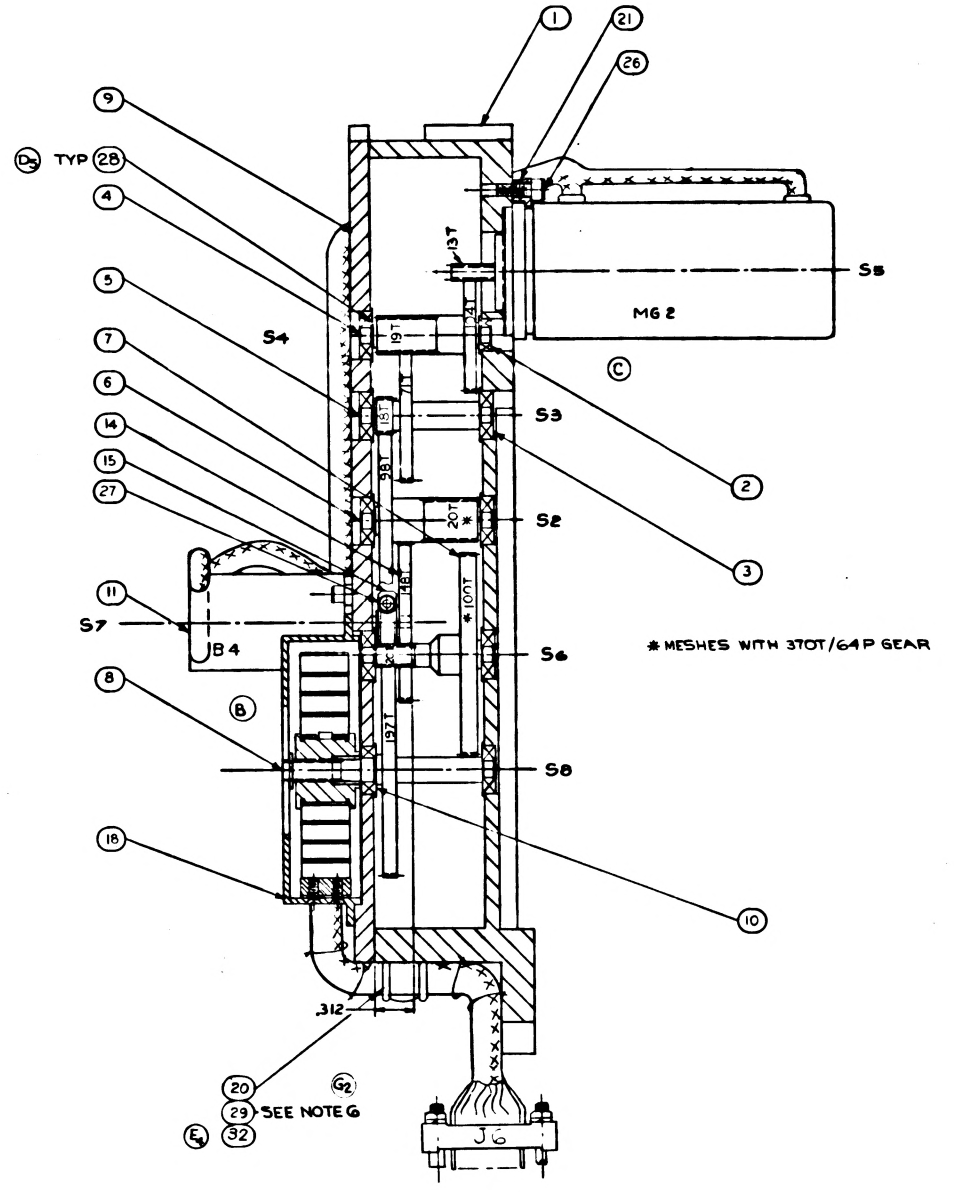
1011705 F

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. FLAT WASHERS (ITEM 28) OF INCREMENTAL THICKNESS SHALL BE SELECTED AND INSERTED BETWEEN GEARSHAFT SHOULDERS AND BEARINGS TO LIMIT ENDPLAY TO .004 IN. MAX. AT SHAFTS S2, S3, S4, S6 AND S8. WHEN REQUIRED, THE FLAT WASHERS SHALL BE APPLIED ON THE PLATE END OF GEARSHAFTS.
3. RESOLVER B4 SHALL BE ADJUSTED TO ITS NULL SETTING (AS INDICATED BY MARKING ON RESOLVER SHAFT AND BODY) WHEN THE SPRING, OF THE HOUSING & SPRING ASSY (ITEM 18), IS IN THE UNLOADED ATTITUDE.
4. COMPLETE ASSEMBLY SHALL START WHEN THE MOTOR MG2 IS ENERGIZED WITH 4.0 VOLTS, 400 C.P.S. MAX AND RUN CONTINUOUSLY AT 2.0 VOLTS MAX., IN EITHER DIRECTION, THROUGH 360° ROTATION OF ITEM 6.
5. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.
6. VIBRATION PROOF ITEM 29 USING LOCKING COMPOUND GRADE "EV" PER MIL-S-22473.

SOL1101

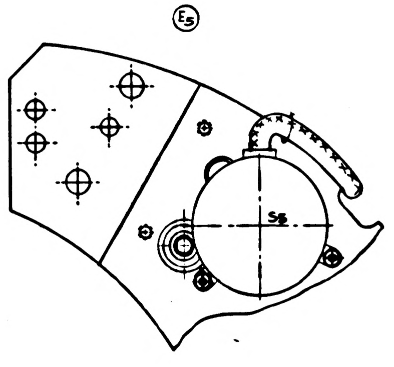
REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A5		REVISED PER TDRR NO 03500	5-9-63	
B		REVISED PER TDRR NO 05736	14 JAN 64	
C		REVISED PER TDRR NO. 07828		
D5		REVISED PER TDRR NO. 08034	4/28/64	
E5		REVISED PER TDRR NO. 08035	4/28/64	
F		REVISED PER TDRR NO. 08036	4/28/64	
G3		REVISED PER TDRR NO. 08619	5/19/64	





SECTION A-A

* MESHES WITH 37OT/64P GEAR



SEE NOTE 2

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
32	1		1011918-3			WASHER, CABLE CLAMP			
31									
30									
29	1	NAS	1352C06-6			SCREW, CAP, SOC HD			
28	AS REQD		1011804-	7938690 0301 0304		WASHER, FLAT			
27	1	*	1011625-11	74455151011		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
26	3	*	1011625-18	74455151018		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
25									
24									
23									
22									
21	3		1011868-1	54386900330		CLAMP, RIM CLENCHING			
20	1	*	1000220-4			CLAMP, CABLE			
19	1		MS16624-18			RING, RETAINING (WALDES TRUARC 5100-18)			
18	1		1011911	85386900980		HOUSING AND SPRING ASSEMBLY			
17	6	*	1011625-28	74455151028		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
16	4	NAS	1352C02LL4	74455157006		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
15	1		1011355-2	57386901331		CLAMP, COLLAR			
14	1		1011297	33386900440		GEAR, SPUR (148T-120P)			
13	3	*	1011625-16	74455151016		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
12	3		1011868-3	54386900332		CLAMP, RIM CLENCHING			
11	1		1011933	80386900040		SXT SHAFT DRIVE HARNESS, ASSY OF			
10	1	*	1011608-4	30025770120		BEARING, BALL, ANNULAR			
9	1		1011715	85386900660		PLATE BEARING AND PIN ASSY			
8	1		1011309	33386900470		GEARSHAFT (197T-120P)			
7	1		1011299	33386900460		GEARSHAFT (20T-120P, 100T-64P)			
6	1		1011298	33386900450		GEARSHAFT (20T-64P, 98T-72P)			
5	1		1011296	33386900430		GEARSHAFT (18T-72P, 71T-72P)			
4	1		1011295	33386900420		GEARSHAFT (19T-72P, 104T-120P)			
3	8	*	1011608-3	30025770082		BEARING, BALL, ANNULAR			
2	1	*	1011608-1	30025770080		BEARING, BALL, ANNULAR			
1	1		1011897	85386900820		HOUSING, GEAR (SEXTANT SHAFT DRIVE) ASSY OF			

LIST OF PARTS AND MATERIALS

*PURCHASED ITEM SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± .005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900790
DRAWN [illegible] DATE 6-20-63
CHECKED [illegible] 7/19/63
APPROVAL [illegible]
APPROVAL [illegible]
NASA APPROVAL W.J. [illegible] 8-6-63
MIT APPROVAL [illegible]

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SXT SHAFT DRIVE GEARBOX
ASSEMBLY

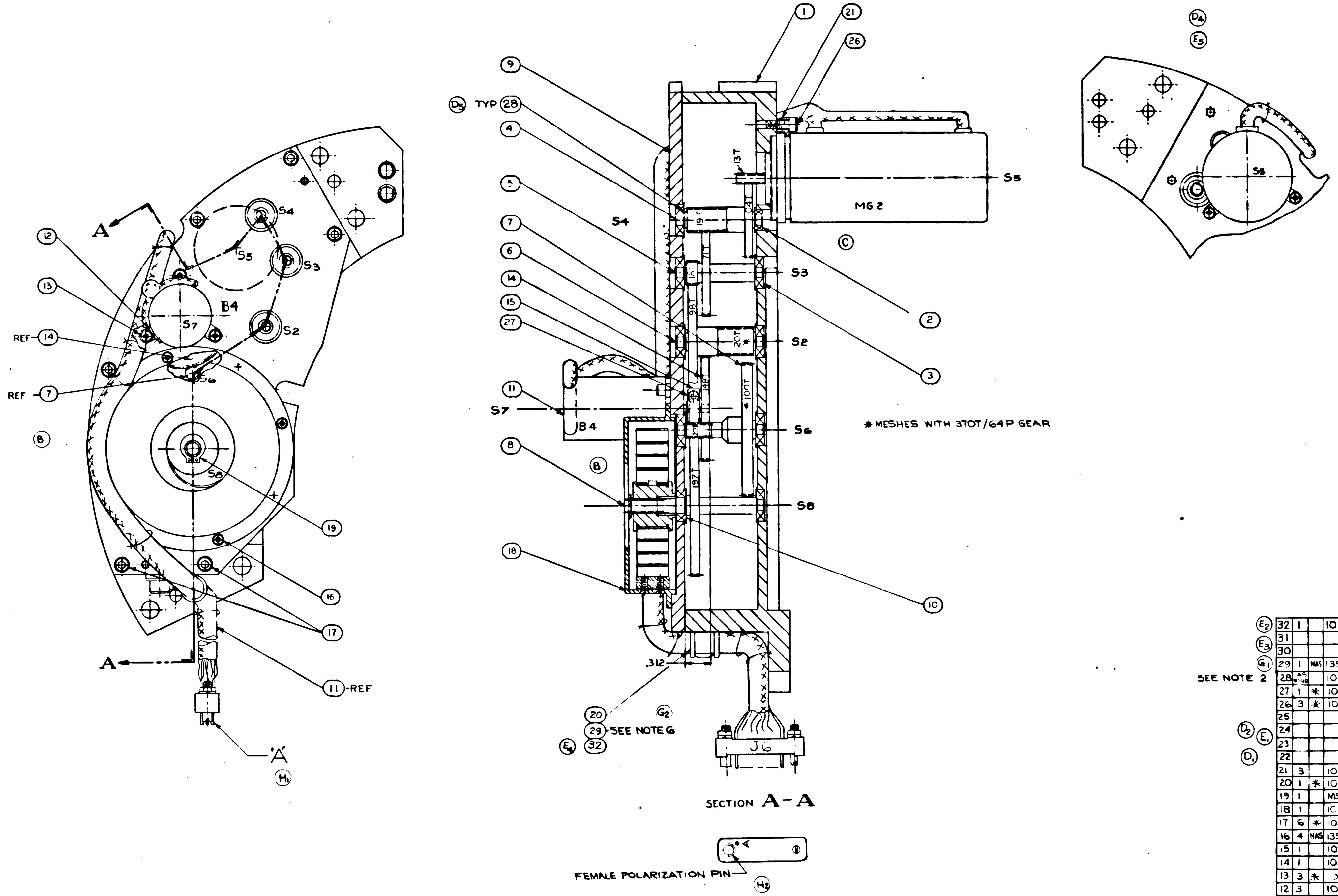
CODE IDENT NO.
SIZE E
NASA NUMBER 1011705
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. FLAT WASHERS (ITEM 28) OF INCREMENTAL THICKNESS SHALL BE SELECTED AND INSERTED BETWEEN GEARSHAFT SHOULDERS AND BEARINGS TO LIMIT ENDPLAY TO .004 IN. MAX AT SHAFTS S2, S3, S4, S6 AND S8. WHEN REQUIRED, THE FLAT WASHERS SHALL BE APPLIED ON THE PLATE END OF GEARSHAFTS.
3. RESOLVER B4 SHALL BE ADJUSTED TO ITS NULL SETTING (AS INDICATED BY MARKING ON RESOLVER SHAFT AND BODY) WHEN THE SPRING, OF THE HOUSING & SPRING ASSY (ITEM 18), IS IN THE UNLOADED ATTITUDE. Ⓕ
4. COMPLETE ASSEMBLY SHALL START WHEN THE MOTOR MG2 IS ENERGIZED WITH 4.0 VOLTS, 400 C.P.S. MAX AND RUN CONTINUOUSLY AT 2.0 VOLTS MAX., IN EITHER DIRECTION, THROUGH 360° ROTATION OF ITEM 6.
5. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019.
6. VIBRATION PROOF ITEM 29 USING LOCKING COMPOUND GRADE "EV" PER MIL-S-22473. (G_3)

H SOL1101

REVISIONS 02623

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A_5		REVISED PER TDRR NO [illegible]	5-9-63	
B		REVISED PER TDRR NO [illegible]	14 JAN 64	
C		REVISED PER TDRR NO. 07828	[illegible]	
D_5		REVISED PER TDRR NO. 08034	4/28/64	
E_5		REVISED PER TDRR NO. 08035	4/28/64	
F		REVISED PER TDRR NO. 08036	4/28/64	
G_3		REVISED PER TDRR NO. 08619	5/19/64	
H_2		REVISED PER TDRR NO. 12848	9/23/64	



* MESHES WITH 370T/64P GEAR

SECTION A-A

SEE NOTE 2

ITEM NO	QTY REQD	SYM	GOVERNMENT/NASA NO	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
32	1		1011918-3			WASHER, CABLE CLAMP			
31									
30									
29	1	NAS	1352C06-6			SCREW, CAP, SOC HD			
28	AS REQD		1011804-	7938690 0301 0304		WASHER, FLAT			
27	1	*	1011625-11	74455151011		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
26	3	*	1011625-18	74455151018		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
25									
24									
23									
22									
21	3		1011868-1	54386900330		CLAMP, RIM CLENCHING			
20	1	*	1000220-4			CLAMP, CABLE			
19	1		MS16624-18			RING, RETAINING (WALDES TRUARC 5100-18)			
18	1		1011911	85386900980		HOUSING AND SPRING ASSEMBLY			
17	6	*	1011625-28	74455151028		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
16	4	NAS	1352C02LL4	74455157006		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
15	1		1011355-2	57386901331		CLAMP, COLLAR			
14	1		1011297	33386900440		GEAR, SPUR (148T-120P)			
13	3	*	1011625-16	74455151016		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
12	3		1011868-3	54386900332		CLAMP, RIM CLENCHING			
11	1		1011933	80386900040		SXT SHAFT DRIVE HARNESS, ASSY OF			
10	1	*	1011608-4	30025770120		BEARING, BALL, ANNULAR			
9	1		1011715	85386900660		PLATE BEARING AND PIN ASSY			
8	1		1011309	33386900470		GEARSHAFT (197T-120P)			
7	1		1011299	33386900460		GEARSHAFT (20T-120P, 100T-64P)			
6	1		1011298	33386900450		GEARSHAFT (20T-64P, 98T-72P)			
5	1		1011296	33386900430		GEARSHAFT (18T-72P, 7 T-72P)			
4	1		1011295	33386900420		GEARSHAFT (19T-72P, 104T-120P)			
3	8	*	1011608-3	30025770082		BEARING, BALL, ANNULAR			
2	1	*	1011608-1	30025770080		BEARING, BALL, ANNULAR			
1	1		1011897	85386900820		HOUSING, GEAR (SEXTANT SHAFT DRIVE) ASSY OF			

LIST OF PARTS AND MATERIALS

* PURCHASED ITEM SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON: FRACTIONS ± — DECIMALS ± .005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900790

DRAWN W. CABRAL DATE 6-20-63
CHECKED 7-19-63
APPROVAL
APPROVAL
NASA APPROVAL 8-6-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

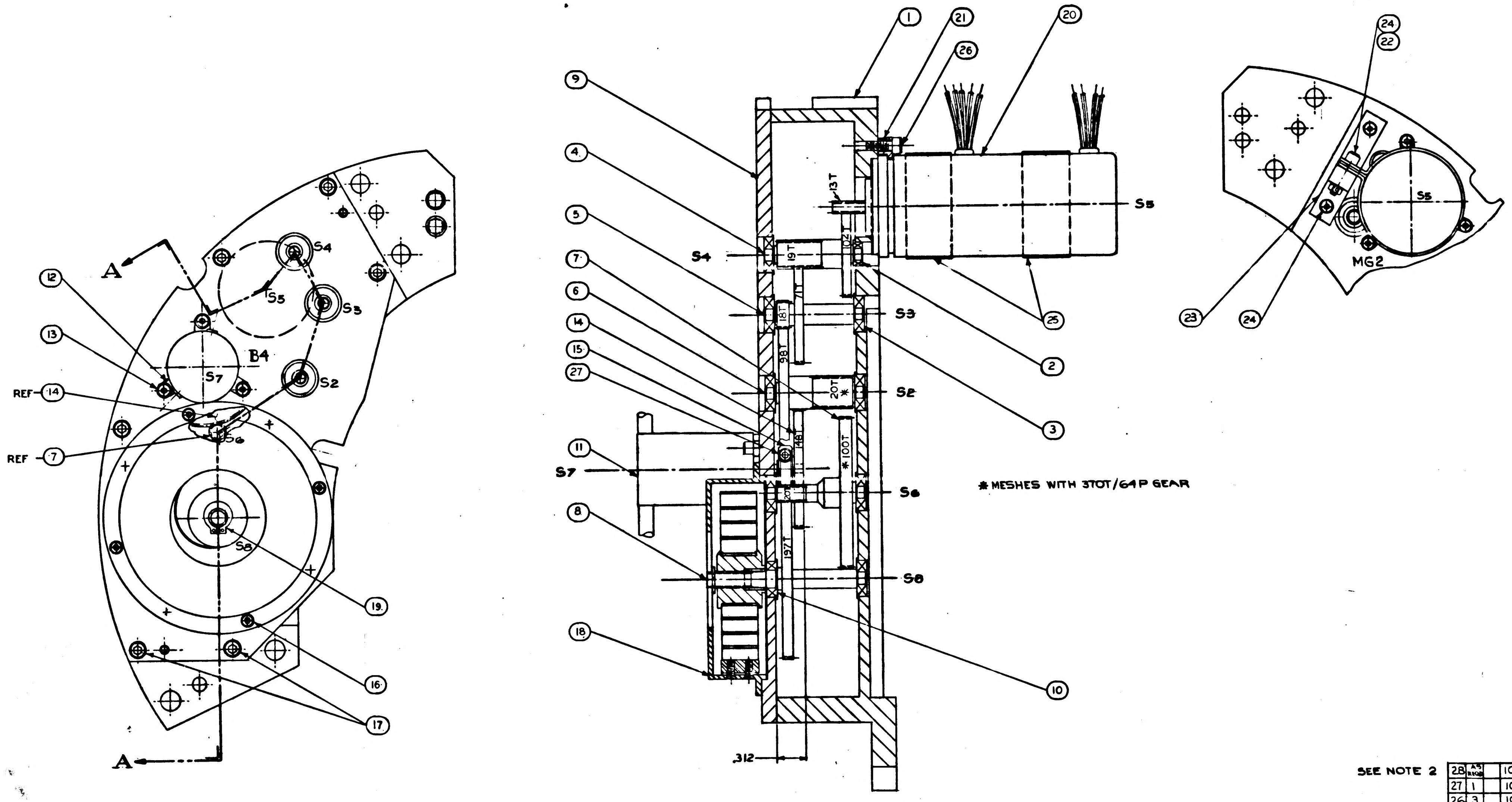
TITLE
SXT SHAFT DRIVE GEARBOX
ASSEMBLY

CODE IDENT NO.
SIZE E
NASA NUMBER 1011705
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF

1011705

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. LIMIT ENDPLAY OF S2, S3, S4 AND S6 TO .002±.001 USING 1011804- (ITEM 28).
3. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL



SECTION A-A

*PURCHASED ITEM SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

SEE NOTE 2

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
28	AS REQD		1011804-	7938690 0301 0304		WASHER, FLAT			
27	1		1011625-11	74455151011		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
26	3		1011625-18	74455151018		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
25	2		1011314	56386900190		HEAT SINK			
24	3	NAS	1352C02LL6	74455157007		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
23	1		1011313	52386900630		BRACKET, HEAT SINK			
22	1		AN340C2			NUT PLAIN, HEX.			
21	3		1011868-1	54386900330		CLAMP, RIM CLENCHING			
* 20	1		1010610	75001010101		SERVO MOTOR-TACHOMETER, GENERATOR			
19	1		MS16624-18			RING, RETAINING (WALDES TRUARC 5100-18)			
18	1		1011911	85386900980		HOUSING AND SPRING ASSEMBLY			
17	6		1011625-23	74455151028		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
16	4	NAS	1352C02LL4	74455157006		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
15	1		1011355-2	57386901331		CLAMP, COLLAR			
14	1		1011297	33386900440		GEAR, SPUR (148T-120P)			
13	3		1011625-16	74455151016		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
12	3		1011868-3	54386900332		CLAMP, RIM CLENCHING			
* 11	1		1010341	75002010301		RESOLVER, RECEIVER ONE SPEED, SIZE 8			
10	1		1011608-4	30025770120		BEARING, BALL, ANNULAR			
9	1		1011715	85386900660		PLATE BEARING AND PIN ASSY			
8	1		1011309	33386900470		GEARSHAFT (197T-120P)			
7	1		1011299	33386900460		GEARSHAFT (20T-120P, 100T-64P)			
6	1		1011298	33386900450		GEARSHAFT (20T-64P, 98T-72P)			
5	1		1011296	33386900430		GEARSHAFT (18T-72P, 71T-72P)			
4	1		1011295	33386900420		GEARSHAFT (19T-72P, 104T-120P)			
3	8		1011608-3	30025770082		BEARING, BALL, ANNULAR			
2	1		1011608-1	30025770080		BEARING, BALL, ANNULAR			
1	1		1011897	85386900820		HOUSING, GEAR (SEXTANT SHAFT DRIVE) ASSY OF			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011912	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± .005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900790
DRAWN W CABAU DATE 6-20-63
CHECKED 7/19/63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL W J Rhine 8-26-63
MIT APPROVAL 14 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SXT SHAFT DRIVE GEARBOX ASSEMBLY

CODE IDENT NO.
SIZE E
NASA NUMBER 1011705
SCALE 2/1
WEIGHT
CALC ACTUAL
SHEET 1 OF

MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

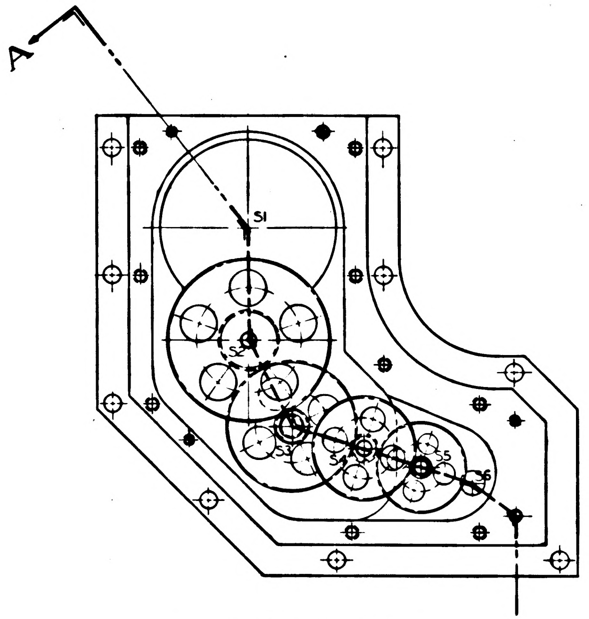
1011705

A | 1011706

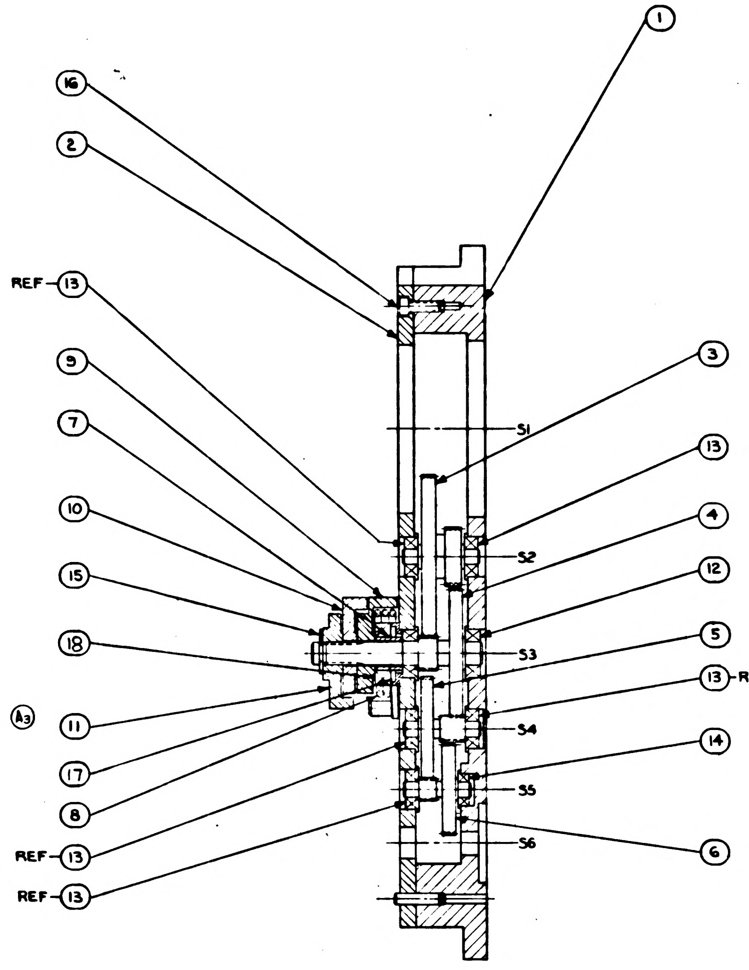
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3	B3 C3 D6	REVISED PER TDRR NO. 08037	4-23-64	

REVISIONS 02623

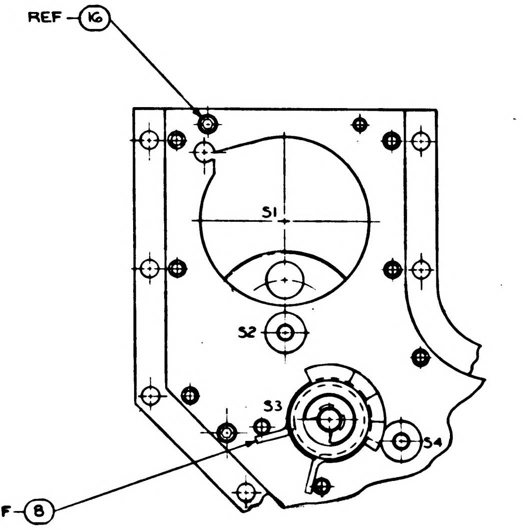
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019



VIEW WITH TOP PLATE REMOVED



SECTION A-A



VIEW WITH TOP PLATE ASSEMBLED

	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
A2	18	1	*	1011610	30005770161		BEARING, BALL, ANNULAR			
	17	1		10112075	57386901690		SPACER			
	16	3	NAS	1352C02LL4	74455157006		SCREW, CAP, HEX SOC HD. SELF-LOCKING			
	15	1	MS	16633-4017	74453081008		RING, RETAINING			
	14	1	*	1011608-1	30025770080		BEARING, BALL, ANNULAR			
	13	5	*	1011608-2	30025770081		BEARING, BALL, ANNULAR			
	12	2	*	1011608-4	300257700120		BEARING, BALL, ANNULAR			
	11	1		1011578	57386900930		DOG, LIMIT STOP, OUTER			
	10	1		1011579	57386900940		DOG, LIMIT STOP, MIDDLE			
	9	1		1011580	57386900950		DOG, LIMIT STOP, INNER			
	8	1		1011577	56386900290		SPRING, TORSION			
A1	7	1		10112074	57386901680		SLEEVE			
	6	1		1011349	33386900520		GEARSHAFT (19T-120P)(84T-120P) (S5)			
	5	1		1011348	33386900510		GEARSHAFT (19T-96P)(95T-120P) (S4)			
	4	1		1011347	33386900500		GEARSHAFT (24T-96P)(95T-96P) (S3)			
	3	1		1011346	33386900490		GEARSHAFT (42T-96P)(120T-96P) (S2)			
	2	1		1011795	85386900620		PLATE & PIN, ASSY OF			
	1	1		1011725	85386900610		HOUSING & PIN, ASSY OF			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

NEXT ASSY	USED ON
1011701	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900640

DRAWN F. Sellle DATE 6-12-63
CHECKED Paul Tappschuster
APPROVAL [illegible]
APPROVAL [illegible] 2-5-63
NASA APPROVAL W J [illegible] 8-[illegible]-63
MIT APPROVAL W [illegible]

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
TRUNNION DRIVE GEARBOX ASSEMBLY

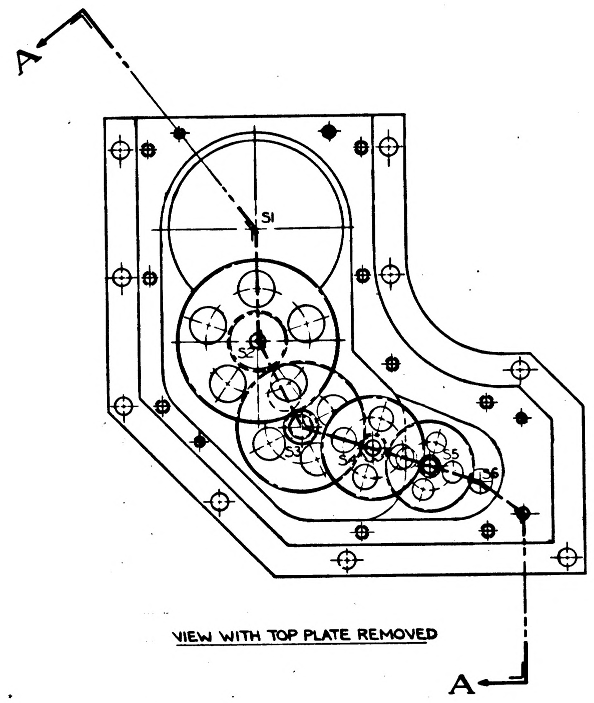
CODE IDENT NO. | SIZE E | NASA NUMBER 1011706
SCALE 2/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

1011706 A

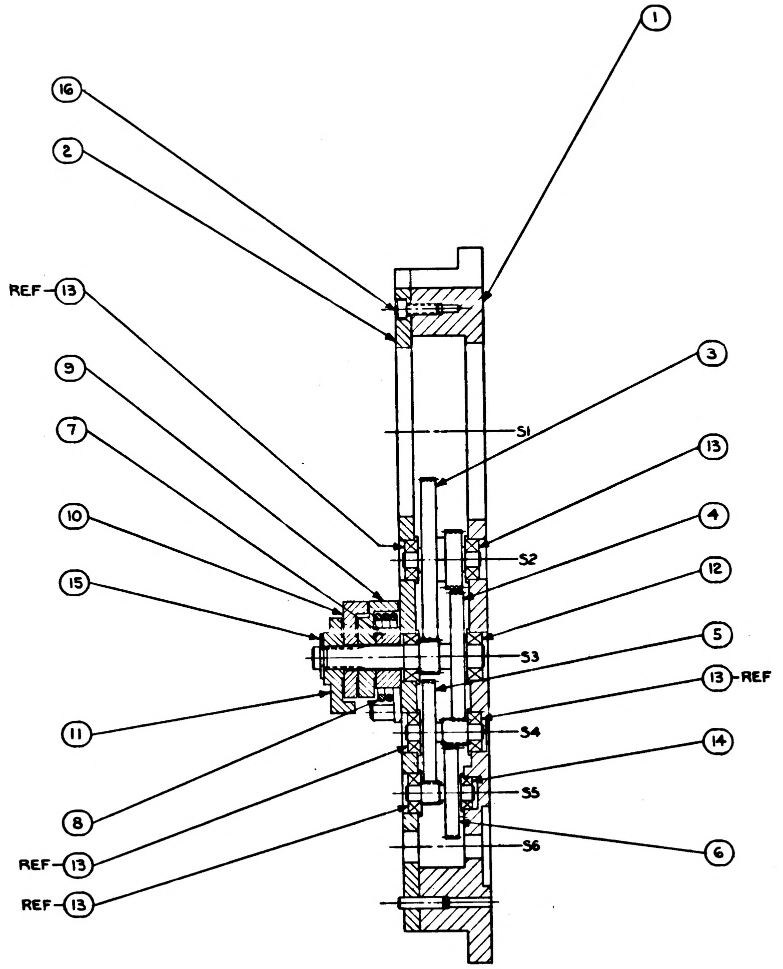
1011706

REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

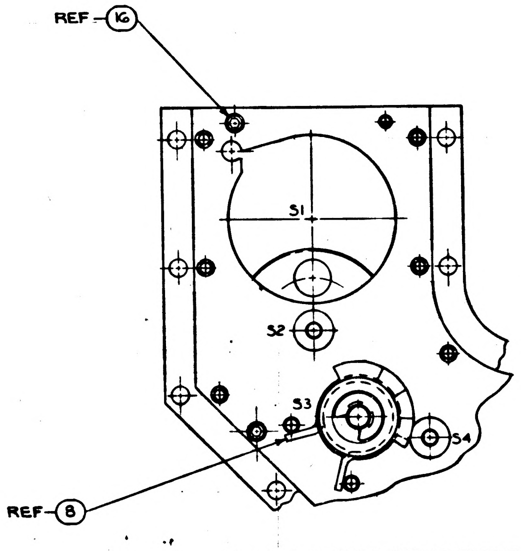
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019



VIEW WITH TOP PLATE REMOVED



SECTION A-A



VIEW WITH TOP PLATE ASSEMBLED

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
16	3	NAS	1352C02LL4	74455157006		SCREW, CAP, HEX SOC HD. SELF-LOCKING			
15	1	MS	16633-4017	74453081008		RING, RETAINING			
14	1	*	1011608-1	30025770080		BEARING, BALL, ANNULAR			
13	5	*	1011608-2	30025770081		BEARING, BALL, ANNULAR			
12	2	*	1011608-4	300257700120		BEARING, BALL, ANNULAR			
11	1		1011578	57386900930		DOG, LIMIT STOP, OUTER			
10	1		1011579	57386900940		DOG, LIMIT STOP, MIDDLE			
9	1		1011580	57386900950		DOG, LIMIT STOP, INNER			
8	1		1011577	56386900290		SPRING, TORSION			
7	1		1011581	57386900960		GUIDE, SPRING, LIMIT STOP			
6	1		1011349	33386900520		GEARSHAFT (19T-120P)(84T-120P) (S5)			
5	1		1011348	33386900510		GEARSHAFT (19T-96P)(95T-120P) (S4)			
4	1		1011347	33386900500		GEARSHAFT (24T-96P)(95T-96P) (S3)			
3	1		1011346	33386900490		GEARSHAFT (42T-96P)(120T-96P) (S2)			
2	1		1011795	85386900620		PLATE & PIN, ASSY OF			
1	1		1011725	85386900610		HOUSING & PIN, ASSY OF			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011701	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900640
DRAWN DATE 6-12-63
CHECKED
APPROVAL
APPROVAL 8-5-63
NASA APPROVAL
MIT APPROVAL W K 16 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
TRUNNION DRIVE GEARBOX ASSEMBLY

CODE IDENT NO.
SIZE E
NASA NUMBER 1011706
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF

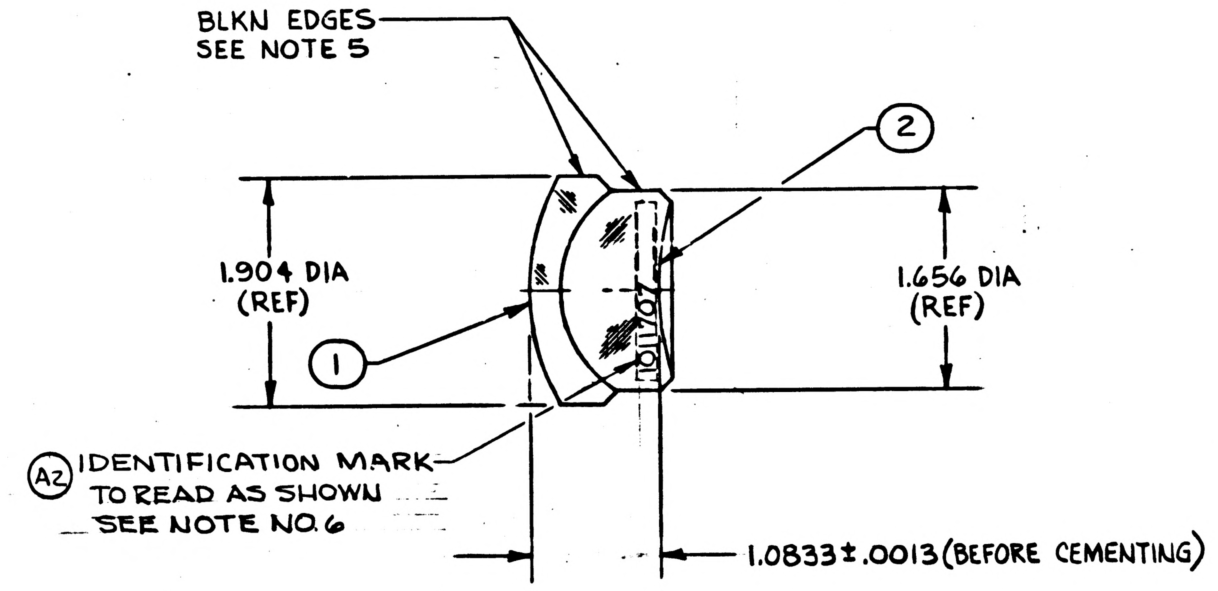
1011706

INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

1011707 A

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS TDRR 01220				
A2		REVISED PER TDRR NO 03157	9-16-63	9/17

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. ELEMENT IN ACCORDANCE WITH SPEC MIL-O-13830.
3. CEMENT IN ACCORDANCE WITH SPEC MIL-O-13830 PAR 3.5.11 USING ADHESIVE PER MIL-A-3920.
4. CTRG ERROR 3 MINUTES MAX.
5. BLACKEN IN ACCORDANCE WITH SPEC MIL-O-13830 PAR 3.5.12 BLKING MATL: BLACK INK PER FED. SPEC TT-1-528.
(A1) 6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019.



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	1		1011636	28386900420		LENS, POSITIVE			
1	1		1011637	28386900430		LENS, NEGATIVE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011722	1011000

APPLICATION

MASTER

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ~ DECIMALS ±.005 ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 76386900170

DRAWN V. AMATO DATE 4-8-63
CHECKED Thornton Stevens 5-6-63
APPROVAL Thornton Stevens 5-6-63
APPROVAL E. Thomas 5-7-63
NASA APPROVAL W. J. Rhine 5-9-63
MIT APPROVAL W. Kupfer 9/18/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LENS, ASSY OF
(TELESCOPE OBJECTIVE)

CODE IDENT NO.
SIZE C
NASA NUMBER 1011707
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

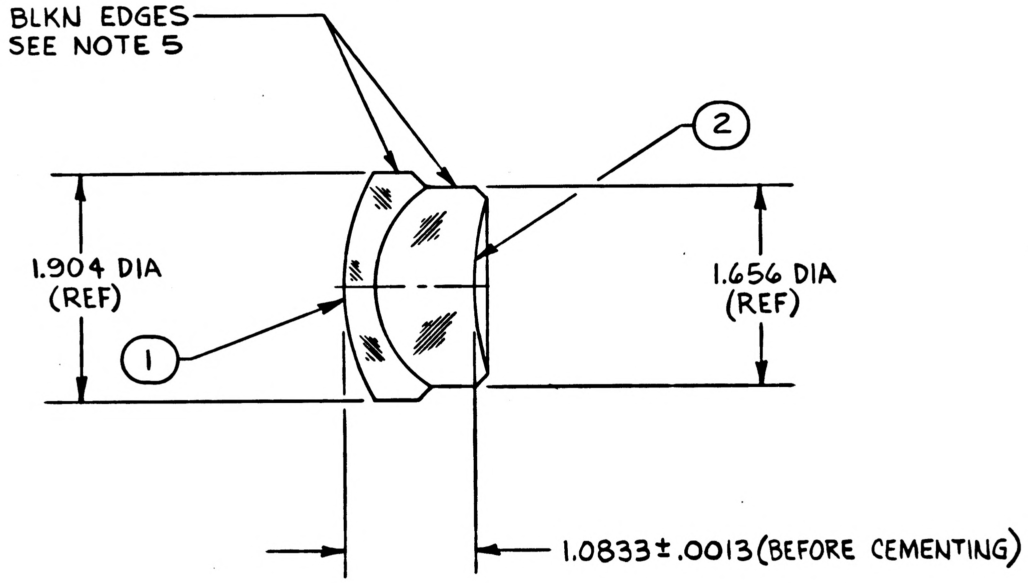
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

7,8-8,9

LOL1101

REVISIONS TDRR 01220				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. ELEMENT IN ACCORDANCE WITH SPEC MIL-O-13830.
3. CEMENT IN ACCORDANCE WITH SPEC MIL-O-13830 PAR 3.5.11 USING ADHESIVE PER MIL-A-3920.
4. CTRG ERROR 3 MINUTES MAX.
5. BLACKEN IN ACCORDANCE WITH SPEC MIL-O-13830 PAR 3.5.12 BLKING MATL: BLACK INK PER FED. SPEC TT-1-528.



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	1		1011636	28386900420		LENS, POSITIVE			
1	1		1011637	28386900430		LENS, NEGATIVE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011722	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ~ DECIMALS ±.005 ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 76386900170
DRAWN V. AMATO DATE 4-8-63
CHECKED Thornton Stearns 5-6-63
APPROVAL Thornton Stearns 5-6-63
APPROVAL E. Thorup 5-7-63
NASA APPROVAL W. J. Rline 5-9-63
MIT APPROVAL W. Kupfer 9 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LENS, ASSY OF
(TELESCOPE OBJECTIVE)

CODE IDENT NO.
SIZE C
NASA NUMBER 1011707
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

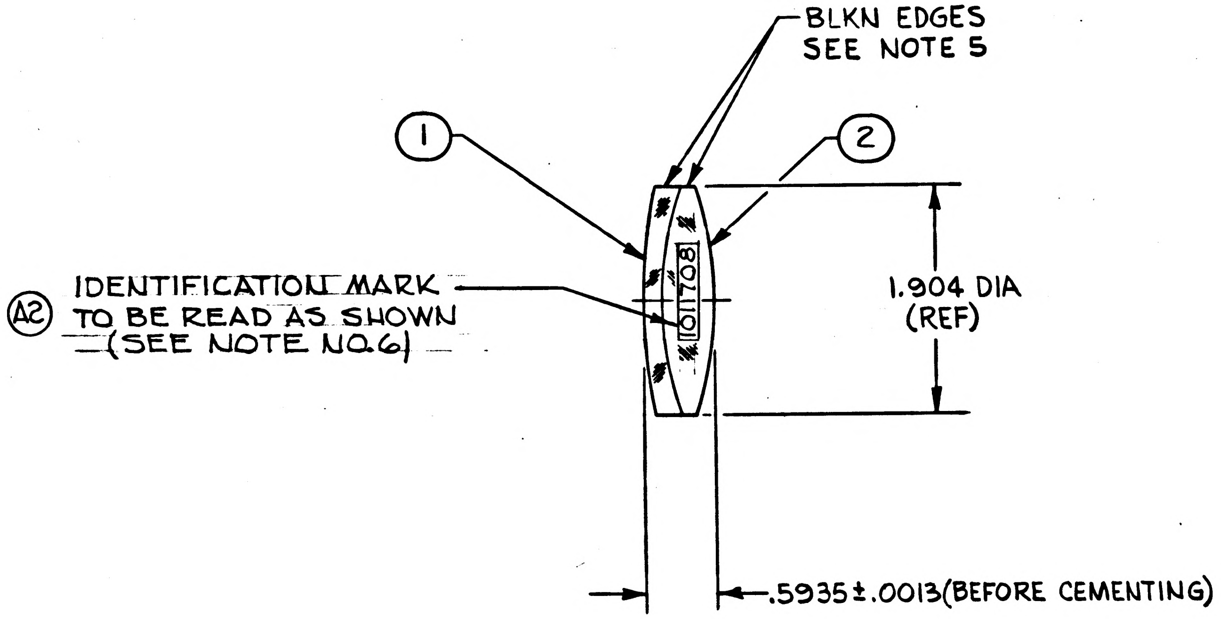
7,8-8,9

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011708 A

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS TDRR 01220				
(M) A_2	—	REVISED PER TDRR NO. 02680	— 8/21/63	

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. ELEMENT IN ACCORDANCE WITH SPEC MIL-O-13830.
3. CEMENT IN ACCORDANCE WITH SPEC MIL-O-13830 PAR 3.5.11 USING ADHESIVE PER MIL-A-3920.
4. CTRG ERROR 3 MINUTES MAX.
5. BLACKEN IN ACCORDANCE WITH SPEC MIL-O-13830 PAR 3.5.12 BLKING MATL: BLACK INK PER FED. SPEC TT-I-528.
6. (A1) IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURER'S SYMBOL PER ND 1002019


BLKN EDGES
SEE NOTE 5
1
2
(A2) IDENTIFICATION MARK TO BE READ AS SHOWN (SEE NOTE NO.6)
1011708
1.904 DIA
(REF)
.5935±.0013(BEFORE CEMENTING)

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	1		1011652	28386900450		LENS, POSITIVE			
1	1		1011651	28386900440		LENS, NEGATIVE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011722	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ~ DECIMALS ±.005 ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 76386900180

DRAWN V. AMATO DATE 4-8-63
CHECKED Thornton Stearns 5-6-63
APPROVAL Thornton Stearns 5-6-63
APPROVAL E. Thomp 5-7-63
NASA APPROVAL W J Rhine 5-9-63
MIT APPROVAL W Kupfer 9 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LENS, ASSY OF
(TELESCOPE OBJECTIVE)

CODE IDENT NO.
SIZE C
NASA NUMBER 1011708
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

4,5-5,6

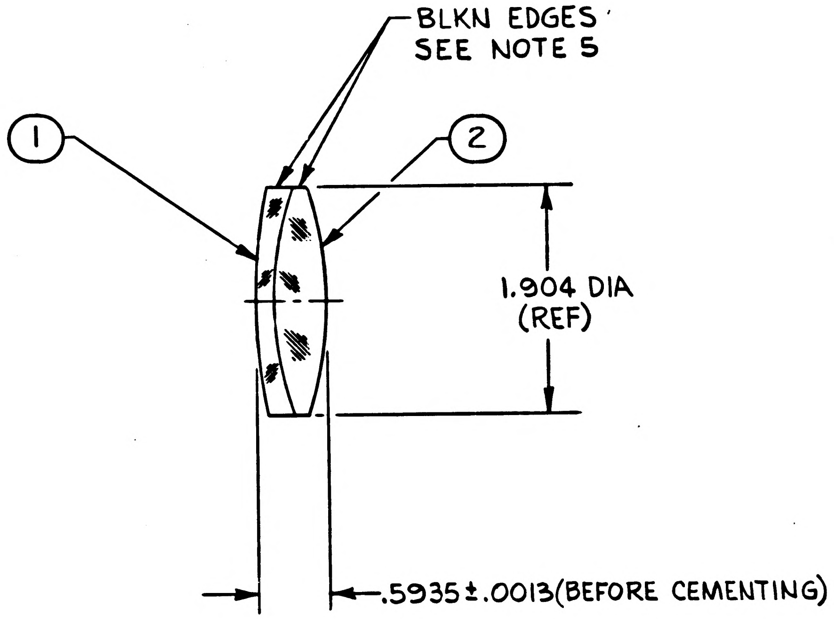
1011708-A

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011708

SYM	ZONE	REVISIONS TDRR 01220 DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. ELEMENT IN ACCORDANCE WITH SPEC MIL-O-13830.
3. CEMENT IN ACCORDANCE WITH SPEC MIL-O-13830 PAR 3.5.11 USING ADHESIVE PER MIL-A-3920.
4. CTRG ERROR 3 MINUTES MAX.
5. BLACKEN IN ACCORDANCE WITH SPEC MIL-O-13830 PAR 3.5.12 BLKING MATL: BLACK INK PER FED. SPEC TT-I-528.



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	1		1011652	28386900450		LENS, POSITIVE			
1	1		1011651	28386900440		LENS, NEGATIVE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011722	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	±.005	± ~

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 76386900180

DRAWN V. AMATO DATE 4-8-63
CHECKED Thornton Stearns 5-6-63
APPROVAL Thornton Stearns 5-6-63
APPROVAL E. Thorup 5-7-63
NASA APPROVAL W J Rhine 5-9-63
MIT APPROVAL W Kupfer 9 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LENS, ASSY OF
(TELESCOPE OBJECTIVE)

CODE IDENT NO.
SIZE C
NASA NUMBER 1011708
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

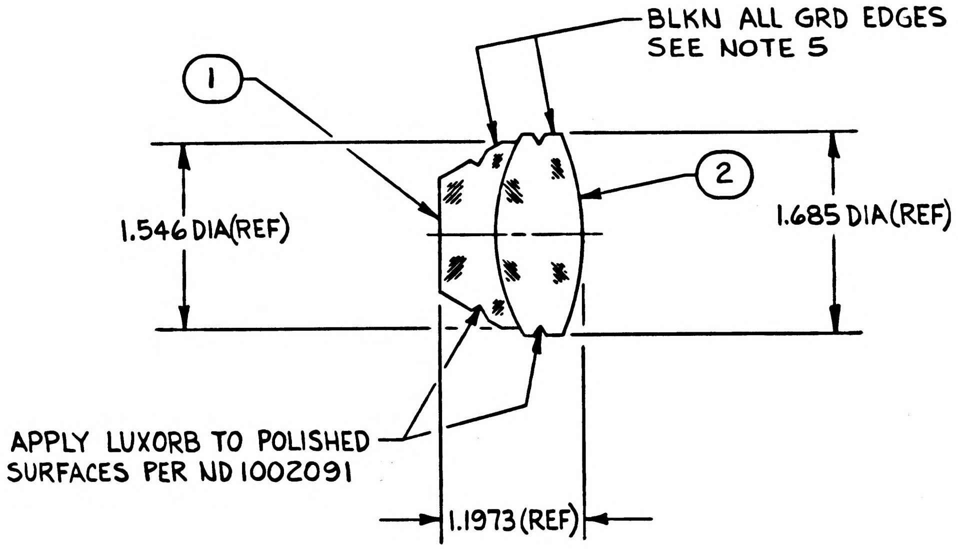
E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

	60L1101

SYM	ZONE	REVISIONS TDRR 01220 DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. ELEMENT IN ACCORDANCE WITH SPEC MIL-O-13830.
3. CEMENT IN ACCORDANCE WITH SPEC MIL-O-13830 PAR 3.5.11 USING ADHESIVE PER MIL-A-3920.
4. CTRG ERROR 3 MINUTES MAX.
5. BLACKEN IN ACCORDANCE WITH SPEC MIL-O-13830 PAR 3.5.12 BLKING MATL: BLACK INK PER FED. SPEC TT-I-528.



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	1		1011658	28386900470		LENS, POSITIVE			
1	1		1011657	28386900460		LENS, NEGATIVE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011722	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	±.005	± 1°

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 76386900190
DRAWN V.AMATO DATE 4-9-63
CHECKED 5-6-63
APPROVAL 5-6-63
APPROVAL 5-7-63
NASA APPROVAL 5-9-63
MIT APPROVAL 9 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LENS, ASSY OF
(TELESCOPE OBJECTIVE)

CODE IDENT NO.
SIZE C
NASA NUMBER 1011709
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1,2-2,3

1011709

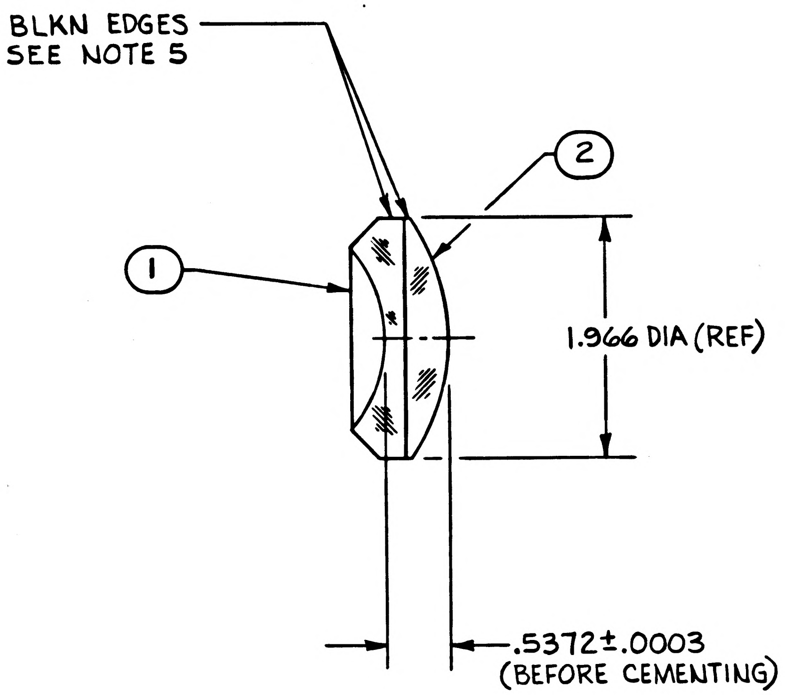
E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

01L1101

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS TDRR 01220				

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. ELEMENT IN ACCORDANCE WITH SPEC MIL-O-13830.
3. CEMENT IN ACCORDANCE WITH SPEC MIL-O-13830 PAR 3.5.11 USING ADHESIVE PER MIL-A-3920.
4. CTRG ERROR ½ MINUTE MAX.
5. BLACKEN IN ACCORDANCE WITH SPEC MIL-O-13830 PAR 3.5.12 BLKING MATL: BLACK INK PER FED. SPEC TT-1-528.



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	1		1011669	28386900510		LENS, POSITIVE			
1	1		1011664	28386900500		LENS, NEGATIVE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011732	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ~ | DECIMALS ±.005 | ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 76386900200
DRAWN V. AMATO DATE 4-11-63
CHECKED 5-6-63
APPROVAL 5-6-63
APPROVAL E. 5-7-63
NASA APPROVAL W. J. 5-9-63
MIT APPROVAL 9 My 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LENS, ASSY OF
(TELESCOPE RELAY)

CODE IDENT NO.
SIZE C
NASA NUMBER 1011710
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

67, 7-1

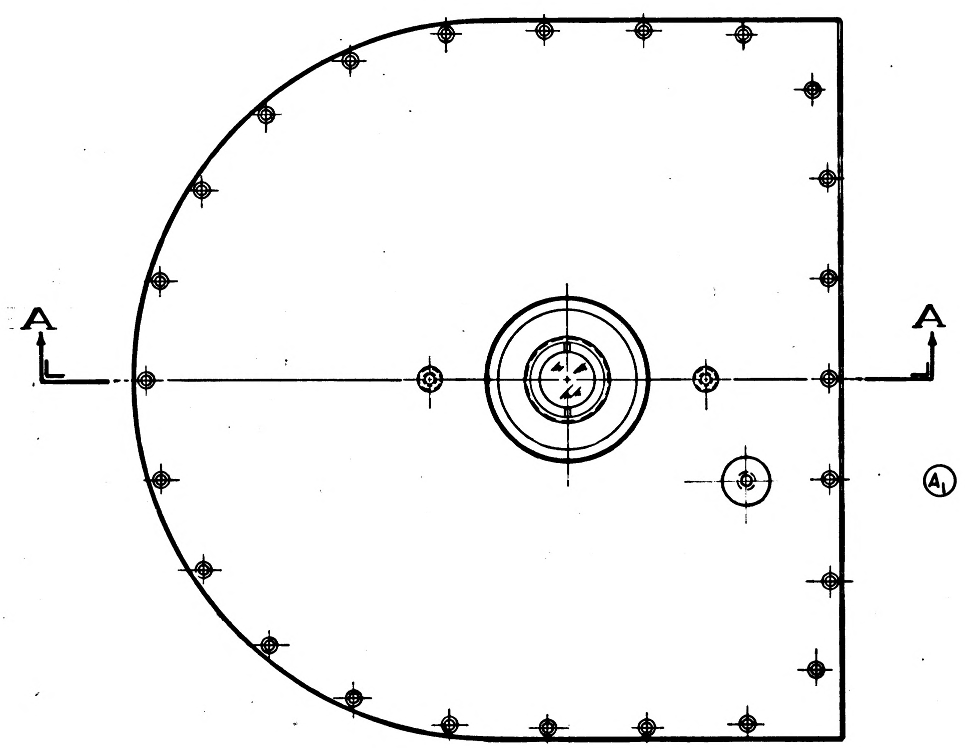
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

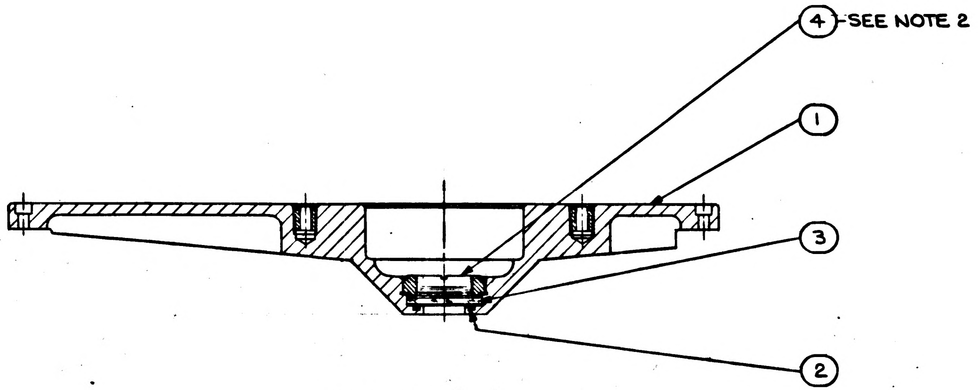
01L1101

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. VIBRATION PROOF ASSY IN ACCORDANCE WITH MIL-E-5400 (PAR 3.1.17e).
3. IDENTIFY USING NASA NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019

A	1011711

REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR NO. 06509	26 FEB 64	





SECTION A-A

MASTER

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
4	1		1011588	57386900990		RING, RETAINING			
3	1		1011589	28386900390		WINDOW, GLASS			
2	1	*	1011768-16	74453043016		PACKING-PREFORMED			
1	1		1011586	85386900340		SEXTANT PANEL & INSERT, ASSY OF			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ −	+ −	+ −

DO NOT SCALE THIS DRAWING

MATERIAL

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900940

DRAWN DATE 7-19-63
CHECKED 8-13-63
APPROVAL 8-14-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PANEL ASSEMBLY,
SXT

CODE IDENT NO.	SIZE	NASA NUMBER
	D	1011711

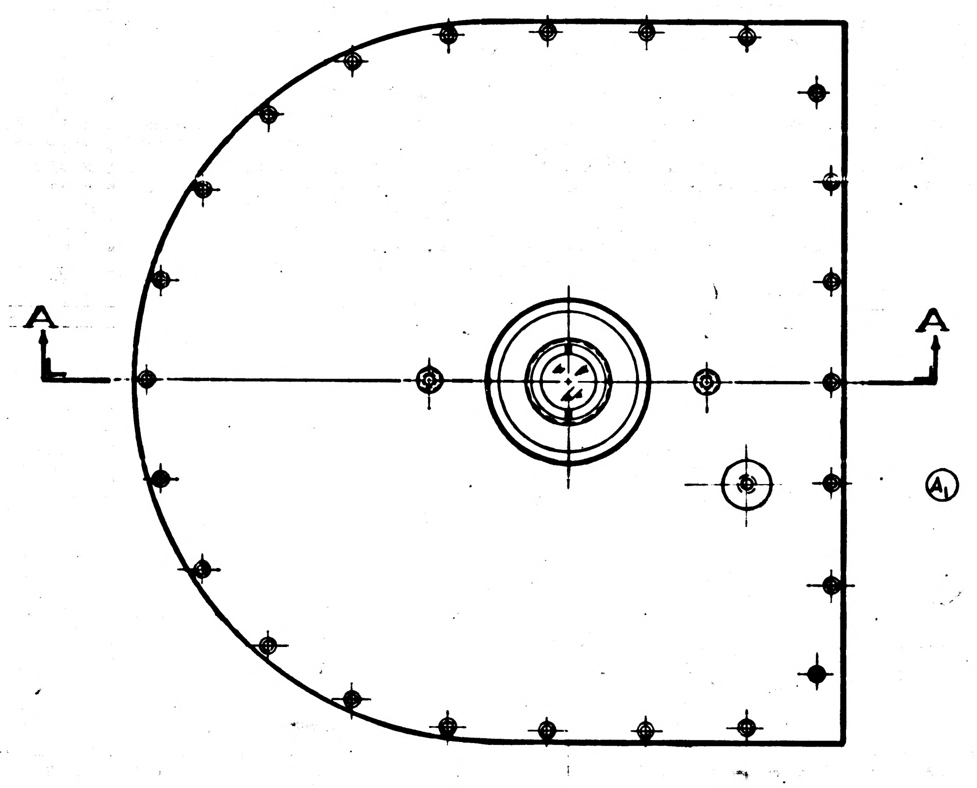
SCALE 1/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

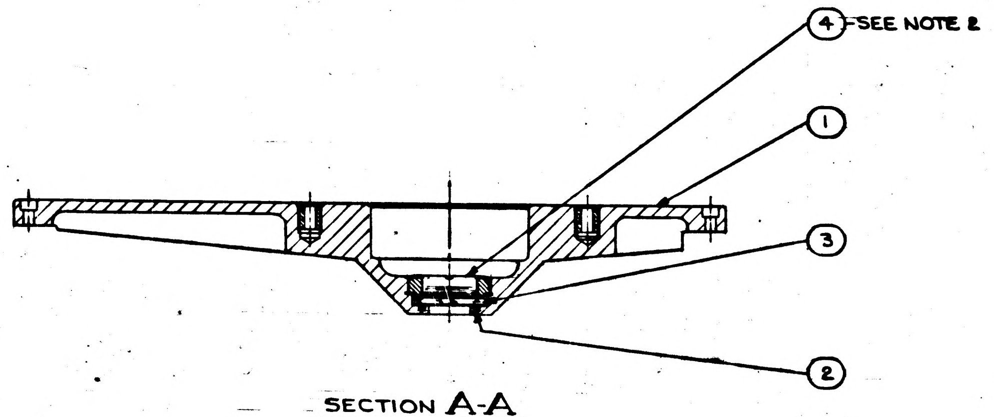
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. VIBRATION PROOF ASSY USING ONE DROP OF LOCKING COMPOUND, GRADE "H" PER MIL-S-22473. Ⓑ
3. IDENTIFY USING NASA NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019

B	11L1101

REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR NO. 06509	26 FEB 64	
B		REVISED PER TDRR NO. 08606	6-1-64	





SECTION A-A

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
4	1		1011588	57386900990		RING, RETAINING			
3	1		1011589	28386900390		WINDOW, GLASS			
2	1	*	1011768-16	74453043016		PACKING-PREFORMED			
1	1		1011586	85386900340		SEXTANT PANEL & INSERT, ASSY OF			

LIST OF PARTS AND MATERIALS

1011000	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ −	+ −	+ −

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900940

DRAWN DATE 7-19-63
CHECKED 8-13-63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL W.J. Rhine 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PANEL ASSEMBLY, SXT

CODE IDENT NO. | SIZE D | NASA NUMBER 1011711
SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

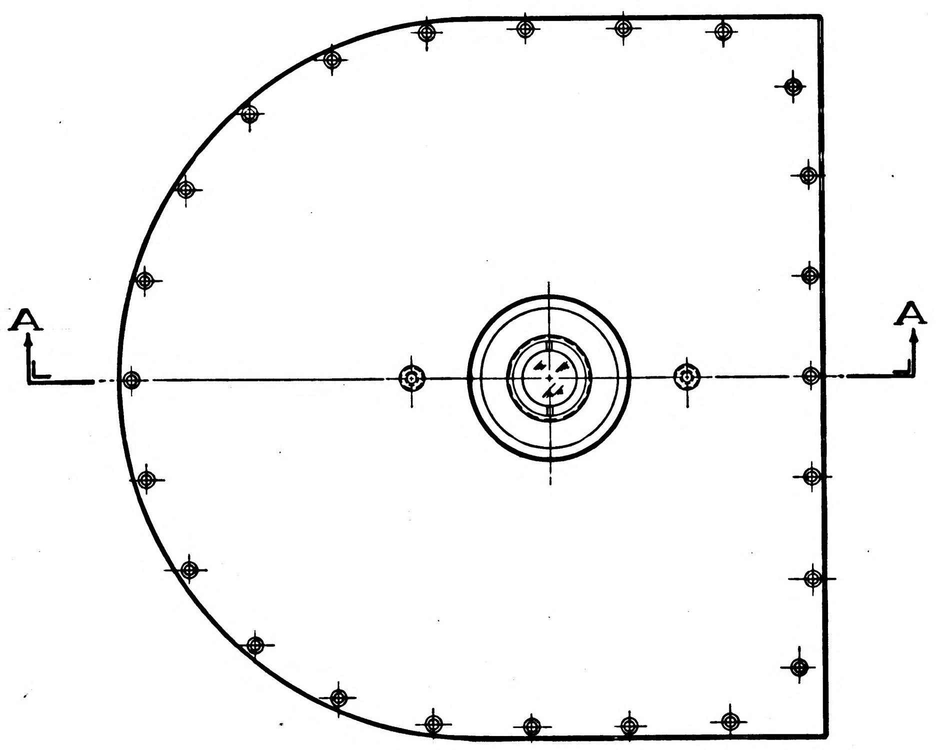
1011711 B

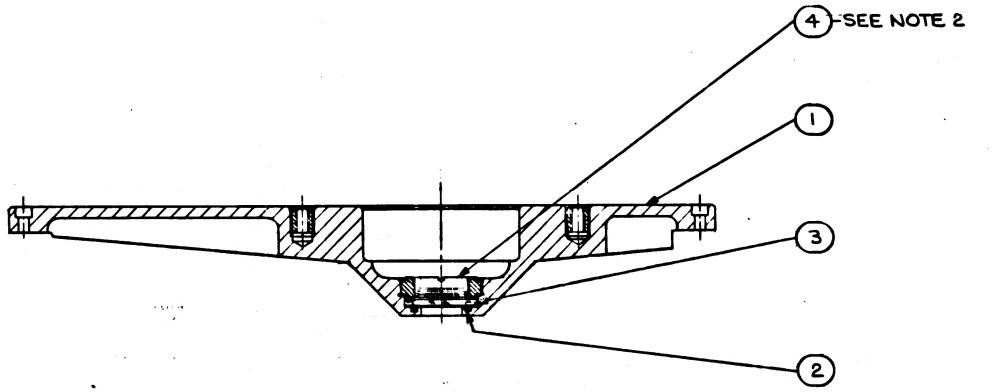
11L1101

REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. VIBRATION PROOF ASSY IN ACCORDANCE WITH MIL-E-5400 (PAR 3.1.17e).
3. IDENTIFY USING NASA NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019





SECTION A-A

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
4	1		1011588	57386900990		RING, RETAINING			
3	1		1011589	28386900390		WINDOW, GLASS			
2	1	*	1011768-16	74453043016		PACKING-PREFORMED			
1	1		1011586	85386900340		SEXTANT PANEL & INSERT, ASSY OF			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ −	+ −	+ −

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900940
DRAWN DATE 7-19-63
CHECKED 8-13-63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PANEL ASSEMBLY,
SXT

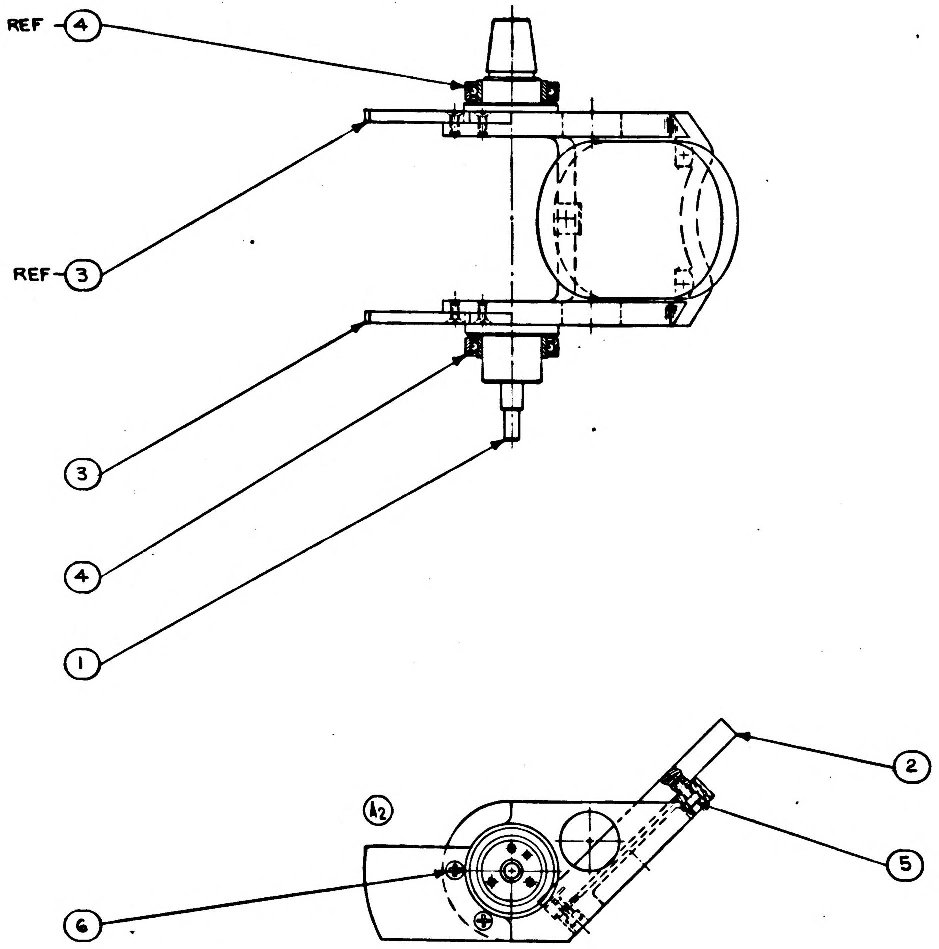
CODE IDENT NO. | SIZE D | NASA NUMBER 1011711
SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

INCHES
0 2
PHOTOGRAPHIC SCALE ONLY

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLY TEST PROCEDURE IN ACCORDANCE WITH ATP 1011712. (A3)
3 IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019

1011712 | A

REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO. 07824	4-21-64	



*PURCHASE ITEM:-SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
(A1)	6	4	NAS	1189C04P5L	74455155009		SCREW, SELF-LOCKING, 100° FLAT HD.			
	5	3	NAS	1352C04LL4	74455157013		SCREW, CAP, HEX SOC HD. SELF-LOCKING			
	4	2	*	1011612	30295770480		BEARING, BALL, ANNULAR			
	3	2		1011273	57386900660		COUNTERWEIGHT			
	2	1		1011259	52386900490		MIRROR, INDEX, SXT HEAD			
	1	1		1011258	52386900480		SHAFT, INDEX MIRROR, SXT HEAD			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011701	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± –	± –	± –

DO NOT SCALE THIS DRAWING

MATERIAL –

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900680

DRAWN DATE 6-12-63
CHECKED
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-4-63
MIT APPROVAL 16 Au 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
INDEXING MIRROR & MOUNT ASSEMBLY (SXT HEAD)

CODE IDENT NO.	SIZE	NASA NUMBER
	D	1011712

SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

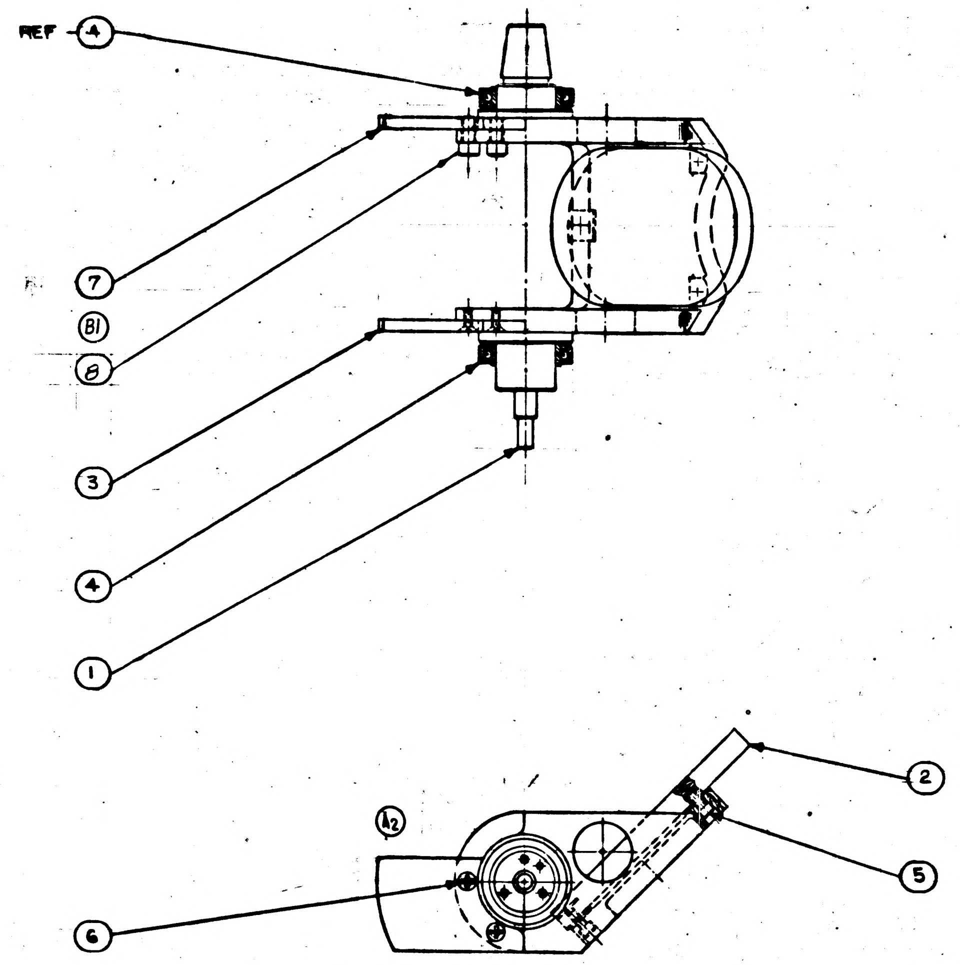
1011712 A

B 1011712

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLY TEST PROCEDURE IN ACCORDANCE WITH ATP 1011712. (A3)
3 IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019

REVISIONS 02623

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO. 07824	4-21-64	JnB
B3		REVISED PER TDRR NO. 08472	5-14-64	JnB



*PURCHASE ITEM:-SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
(B3)	8	2		1011625-51	74455151052		SCREW, CAP, HEX SOC HD. SELF-LOCKING			
	7	1		1012091	52386901010		COUNTERWEIGHT			
(A1)	6	2	NAS	1189C04P5L	74455155009		SCREW, SELF-LOCKING, 100° FLAT HD.			
	5	3	NAS	1352C04LL4	74455157013		SCREW, CAP, HEX SOC HD. SELF-LOCKING			
	4	2	*	1011612	30295770480		BEARING, BALL, ANNULAR			
(B2)	3	1		1011273	57386900660		COUNTERWEIGHT			
	2	1		1011259	52386900490		MIRROR, INDEX, SXT HEAD			
	1	1		1011258	52386900480		SHAFT, INDEX MIRROR, SXT HEAD			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011701	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900680
DRAWN DATE 8-15-63
CHECKED
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL W.G. 9-63
MIT APPROVAL 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
INDEXING MIRROR & MOUNT ASSEMBLY (SXT HEAD)

CODE IDENT NO.
SIZE D
NASA NUMBER 1011712
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011712 B

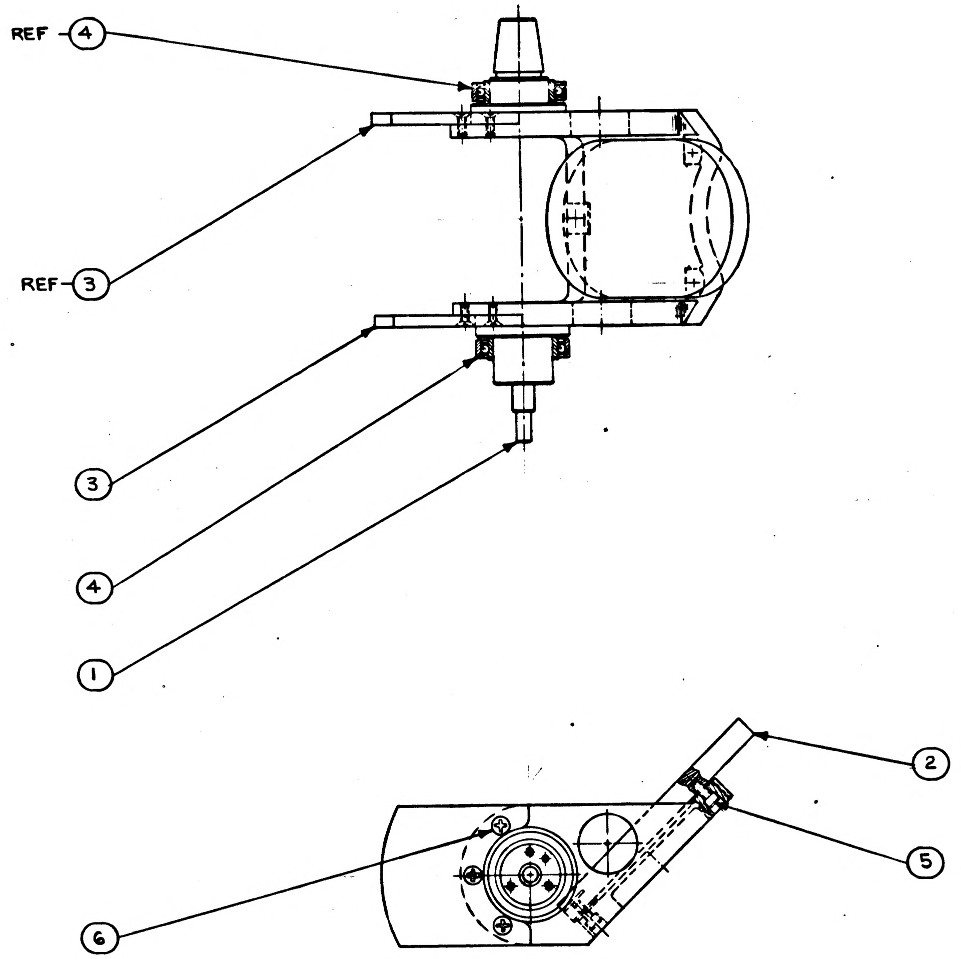
MASTER

1011712

REVISIONS 02623

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLY AND TEST PROCEDURE IN ACCORDANCE WITH ATP 1011712.
3. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
6	6	NAS	1189C04P5L	74455155009		SCREW, SELF-LOCKING, 100° FLAT HD.			
5	3	NAS	1352C04LL4	74455157013		SCREW, CAP, HEX SOC HD. SELF-LOCKING			
4	2	*	1011612	30295770480		BEARING, BALL, ANNULAR			
3	2		1011273	57386900660		COUNTERWEIGHT			
2	1		1011259	52386900490		MIRROR, INDEX, SXT HEAD			
1	1		1011258	52386900480		SHAFT, INDEX MIRROR, SXT HEAD			

LIST OF PARTS AND MATERIALS

*PURCHASE ITEM:-SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

NEXT ASSY	USED ON
1011701	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900680
DRAWN J. Schiller DATE 6-12-63
CHECKED Paul Pappachristo
APPROVAL [illegible] 8-15-63
APPROVAL [illegible] 8-15-63
NASA APPROVAL W J Klein 5-4-63
MIT APPROVAL [illegible] 16 Jan 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
INDEXING MIRROR & MOUNT ASSEMBLY (SXT HEAD)

CODE IDENT NO.
SIZE D
NASA NUMBER 1011712
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

A	1011713

REVISIONS TDRR 03960

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A24		REVISED PER TDRR NO. 07516	4/19/64	

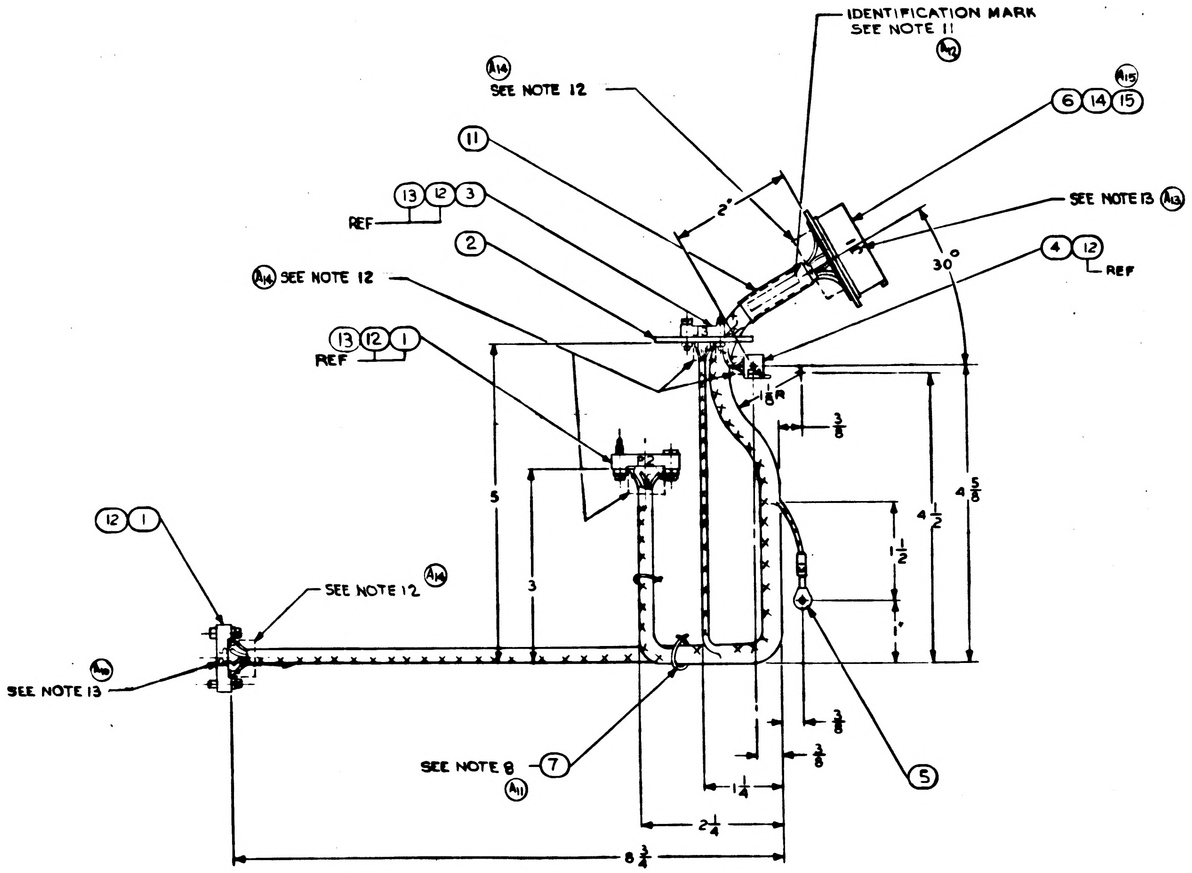
NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING DIAGRAM NASA DWG NO. 1015129.
3. CONDUCTOR NO. SHALL BE MARKED ON EACH WIRE PER ND1002019. (A1) SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY TWO (2) INCHES, MAXIMUM. SPIRALING OF THE MARKINGS IS ALLOWED.
4. TWIST CONDUCTORS IN ACCORDANCE WITH ND1002032.
5. CONNECT CONDUCTORS A12C TO RESPECTIVE SHIELDS (PER WIRING LEGEND) USING ITEM 15.
6. SLIDE ITEMS 11, 12, 13 & 14 OVER WIRE BEYOND STRIPPED ENDS
7. SOLDER CONDUCTORS, PER WIRING LEGEND, WITH Sn60WRP2 PER QQ-S-571, PER MSFC-PROC-158.
8. LACE CONDUCTORS, USING ITEM 7, IN ACCORDANCE WITH ND1002032
9. PERFORM CONTINUITY CHECK.
10. SLIDE ITEMS 12, 3 & 4 OVER SOLDERED JOINTS AND SHRINK.
11. SHRINK ITEM 11 AND IDENTIFY ASSEMBLY USING NASA DRAWING NO. REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND-1002019.
12. POT IN ACCORDANCE WITH ND1002009, METHOD C.
    - A- POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
    - B- POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
13. MARK REF. DESIGNATIONS 1/8 INCH HIGH IN ACCORDANCE WITH ND1002019

WIRING LEGEND (A22)

COND NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 4
A1	WHITE	8	12 IN	J1 - A	P2 - A	8
A2	↑	↑	12 IN	J1 - B	P2 - B	
(A6) A3			12 IN	J1 - A	P5 - A	8
(A7) A4			12 IN	J1 - B	P5 - B	
A5			15¾ IN	J1 - E	P5 - C	8
A6			15¾ IN	J1 - F	P5 - D	
A7			15¾ IN	J1 - G	P5 - E	
A8			12 IN	J1 - J	P2 - F	8
A9			12 IN	J1 - K	P2 - H	
(A8) A10		↓	12 IN	J1 - J	P5 - F	8
(A9) A11	↓	8	12 IN	J1 - K	P5 - H	
A12	WHITE	10	15¾ IN			8
A12A**	BLUE		15¾ IN	J1 - N	P5 - J	
(A2) A12B**	BROWN		15¾ IN	J1 - P	P5 - K	
(A3) A12C**	WHITE	8	2 IN	A12-SHIELD	J1 - R	
A13	WHITE	8	15¾ IN	J1 - T	P5 - M	8
A14	↑	↑	↑	J1 - U	P5 - N	
A15				J1 - S	P5 - P	
A16				J1 - V	P5 - R	8
A17				J1 - W	P5 - S	
A18				J1 - X	P5 - T	8
A19				J1 - Y	P5 - U	
A20				J1 - Z	P5 - V	
A21	↓	↓	↓	J1 - a	P5 - W	
A22	WHITE	8	15¾ IN	J1 - C	P5 - X	

WIRING LEGEND (A22)

COND NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 4
A23	WHITE	8	12 IN	J1-c	P2-C	8
A24	↑	8	↑	J1-H	P2-D	
A25	↓	8		J1-d	P2-E	
A26	WHITE	10				8
A26A **	BLUE		↓	J1-e	P2-J	
A26B **	BROWN		12 IN	J1-f	P2-K	
(A5) A26C **	WHITE	8	2 IN	A26-SHIELD	J1 - b	
A27	WHITE	8	12 IN	J1-g	P2-M	8
A28	↑	↑	↑	J1-h	P2-N	
A29				J1-n	P2-P	
A30				J1-i	P2-R	8
A31				J1-j	P2-S	
A32				J1-k	P2-T	8
A33				J1-m	P2-U	
A34			↓	J1-p	P2-W	
A35 (A23)			12 IN	J1-q	P2-X	
A36			3 IN	J1-r	P4-B	8
A37			3 IN	J1-s	P4-A	
(A20) A38			12½ IN	J1-r	J3-C	8
(A21) A39			12½ IN	J1-s	J3-D	
(A17)						
(A18)	↓	↓				
(A19) A40	WHITE	9	6½ IN	J1-t	E1	



(A16)

ITEM NO.	QTY REQU	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
15	4	*	1010402-2			SLEEVE, SOLDER, ELECT COND INSUL, HEAT SHRINKABLE			
14	37	*	1010490-058	—		INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
13	6	*	1010490-054	—		INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
12	35	*	1010490-060	—		INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
11	1	*	1010490-277	—		INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKAB			
10	1		1010490-7	—		WIRE, IRRADIATED POLYOLEFIN INSULATED (2			
9	1		1010685-2	—		WIRE, IRRADIATED POLYOLEFIN INSULATED (			
8	1		1010685-1	—		WIRE, IRRADIATED POLYOLEFIN INSULATED (3			
7	AR	*	1011753	—		TAPE, LACING & TYING			
6	1		1011798	85386900740		PLATE AND CONNECTOR, ASSY OF			
5	1		MS25036-1	—		TERMINAL, LUG, CRIMP STYLE, COPPER, INSULATED			
4	1	*	1011748-1	68502016401		CONNECTOR, ELECTRICAL			
3	1	*	1011646	68502017401		CONNECTOR, ELECTRICAL			
2	1		1011331	52386900670		PLATE, CONNECTOR MOUNTING			
1	2	*	1011758	68502018201		CONNECTOR, ELECTRICAL			

LIST OF PARTS AND MATERIALS

** CONDUCTOR NUMBER FOR REFERENCE ONLY - WIRE SHALL NOT BE MARKED

* PURCHASE ITEM: SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/8 DECIMALS ± — ANGLES ± 5°
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80386900020
DRAWN E. DRAPALA DATE 10-7-63
CHECKED 10/8/63
APPROVAL 10/8/63
APPROVAL 10-15-63
NASA APPROVAL
MIT APPROVAL 17 Oct

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCT BASE HARNESS
ASSEMBLY

CODE IDENT NO. | SIZE E | NASA NUMBER 1011713
SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

B 1011713

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS TDRR 07550				
A24		REVISED PER TDRR NO. C7516	4/19/64	
B		REPLACED WITH CHANGES BY REV C PER TDRR No. 09070	7/29/64	

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING DIAGRAM NASA DWG NO. 1015129.
3. CONDUCTOR NO. SHALL BE MARKED ON EACH WIRE PER ND1002019. (A1) SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY TWO (2) INCHES, MAXIMUM. SPIRALING OF THE MARKINGS IS ALLOWED.
4. TWIST CONDUCTORS IN ACCORDANCE WITH ND1002032.
5. CONNECT CONDUCTORS A12C TO RESPECTIVE SHIELDS (PER WIRING LEGEND) USING ITEM 15.
6. SLIDE ITEMS 11, 12, 13 & 14 OVER WIRE BEYOND STRIPPED ENDS
7. SOLDER CONDUCTORS, PER WIRING LEGEND, WITH Sn60WRP2 PER QQ-S-571, PER MSFC-PROC-158.
8. LACE CONDUCTORS, USING ITEM 7, IN ACCORDANCE WITH ND1002032
9. PERFORM CONTINUITY CHECK.
10. SLIDE ITEMS 12, 3 & 4 OVER SOLDERED JOINTS AND SHRINK.
11. SHRINK ITEM 11 AND IDENTIFY ASSEMBLY USING NASA DRAWING NO. REVISION LETTER AND MANUFACTURER'S SYMBOL IN ACCORDANCE WITH ND-1002019.
12. POT IN ACCORDANCE WITH ND1002009, METHOD C.
    - A- POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
    - B- POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
13. MARK REF. DESIGNATIONS 1/8 INCH HIGH IN ACCORDANCE WITH ND1002019

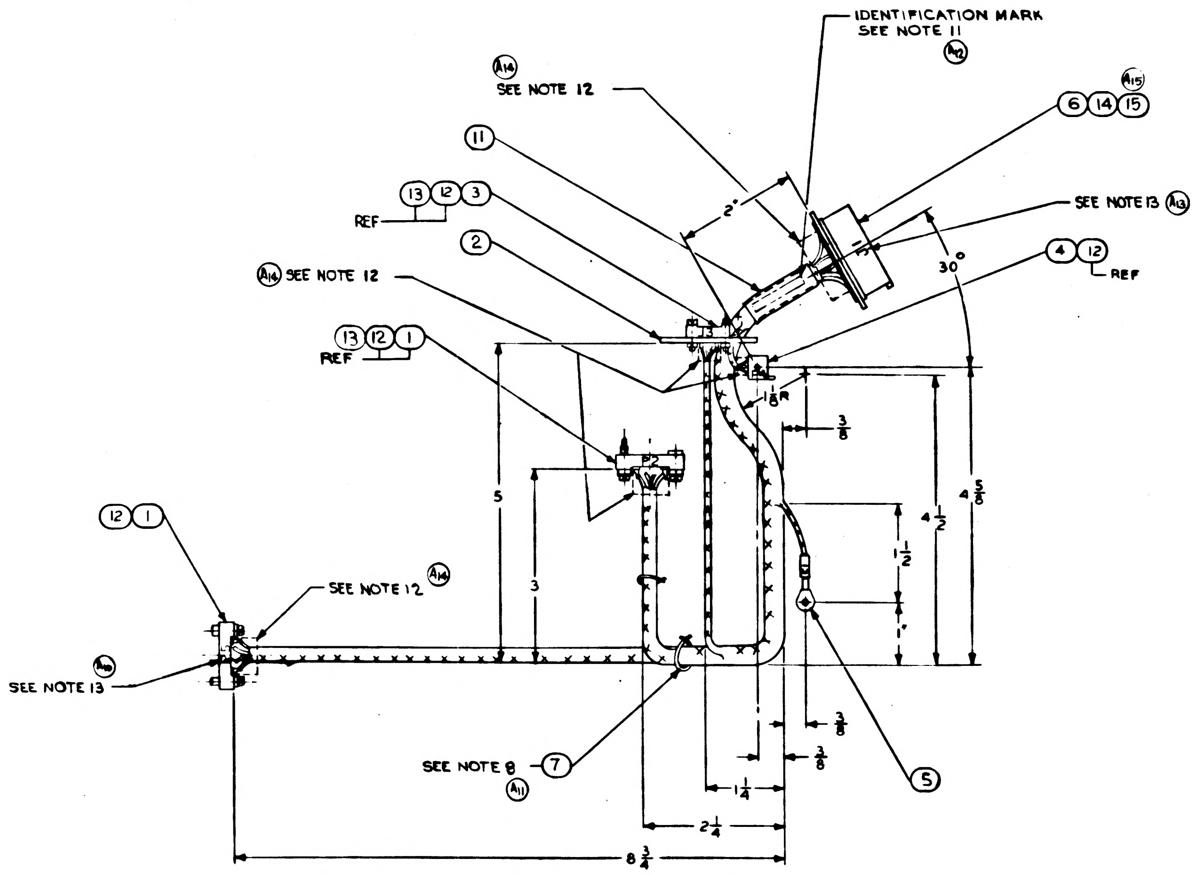
WIRING LEGEND (A22)

COND NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 4
A1	WHITE	8	12 IN	J1 - A	P2 - A	8
A2			12 IN	J1 - B	P2 - B	
(A6) A3			12 IN	J1 - A	P5 - A	8
(A7) A4			12 IN	J1 - B	P5 - B	
A5			15¾ IN	J1 - E	P5 - C	8
A6			15¾ IN	J1 - F	P5 - D	
A7			15¾ IN	J1 - G	P5 - E	
A8			12 IN	J1 - J	P2 - F	8
A9			12 IN	J1 - K	P2 - H	
(A8) A10			12 IN	J1 - J	P5 - F	8
(A9) A11		8	12 IN	J1 - K	P5 - H	
A12	WHITE	10	15¾ IN			(8)
A12A**	BLUE		15¾ IN	J1 - N	P5 - J	
(A2) A12B**	BROWN		15¾ IN	J1 - P	P5 - K	
(A3) A12C**	WHITE	8	2 IN	A12-SHIELD	J1 - R	
A13	WHITE	8	15¾ IN	J1 - T	P5 - M	8
A14				J1 - U	P5 - N	
A15				J1 - S	P5 - P	
A16				J1 - V	P5 - R	8
A17				J1 - W	P5 - S	
A18				J1 - X	P5 - T	8
A19				J1 - Y	P5 - U	
A20				J1 - Z	P5 - V	
A21				J1 - a	P5 - W	
A22	WHITE	8	15¾ IN	J1 - C	P5 - X	

(A24)

WIRING LEGEND (A22)

COND NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 4
A23	WHITE	8	12 IN	J1-c	P2-C	8
A24		8		J1-H	P2-D	
A25		8		J1-d	P2-E	
A26	WHITE	10				(8)
A26A **	BLUE			J1-e	P2-J	
(A4) A26B **	BROWN		12 IN	J1-f	P2-K	
(A5) A26C **	WHITE	8	2 IN	A26-SHIELD	J1 - b	
A27	WHITE	8	12 IN	J1-g	P2-M	8
A28				J1-h	P2-N	
A29				J1-n	P2-P	
A30				J1-i	P2-R	8
A31				J1-j	P2-S	
A32				J1-k	P2-T	8
A33				J1-m	P2-U	
A34				J1-p	P2-W	
A35			12 IN	J1-q	P2-X	(A23)
A36			3 IN	J1-r	P4-B	8
A37			3 IN	J1-s	P4-A	
(A20) A38			12½ IN	J1-r	J3-C	8
(A21) A39			12½ IN	J1-s	J3-D	
(A17)						
(A18)						
(A19) A40	WHITE	9	6½ IN	J1-t	E1	



Ⓑ REPLACED WITH CHANGES BY REV. C

(A16)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
15	4	*	1010402-2			SLEEVE, SOLDER, ELECT. COND INSUL, HEAT SHRINKABLE			
14	37	*	1010490-058	———		INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
13	6	*	1010490-054	———		INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
12	35	*	1010490-060	———		INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
11	1	*	1010490-277	———		INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
10	1		1010490-7	———		WIRE, IRRADIATED POLYOLEFIN INSULATED (28			
9	1		1010685-2	———		WIRE, IRRADIATED POLYOLEFIN INSULATED (			
8	1		1010685-1	———		WIRE, IRRADIATED POLYOLEFIN INSULATED (3			
7	AR	*	1011753	———		TAPE, LACING & TYING			
6	1		1011798	85386900740		PLATE AND CONNECTOR, ASSY OF			
5	1		MS25036-1	———		TERMINAL, LUG, CRIMP STYLE COPPER, INSULATED			
4	1	*	1011748-1	68502016401		CONNECTOR, ELECTRICAL			
3	1	*	1011646	68502017401		CONNECTOR, ELECTRICAL			
2	1		1011331	52386900670		PLATE, CONNECTOR MOUNTING			
1	2	*	1011758	68502018201		CONNECTOR, ELECTRICAL			

LIST OF PARTS AND MATERIALS

** CONDUCTOR NUMBER FOR REFERENCE ONLY - WIRE SHALL NOT BE MARKED

* PURCHASE ITEM: SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/8; DECIMALS ± —; ANGLES ± 5°
DO NOT SCALE THIS DRAWING
MATERIAL ———
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80386900020

DRAWN E. DRAPALA DATE 10-7-63
CHECKED [illegible] 10/8/63
APPROVAL [illegible] 10/8/63
APPROVAL [illegible] 10-15-63
NASA APPROVAL [illegible]
MIT APPROVAL [illegible] 17 Oct

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCT BASE HARNESS
ASSEMBLY

CODE IDENT NO.
SIZE E
NASA NUMBER 1011713
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011713 B

1011713 C

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
C		REDRAWN IN ACCORDANCE WITH TDRR 04070	5-12-64	

REVISIONS

NOTES:

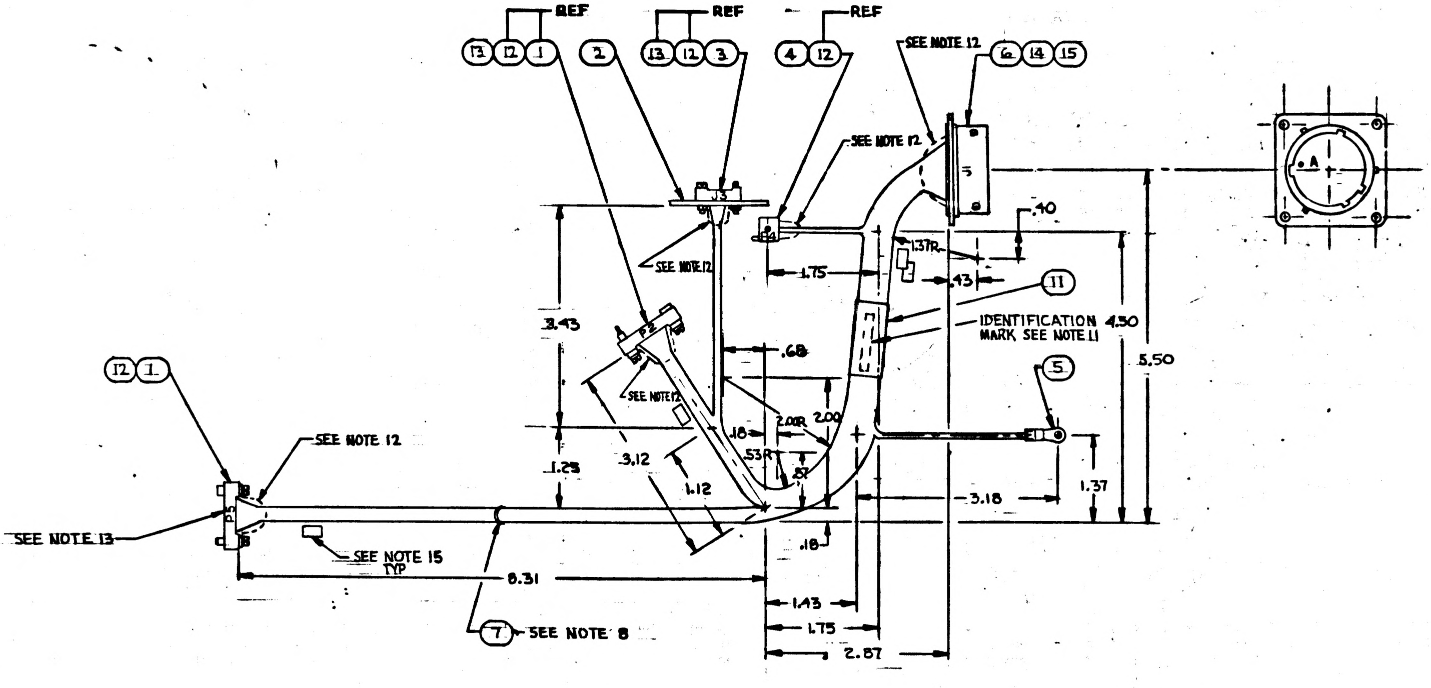
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. REFER TO WIRING SCHEMATIC, NASA DRAWING NO. 1015129.
3. CONDUCTOR NO. SHALL BE MARKED ON EACH WIRE PER ND-1002019. SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY TWO (2) INCHES, MAXIMUM. SPIRALING OF THE MARKINGS IS ALLOWED.
4. TWIST CONDUCTORS IN ACCORDANCE WITH ND-1002032
5. CONNECT CONDUCTORS A12C AND A26C TO RESPECTIVE SHIELDS (PER WIRING LEGEND) USING ITEM ⑮
6. APPLY ITEMS ⑪ ⑫, ⑬ AND ⑭ TO LEADS.
7. SOLDER CONDUCTORS, PER WIRING LEGEND, WITH SN 60WRP2, PER QQ-S-571, PER MSFC-PROC-158.
8. LACE CONDUCTORS, USING ITEM ⑦, IN ACCORDANCE WITH ND-1002032.
9. PERFORM CONTINUITY CHECK.
10. PLACE ITEMS ⑫, ⑬ AND ⑭ OVER CONTACTS AND LEADS AND SHRINK.
11. SHRINK ITEM ⑪ AND IDENTIFY ASSEMBLY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND-1002019.
12. POT IN ACCORDANCE WITH ND-1002009, METHOD C.
    A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
    B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
13. MARK REF DESIGNATIONS 1/8 INCH HIGH IN ACCORDANCE WITH ND-1002019.
14. TERMINATE SHIELDED WIRE AS SHOWN IN DETAIL A.
15. ⊏ SYMBOL ON HARNESS INDICATES APPROXIMATE LOCATION OF SOLDER SLEEVE

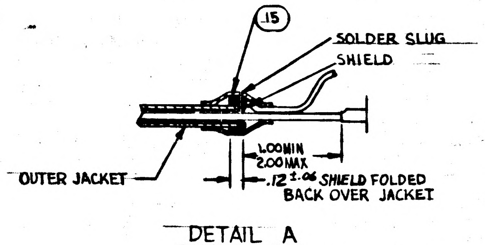
WIRING LEGEND

COND NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 4
A1	WHITE	8	12 IN	J1 - A	P2 - A	8
A2	↑	↑	12 IN	J1 - B	P2 - B	
A3			12 IN	J1 - A	P5 - A	8
A4			12 IN	J1 - B	P5 - B	
A5			15¾ IN	J1 - E	P5 - C	8
A6			15¾ IN	J1 - F	P5 - D	
A7			15¾ IN	J1 - G	P5 - E	
A8			12 IN	J1 - J	P2 - F	8
A9			12 IN	J1 - K	P2 - H	
A10		↓	12 IN	J1 - J	P5 - F	8
A11	↓	8	12 IN	J1 - K	P5 - H	
A12	WHITE	10	15¾ IN			(8)
A12A**	BLUE		15¾ IN	J1 - N	P5 - J	
A12B**	BROWN		15¾ IN	J1 - P	P5 - K	
A12C**	WHITE	8	2½ IN	A12 - SHIELD	J1 - R	
A13	WHITE	↑	15¾ IN	J1 - T	P5 - M	8
A14	↑		↑	J1 - U	P5 - N	
A15				J1 - S	P5 - P	
A16				J1 - V	P5 - R	8
A17				J1 - W	P5 - S	
A18				J1 - X	P5 - T	8
A19				J1 - Y	P5 - U	
A20				J1 - Z	P5 - V	
A21	↓	↓	↓	J1 - a	P5 - W	
A22	WHITE	8	15¾ IN	J1 - C	P5 - X	

WIRING LEGEND

COND NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 4
A23	WHITE	8	12 IN	J1 - c	P2 - C	8
A24	↑	8	↑	J1 - H	P2 - D	
A25	↓	8		J1 - d	P2 - E	
A26	WHITE	10				(8)
A26A**	BLUE		↓	J1 - e	P2 - J	
A26B**	BROWN		12 IN	J1 - f	P2 - K	
A26C**	WHITE	8	2½ IN	A26 - SHIELD	J1 - b	
A27	WHITE	8	12 IN	J1 - g	P2 - M	8
A28	↑	↑	↑	J1 - h	P2 - N	
A29				J1 - i	P2 - P	
A30				J1 - j	P2 - R	8
A31				J1 - k	P2 - S	
A32				J1 - m	P2 - T	8
A33				J1 - n	P2 - U	
A34			↓	J1 - p	P2 - W	
A35			12 IN	J1 - q	P2 - X	
A36			3 IN	J1 - r	P4 - B	8
A37			3 IN	J1 - s	P4 - A	
A38		↓	12½ IN	J1 - r	J3 - C	8
A39	↓	8	12½ IN	J1 - s	J3 - D	
A40	WHITE	9	6½ IN	J1 - t	E1	





DETAIL A
SCALE: NONE

** CONDUCTOR NUMBER FOR REFERENCE ONLY - WIRE SHALL NOT BE MARKED

* PURCHASE ITEM: SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
15	4	*	1010402-2			SLEEVE, SOLDER, ELECT. COND. INSUL., HEAT SHRINKABLE			
14	37	*	1010490-058			INSULATION-SLEEVING ELECTRICAL, HEAT SHRINKABLE			
13	6	*	1010490-054			INSULATION-SLEEVING ELECTRICAL, HEAT SHRINKABLE			
12	35	*	1010490-060			INSULATION-SLEEVING ELECTRICAL, HEAT SHRINKABLE			
11	1	*	1010490-277			INSULATION-SLEEVING ELECTRICAL, HEAT SHRINKABLE			
10	1		1010685-7			WIRE, IRRADIATED POLYOLEFIN INSULATED (28")			
9	1		1010685-2			WIRE, IRRADIATED POLYOLEFIN INSULATED (7")			
8	1		1010685-1			WIRE, IRRADIATED POLYOLEFIN INSULATED (40")			
7	AR	*	1011753			TAPE, LACING & TYING			
6	1		1011738	85386900740		PLATE AND CONNECTOR, ASSY OF			
5	1		MS25036-1			TERMINAL, LUG, CRIMP STYLE, COPPER, INSULATED			
4	1	*	1011748-1			CONNECTOR, ELECTRICAL			
3	1	*	1011646	68502017401		CONNECTOR, ELECTRICAL			
2	1		1011331	52386900670		PLATE, CONNECTOR MOUNTING			
1	2	*	1011758	68502018201		CONNECTOR, ELECTRICAL			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± 1/64 DECIMALS ± .12 ANGLES ± 5°
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80386900020
DRAWN L. MARGIOTTA DATE 2-20-64
CHECKED A.M. BUCHHOLZ
APPROVAL N. BRUNELLE / V.A.
APPROVAL E. Okomo 5/20/64
NASA APPROVAL Barnard
MIT APPROVAL L. Hafel 5/27/64

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCT BASE HARNESS ASSEMBLY

CODE IDENT NO.
SIZE E
NASA NUMBER 1011713
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011713 D

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS				
C		REPLACES REV B WITH CHANGES PER TCRR 09070	5-12-64	
D3		REVISED PER TDRR 15583	1/17/68	

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. REFER TO WIRING SCHEMATIC, NASA DRAWING NO. 1015129.
3. CONDUCTOR NO. SHALL BE MARKED ON EACH WIRE PER ND-1002019. SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY TWO (2) INCHES, MAXIMUM. SPIRALING OF THE MARKINGS IS ALLOWED.
4. TWIST CONDUCTORS IN ACCORDANCE WITH ND-1002032
5. CONNECT CONDUCTORS A12C AND A26C TO RESPECTIVE SHIELDS (PER WIRING LEGEND) USING ITEM ⑮
6. APPLY ITEMS ⑪ ⑫, ⑬ AND ⑭ TO LEADS.
7. SOLDER CONDUCTORS, PER WIRING LEGEND, WITH SN 60 WRP2, PER QQ-S-571, PER MSFC-PROC-158.
8. LACE CONDUCTORS, USING ITEM ⑦, IN ACCORDANCE WITH ND-1002032.
9. PERFORM CONTINUITY CHECK.
10. PLACE ITEMS ⑫, ⑬ AND ⑭ OVER CONTACTS AND LEADS AND SHRINK.
11. SHRINK ITEM ⑪ AND IDENTIFY ASSEMBLY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND-1002019.
12. POT IN ACCORDANCE WITH ND-1002009, METHOD C.
    - A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
    - B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
13. MARK REF DESIGNATIONS 1/8 INCH HIGH IN ACCORDANCE WITH ND-1002019.
14. TERMINATE SHIELDED WIRE AS SHOWN IN DETAIL A.
15. ☐ SYMBOL ON HARNESS INDICATES APPROXIMATE LOCATION OF SOLDER SLEEVE

WIRING LEGEND

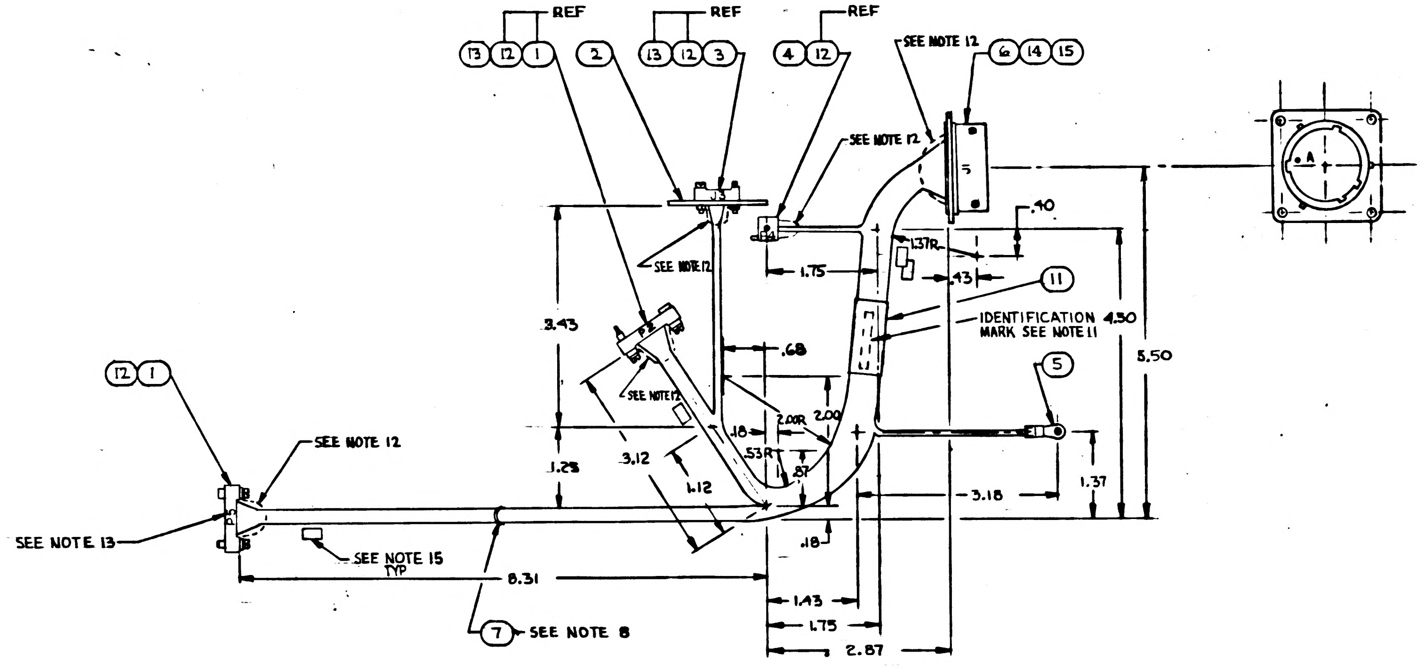
COND NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 4
A1	YEL	8	12 IN	J1-A	P2-A	8
A2	↕	↕	12 IN	J1-B	P2-B	
A3	↕	↕	12 IN	J1-A	P5-A	8
A4	↕	↕	12 IN	J1-B	P5-B	
A5	↕	↕	15¾ IN	J1-E	P5-C	8
A6	↕	↕	15¾ IN	J1-F	P5-D	
A7	↕	↕	15¾ IN	J1-G	P5-E	
A8	↕	↕	12 IN	J1-J	P2-F	8
A9	↕	↕	12 IN	J1-K	P2-H	
A10	↕	↕	12 IN	J1-J	P5-F	8
A11	↕	8	12 IN	J1-K	P5-H	
A12	YEL	10	15¾ IN			(8)
A12A**	RED		15¾ IN	J1-N	P5-J	
A12B**	YEL		15¾ IN	J1-P	P5-K	
A12C**	YEL	8	2½ IN	A12-SHIELD	J1-R	
A13	YEL	↕	15¾ IN	J1-T	P5-M	8
A14	↕	↕	↕	J1-U	P5-N	
A15	↕	↕	↕	J1-S	P5-P	
A16	↕	↕	↕	J1-V	P5-R	8
A17	↕	↕	↕	J1-W	P5-S	
A18	↕	↕	↕	J1-X	P5-T	8
A19	↕	↕	↕	J1-Y	P5-U	
A20	↕	↕	↕	J1-Z	P5-V	
A21	↕	↕	↕	J1-a	P5-W	
A22	YEL	8	15¾ IN	J1-C	P5-X	

(D2)

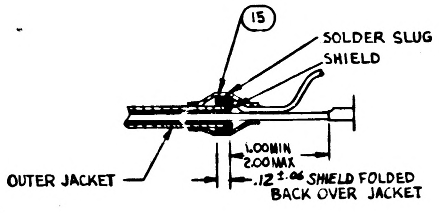
WIRING LEGEND

COND NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 4
A23	YEL	8	12 IN	J1-c	P2-C	8
A24	↕	8	↕	J1-H	P2-D	
A25	↕	8	↕	J1-d	P2-E	
A26	YEL	10	↕			(8)
A26A**	RED		↕	J1-e	P2-J	
A26B**	YEL		12 IN	J1-f	P2-K	
A26C**	YEL	8	2½ IN	A26-SHIELD	J1-b	
A27	YEL	8	12 IN	J1-g	P2-M	8
A28	↕	↕	↕	J1-h	P2-N	
A29	↕	↕	↕	J1-i	P2-P	
A30	↕	↕	↕	J1-j	P2-R	8
A31	↕	↕	↕	J1-k	P2-S	
A32	↕	↕	↕	J1-m	P2-T	8
A33	↕	↕	↕	J1-n	P2-U	
A34	↕	↕	↕	J1-p	P2-W	
A35	↕	↕	12 IN	J1-q	P2-X	
A36	↕	↕	3 IN	J1-r	P4-B	8
A37	↕	↕	3 IN	J1-s	P4-A	
A38	↕	↕	12½ IN	J1-r	J3-C	8
A39	↕	8	12½ IN	J1-s	J3-D	
A40	YEL	9	6½ IN	J1-t	E1	

(D3)



Ⓒ REPLACES REV B WITH CHANGES



DETAIL A
SCALE: NONE

** CONDUCTOR NUMBER FOR REFERENCE ONLY - WIRE SHALL NOT BE MARKED

* PURCHASE ITEM: SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

ITEM NO	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION
15	4	*	1010402-2			SLEEVE, SOLDER, ELECT. COND, INSUL., HEAT SHRINKABLE		
14	37	*	1010490-058			INSULATION-SLEEVING ELECTRICAL, HEAT SHRINKABLE		
13	6	*	1010490-054			INSULATION-SLEEVING ELECTRICAL, HEAT SHRINKABLE		
12	35	*	1010490-060			INSULATION-SLEEVING ELECTRICAL, HEAT SHRINKABLE		
11	1	*	1010490-277			INSULATION-SLEEVING ELECTRICAL, HEAT SHRINKABLE		
10	1		1010789-012			WIRE, ELEC, TFE EXTRUDED, INSUL POLYIMIDE CTD (25')		
9	1		1010789-006			WIRE, ELEC, TFE EXTRUDED, INSUL POLYIMIDE CTD (7')		
8	1		1010789-001			WIRE, ELEC, TFE EXTRUDED, INSUL POLYIMIDE CTD (40')		
7	AR	*	1011753			TAPE, LACING & TYING		
6	1		1011798	85386900740		PLATE AND CONNECTOR, ASSY OF		
5	1		MS25036-1			TERMINAL, LUG, CRIMP STYLE, COPPER. INSULATED		
4	1	*	1011748-1			CONNECTOR, ELECTRICAL		
3	1	*	1011646	68502017401		CONNECTOR, ELECTRICAL		
2	1		1011331	52386900670		PLATE, CONNECTOR MOUNTING		
1	2	*	1011758	68502018201		CONNECTOR, ELECTRICAL		

(D1)

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64 DECIMALS ± .12 ANGLES ± 5°
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80386900020

DRAWN J. MARGIOTTA DATE 2-28-64
CHECKED A.M. BUCHHOLZ
APPROVAL V. BRUNELLE / LA.
APPROVAL E. [illegible] 5/20/64
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCT BASE HARNESS
ASSEMBLY

CODE IDENT NO.
SIZE E
NASA NUMBER 1011713
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011713 E

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. REFER TO WIRING SCHEMATIC, NASA DRAWING NO. 1015129.
3. CONDUCTOR NO. SHALL BE MARKED ON EACH WIRE PER ND-1002019. SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY TWO (2) INCHES, MAXIMUM. SPIRALING OF THE MARKINGS IS ALLOWED.
4. TWIST CONDUCTORS IN ACCORDANCE WITH ND-1002032
5. CONNECT CONDUCTORS A12C AND A26C TO RESPECTIVE SHIELDS (PER WIRING LEGEND) USING ITEM ⑮
6. APPLY ITEMS ⑪ ⑫ ⑬ AND ⑭ TO LEADS.
7. SOLDER CONDUCTORS, PER WIRING LEGEND, WITH SN 60 WRP2, PER QQ-S-571, PER MSFC-PROC-158.
8. LACE CONDUCTORS, USING ITEM ⑦, IN ACCORDANCE WITH ND-1002032.
9. PERFORM CONTINUITY CHECK.
10. PLACE ITEMS ⑫, ⑬ AND ⑭ OVER CONTACTS AND LEADS AND SHRINK.
11. SHRINK ITEM ⑪ AND IDENTIFY ASSEMBLY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND-1002019.
12. POT 1011713-000 CONNECTORS PER ND 1002009, METHOD C. (E2)
POT 1011713-001 CONNECTORS PER ND 1002240.
A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH
13. MARK REF DESIGNATIONS 1/8 INCH HIGH IN ACCORDANCE WITH ND-1002019.
14. TERMINATE SHIELDED WIRE AS SHOWN IN DETAIL A.
15. ☐ SYMBOL ON HARNESS INDICATES APPROXIMATE LOCATION OF SOLDER SLEEVE

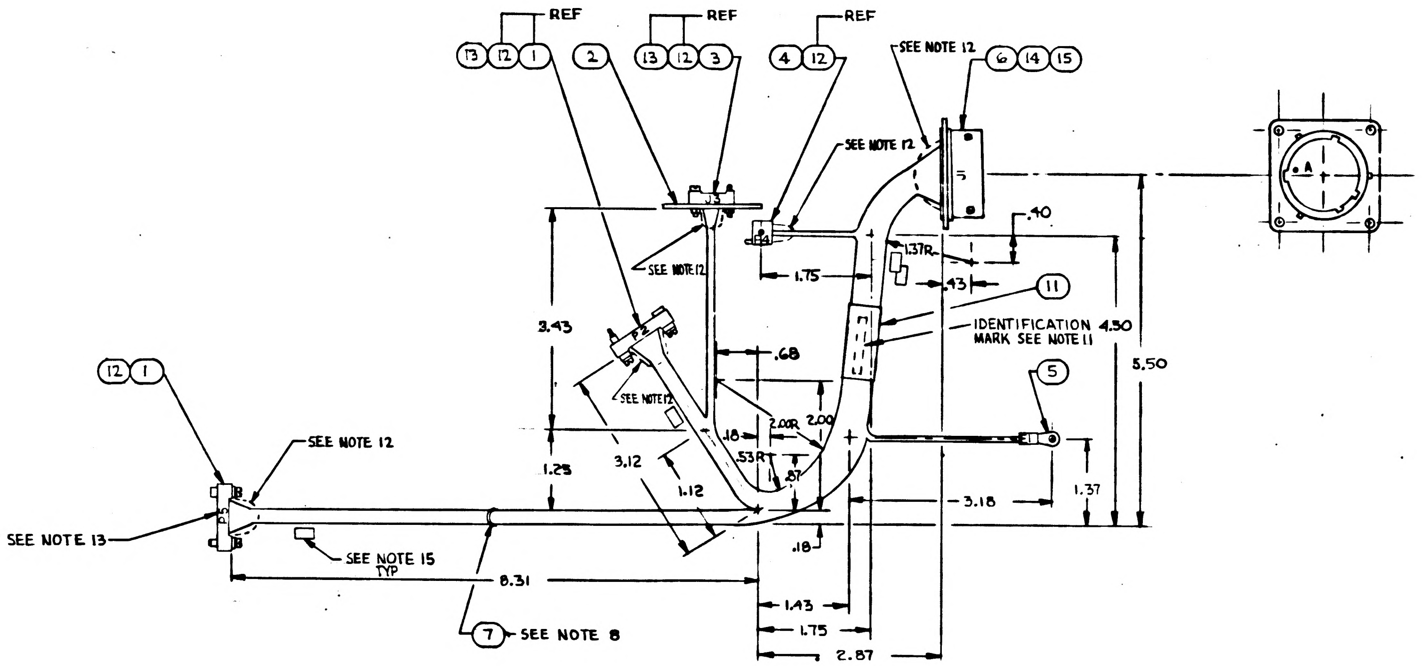
WIRING LEGEND						
COND NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 4
A1	YEL	8	12 IN	J1 - A	P2 - A	8
A2			12 IN	J1 - B	P2 - B	
A3			12 IN	J1 - A	P5 - A	8
A4			12 IN	J1 - B	P5 - B	
A5			15¾ IN	J1 - E	P5 - C	8
A6			15¾ IN	J1 - F	P5 - D	
A7			15¾ IN	J1 - G	P5 - E	
A8			12 IN	J1 - J	P2 - F	8
A9			12 IN	J1 - K	P2 - H	
A10			12 IN	J1 - J	P5 - F	8
A11		8	12 IN	J1 - K	P5 - H	
A12	YEL	10	15¾ IN			(8)
A12A**	RED		15¾ IN	J1 - N	P5 - J	
A12B**	YEL		15¾ IN	J1 - P	P5 - K	
A12C**	YEL	8	2½ IN	A12 - SHIELD	J1 - R	
A13	YEL		15¾ IN	J1 - T	P5 - M	8
A14				J1 - U	P5 - N	
A15				J1 - S	P5 - P	
A16				J1 - V	P5 - R	8
A17				J1 - W	P5 - S	
A18				J1 - X	P5 - T	8
A19				J1 - Y	P5 - U	
A20				J1 - Z	P5 - V	
A21				J1 - a	P5 - W	
A22	YEL	8	15¾ IN	J1 - C	P5 - X	

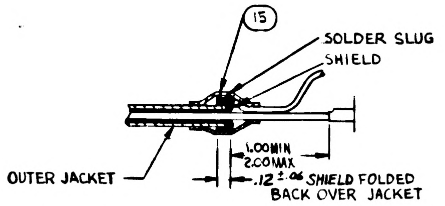
(D2)

WIRING LEGEND						
COND NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 4
A23	YEL	8	12 IN	J1 - c	P2 - C	8
A24		8		J1 - H	P2 - D	
A25		8		J1 - d	P2 - E	
A26	YEL	10				(8)
A26A**	RED			J1 - e	P2 - J	
A26B**	YEL		12 IN	J1 - f	P2 - K	
A26C**	YEL	8	2½ IN	A26 - SHIELD	J1 - b	
A27	YEL	8	12 IN	J1 - g	P2 - M	8
A28				J1 - h	P2 - N	
A29				J1 - i	P2 - P	
A30				J1 - j	P2 - R	8
A31				J1 - k	P2 - S	
A32				J1 - m	P2 - T	8
A33				J1 - n	P2 - U	
A34				J1 - p	P2 - W	
A35			12 IN	J1 - q	P2 - X	
A36			3 IN	J1 - r	P4 - B	8
A37			3 IN	J1 - s	P4 - A	
A38			12½ IN	J1 - r	J3 - C	8
A39		8	12½ IN	J1 - s	J3 - D	
A40	YEL	9	6½ IN	J1 - t	E1	

(D3)

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
C		REPLACES REV B WITH CHANGES PER TDRR 09070	5-12-64	
D3		REVISED PER TDRR 15583	1/19/65	
E2		REVISED PER TDRR No 16898	2/26/65	





DETAIL A
SCALE: NONE

Ⓒ REPLACES REV B WITH CHANGES

** CONDUCTOR NUMBER FOR REFERENCE ONLY - WIRE SHALL NOT BE MARKED

* PURCHASE ITEM: SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

4	4	15		*	1010402-2			SLEEVE, SOLDER, ELECT COND, INSUL., HEAT SHRINKABLE			
37	37	14		*	1010490-058			INSULATION-SLEEVING ELECTRICAL, HEAT SHRINKABLE			
6	6	13		*	1010490-054			INSULATION-SLEEVING ELECTRICAL, HEAT SHRINKABLE			
35	35	12		*	1010490-060			INSULATION-SLEEVING ELECTRICAL, HEAT SHRINKABLE			
1	1	11		*	1010490-277			INSULATION-SLEEVING ELECTRICAL, HEAT SHRINKABLE			
1	1	10			1010789-012			WIRE, ELEC, TFE EXTRUDED, INSUL POLYIMIDE CTD (25")			
1	1	9			1010789-006			WIRE, ELEC, TFE EXTRUDED, INSUL POLYIMIDE CTD (7")			
1	1	8			1010789-001			WIRE, ELEC, TFE EXTRUDED, INSUL POLYIMIDE CTD (40")			
AR	AR	7		*	1011753			TAPE, LACING & TYING			
1	1	6			1011798	85386900740		PLATE AND CONNECTOR, ASSY OF			
1	1	5			MS25036-1			TERMINAL, LUG, CRIMP STYLE, COPPER, INSULATED			
1	1	4		*	1011748-1			CONNECTOR, ELECTRICAL			
1	1	3		*	1011646	68502017401		CONNECTOR, ELECTRICAL			
1	1	2			1011331	52386900610		PLATE, CONNECTOR MOUNTING			
2	2	1		*	1011758	68502018201		CONNECTOR, ELECTRICAL			
001 QTY REQD	000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UN W

(D1)
(E1)

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/2; DECIMALS ± .12; ANGLES ± 5°
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80386900020

DRAWN MARGIOTTA DATE 2-28-64
CHECKED A.M. BUCHHOLZ
APPROVAL V. BRUNE JE
APPROVAL E. [illegible]
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCT BASE HARNESS ASSEMBLY

CODE IDENT NO. | SIZE E | NASA NUMBER 1011713
SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

10109/6306

REVISIONS TDRR 03660				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

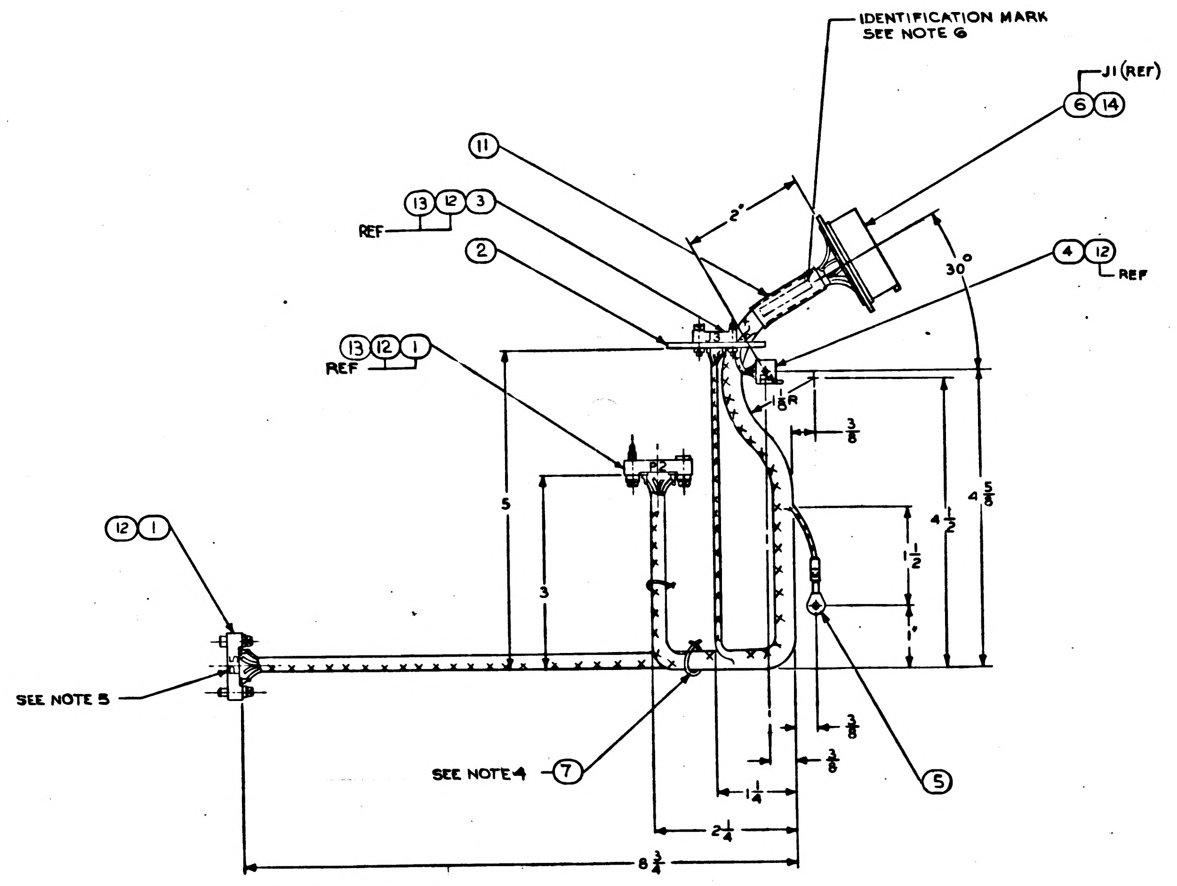
NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING DIAGRAM NASA DWG NO. 1015129.
3. SOLDER PER MSFC-PROC-158 USING TYPE SN60 WAR P2 PER QQ-S-571.
4. LACE WIRES TOGETHER USING ITEM ⑦ PER MIL-S-572. FORM S OR Y LOCKSTITCH AT 1/2 INCH SPACING (MIN.)
5. MARK ELECTRICAL REFERENCE DESIGNATION PER ND1002019.
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019.
7. WIRE, ND1002105, 24 AWG, TYPE I, WHITE, 39 FEET IN TOTAL LENGTH.
8. WIRE, ND1002105, 22 AWG, TYPE I, WHITE, 7 INCHES IN TOTAL LENGTH.
9. WIRE, ND1002105, 24 AWG, TYPE VII-2 (WHITE) [BLUE, BROWN], 28 INCHES IN TOTAL LENGTH.
10. COND. NO. SHALL BE MARKED ON EACH WIRE PER ND1002019. SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY TWO (2) INCHES, MAXIMUM. SPIRALLING OF THE MARKINGS IS ALLOWED.
11. TWISTED CONDUCTORS TO CONSIST OF THREE (3) FULL TURNS PER INCH MINIMUM.

WIRING LEGEND

COND NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 11
A1	WHITE	8	12 IN	J1 - A	P2 - A	8
A2			12 IN	J1 - B	P2 - B	
A3			10 IN	P2 - A	P5 - A	8
A4			10 IN	P2 - B	P5 - B	
A5			15¾ IN	J1 - E	P5 - C	8
A6			15¾ IN	J1 - F	P5 - D	
A7			15¾ IN	J1 - G	P5 - E	
A8			12 IN	J1 - J	P2 - F	8
A9			12 IN	J1 - K	P2 - H	
A10			10 IN	P2 - F	P5 - F	8
A11		8	10 IN	P2 - H	P5 - H	
A12	WHITE	10	15¾ IN			(8)
A12A**	BLUE		15¾ IN	J1 - N	P5 - J	
A12B**	BROWN		15¾ IN	J1 - P	P5 - L	
A12C**	SHIELD		AR	A12-SHIELD	J1 - R	
A13	WHITE	8	15¾ IN	J1 - T	P5 - M	8
A14				J1 - U	P5 - N	
A15				J1 - S	P5 - P	
A16				J1 - V	P5 - R	8
A17				J1 - W	P5 - S	
A18				J1 - X	P5 - T	8
A19				J1 - Y	P5 - U	
A20				J1 - Z	P5 - V	
A21				J1 - a	P5 - W	
A22	WHITE	8	15¾ IN	J1 - C	P5 - Y	

WIRING LEGEND

COND NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 11
A23	WHITE	8	12 IN	J1-c	P2-C	8
A24		8		J1-H	P2-D	
A25		8		J1-d	P2-E	
A26	WHITE	10				(8)
A26A**	BLUE			J1-e	P2-J	
A26B**	BROWN		12 IN	J1-f	P2-L	
A26C**	SHIELD		AR	A26-SHIELD	J1-R	
A27	WHITE	8	12 IN	J1-g	P2-M	8
A28				J1-h	P2-N	
A29				J1-n	P2-P	
A30				J1-i	P2-R	8
A31				J1-j	P2-S	
A32				J1-k	P2-T	8
A33				J1-m	P2-U	
A34				J1-p	P2-W	
A35			12 IN	J1-q	P2-Y	
A36			3 IN	J1-r	P4-B	8
A37			3 IN	J1-s	P4-A	
A38			12½ IN	P4-B	J3-C	8
A39			12½ IN	P4-A	J3-D	
A40			2 IN	J3-C	J3-A	
A41		8	2 IN	J3-D	J3-E	
A42	WHITE	9	6½ IN	J1-t	E1	



** CONDUCTOR NUMBER FOR REFERENCE ONLY - WIRE SHALL NOT BE MARKED

* PURCHASE ITEM: SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
14	1	*	1006776-10	—		INSULATION-SLEEVING, ELECTRICAL, 18½" LG (37-½ LENGTHS)			
13	1	*	1006776-13	—		INSULATION-SLEEVING, ELECTRICAL, 3" LG (6-½ LENGTHS)			
12	1	*	1006776-20	—		INSULATION-SLEEVING, ELECTRICAL, 17½ LG (35-½ LENGTHS)			
11	1	*	1010490-277	—		INSULATION-SLEEVING, ELECTRICAL			
10	1		SEE NOTE 9	—		WIRE, IRRADIATED POLYOLEFIN INSULATED			
9	1		SEE NOTE 8	—		WIRE, IRRADIATED POLYOLEFIN INSULATED			
8	1		SEE NOTE 7	—		WIRE, IRRADIATED POLYOLEFIN INSULATED			
7	AR	*	1011753	—		TAPE, LACING & TYING			
6	1		1011798	85386900740		PLATE AND CONNECTOR, ASSY OF			
5	1		MS25036-1	—		TERMINAL, LUG, CRIMP STYLE, COPPER, INSULATED			
4	1	*	1011748-1	—		CONNECTOR, ELECTRICAL			
3	1	*	1011646	68502017401		CONNECTOR, ELECTRICAL			
2	1		1011331	52386900670		PLATE, CONNECTOR MOUNTING			
1	2	*	1011758	68502018201		CONNECTOR, ELECTRICAL			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± 1/8, DECIMALS ± —, ANGLES ± 5°
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80386900020
DRAWN E. DRAPALA DATE 10-7-63
CHECKED C.E. Costen 10/8/63
APPROVAL C.E. Costen 10/8/63
APPROVAL 10-8-63
NASA APPROVAL 10/11/63
MIT APPROVAL 17 Oct 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCT BASE HARNESS
ASSEMBLY

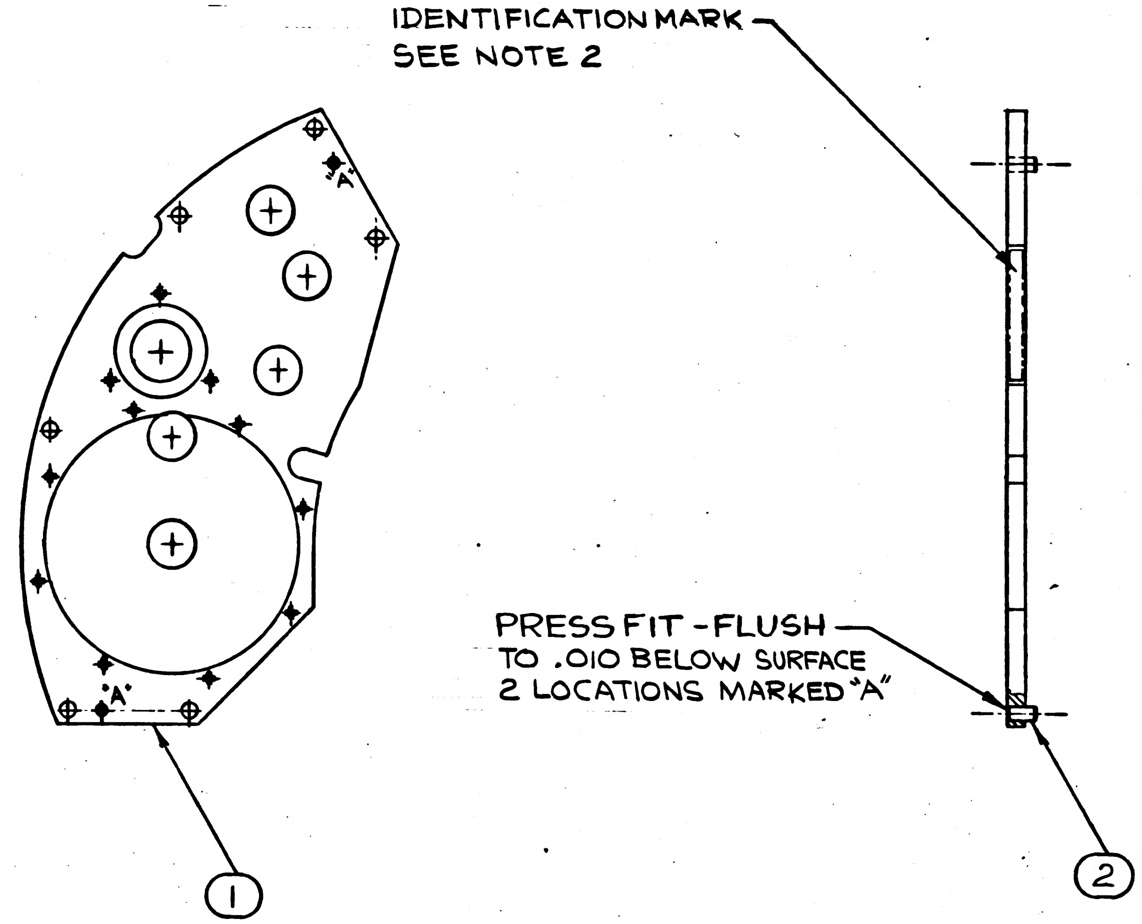
CODE IDENT NO.
SIZE E
NASA NUMBER 1011713
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
0 1
PHOTOGRAPHIC SCALE ONLY

1011715 A

REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A₁		REVISED PER TDRR NO. 06934	17 MAR 64	WK

NOTES:
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. IDENTIFY USING NASA DWG NO. REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORD WITH ND 1002019.


IDENTIFICATION MARK SEE NOTE 2

PRESS FIT - FLUSH TO .010 BELOW SURFACE 2 LOCATIONS MARKED "A"

(A₁)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	2		MS16555-609	74444030009		PIN, DOWEL			
1	1		1011301	52386900600		PLATE, BEARING (SEXTANT SHAFT DRIVE)			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011705	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS + − DECIMALS + − ANGLES + −
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900660
DRAWN W. CAZAU DATE 6-12-63
CHECKED 7/17/63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-14-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE PLATE BEARING AND PIN, ASSY OF

CODE IDENT NO.
SIZE C
NASA NUMBER 1011715
SCALE 1:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

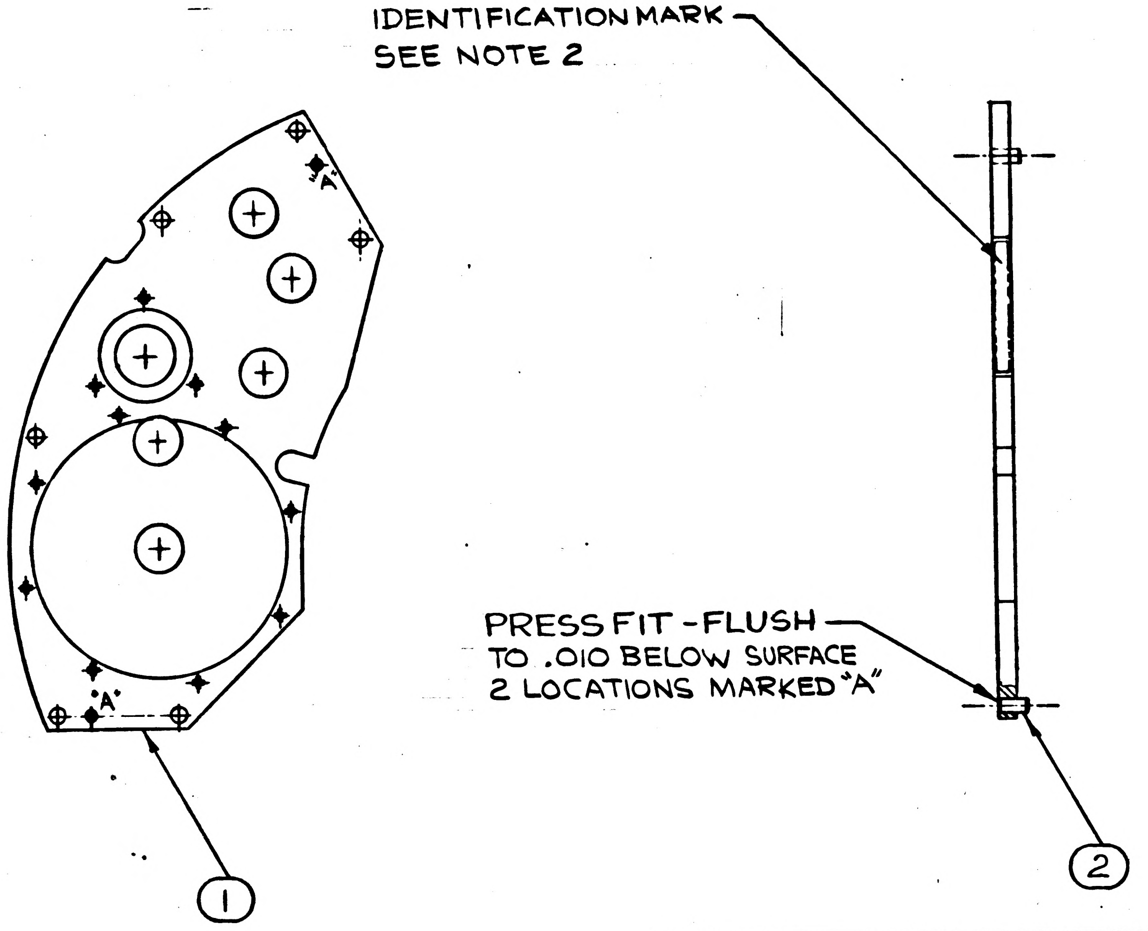
MASTER

INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

1011715

SYM	ZONE	REVISIONS 02623 DESCRIPTION	DATE	APPROVAL

NOTES.
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. IDENTIFY USING NASA DWG NO. REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORD WITH ND 1002019.



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	2		AN122683	73002105065		PIN, DOWEL			
1	1		1011301	52386900600		PLATE, BEARING (SEXTANT SHAFT DRIVE)			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011705	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ −	+ −	+ −

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900660
DRAWN W. CAZAU DATE 6-12-63
CHECKED 7/17/63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE PLATE BEARING AND PIN, ASSY OF

CODE IDENT NO.
SIZE C
NASA NUMBER 1011715
SCALE 1:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

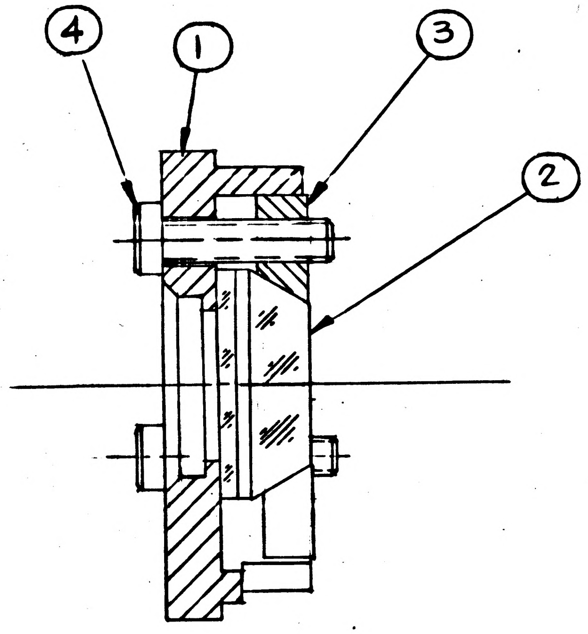
1011715

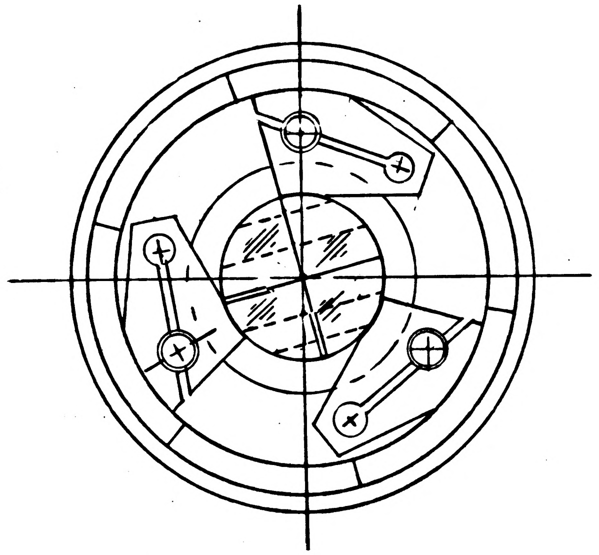
1011716

NOTES:
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327
2. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019

REVISIONS 02623

SYM	ZONE	DESCRIPTION	DATE	APPROVAL





1011716

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
4	3	NAS	1352C02LL6	7455157007		SCREW, CAP, SOC, HD.			
3	3		1011574	54386900320		CLAMP, RETICLE			
2	1		1011594	76386900160		RETICLE, ASSY OF, SXT.			
1	1		1011572	5738690 0910		HOLDER, RETICLE AND LENS			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011704	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS + − DECIMALS + − ANGLES + −
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 38690 0400
DRAWN PAUL PAPPACHRISTOU DATE 6-10-63
CHECKED Paul Pappachristou
APPROVAL G. Ruschman 8-15-63
APPROVAL P. J. Swan 8-15-63
NASA APPROVAL W. J. Rhine 8-6-63
MIT APPROVAL 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RETICLE ASSY OF,

CODE IDENT NO.
SIZE C
NASA NUMBER 1011716
SCALE 4/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

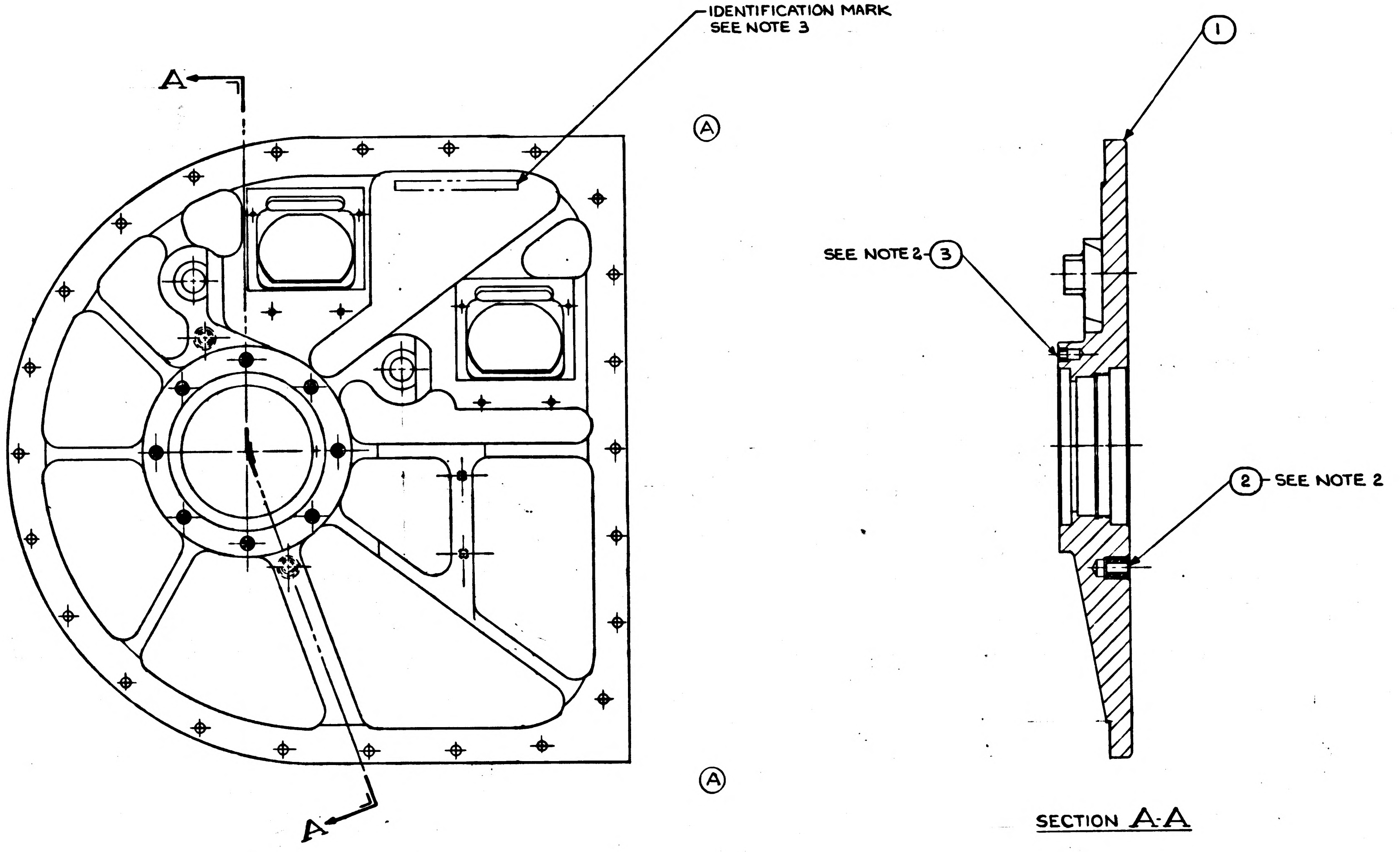
1011716

1011717 A

REVISIONS TDRR 01514				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	B6 E6	SQUARE CORNER WAS ROUND TDRR NO. 01904		

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. INSTALL ITEMS ② & ③ IN ACCORDANCE WITH ND1002121.
3. IDENTIFY USING NASA DWG NO. REVISION LETTER, AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND1002015.



SECTION A-A

1011717-A

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
3	8		1000115-2	—		INSERT, THREADED, SELF LOCKING			
2	2		NAS1394C-3	—		INSERT, THREADED, NON SELF LOCKING			
1	1		1011696	52386900840		PANEL, TELESCOPE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011784	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± —

DO NOT SCALE THIS DRAWING

MATERIAL

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK

KIC PN 85386900410

DRAWN J. Schiller DATE 4-23-63
CHECKED T. SULLIVAN 6-10-63
APPROVAL B. MacDonald 6-10-63
APPROVAL P. Brock 6-13-63
NASA APPROVAL
MIT APPROVAL 6/17/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
TELESCOPE PANEL & INSERT,
ASSY OF

CODE IDENT NO.	SIZE	NASA NUMBER
	D	1011717

SCALE 1/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

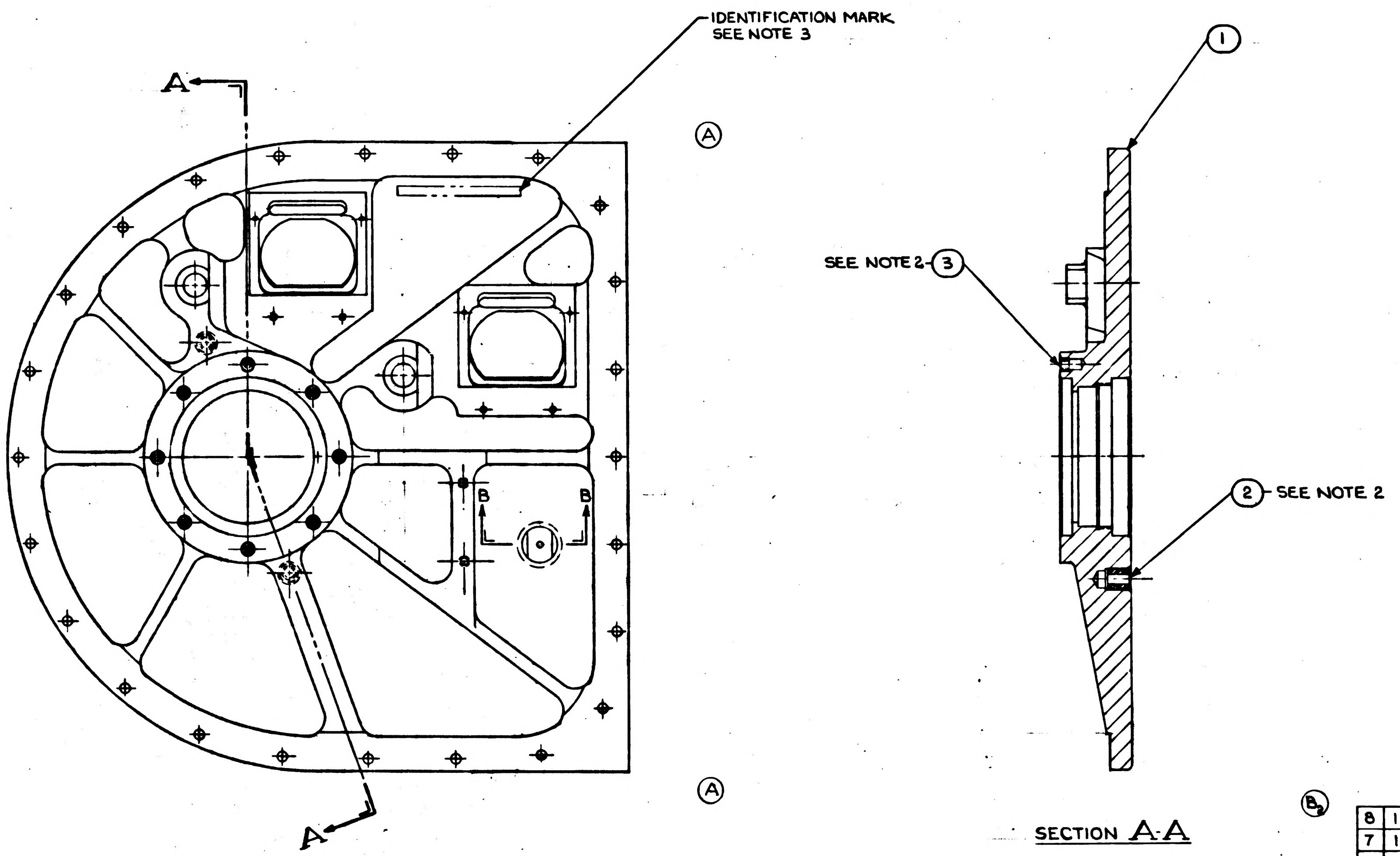
B | 1011717

NOTES:

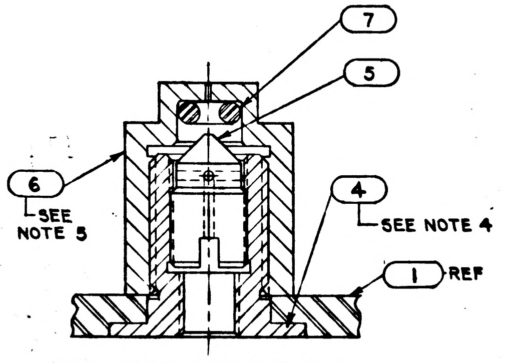
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. INSTALL ITEMS ② & ③ IN ACCORDANCE WITH ND1002121.
3. IDENTIFY USING NASA DWG NO. REVISION LETTER, AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND1002019.
4. CEMENT ITEM ④ TO ITEM ① USING ITEM ⑧ AND CURE AT 150° ± 3° F. FOR 2 HOURS
5. VIBRATION PROOF ITEM ⑥ TO ITEM ④ IN ACCORDANCE WITH MIL-S-22473 GRADE (H)

REVISIONS TDRR 01584

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	B6 E6	SQUARE CORNER WAS ROUND TDRR NO. 01904		
B4		REVISED PER TDRR NO. 06517	26 FEB 64	



SECTION A-A



PARTIAL SECTION B-B
SCALE 4/1

✱ PURCHASE ITEM: SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
8	1	✱	1011541	74471435001		ADHESIVE, EPOXY			
7	1	✱	1011768-4	74453043004		PACKING, PREFORMED			
6	1		1012034	57386901670		HOUSING, GAS INJECTION			
5	1		1012033	57386901660		VALVE, THREADED, GAS INJECTION			
4	1		1012032	57386901650		ADAPTER, THREADED, GAS INJECTION			
3	8		1000115-2	—		INSERT, THREADED, SELF LOCKING			
2	2		NAS1394C-3	—		INSERT, THREADED, NON SELF LOCKING			
1	1		1011696	52386900840		PANEL, TELESCOPE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011784	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± —

DO NOT SCALE THIS DRAWING

MATERIAL

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK

KIC PN 85386900410

DRAWN J. Dillon DATE 4-29-63
CHECKED T. SULLIVAN 6-10-63
APPROVAL B. MacDonald 6-10-63
APPROVAL Brock 6-13-63
NASA APPROVAL Jack Barnard
MIT APPROVAL 6/17/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
TELESCOPE PANEL & INSERT, ASSY OF

CODE IDENT NO. | SIZE D | NASA NUMBER 1011717

SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

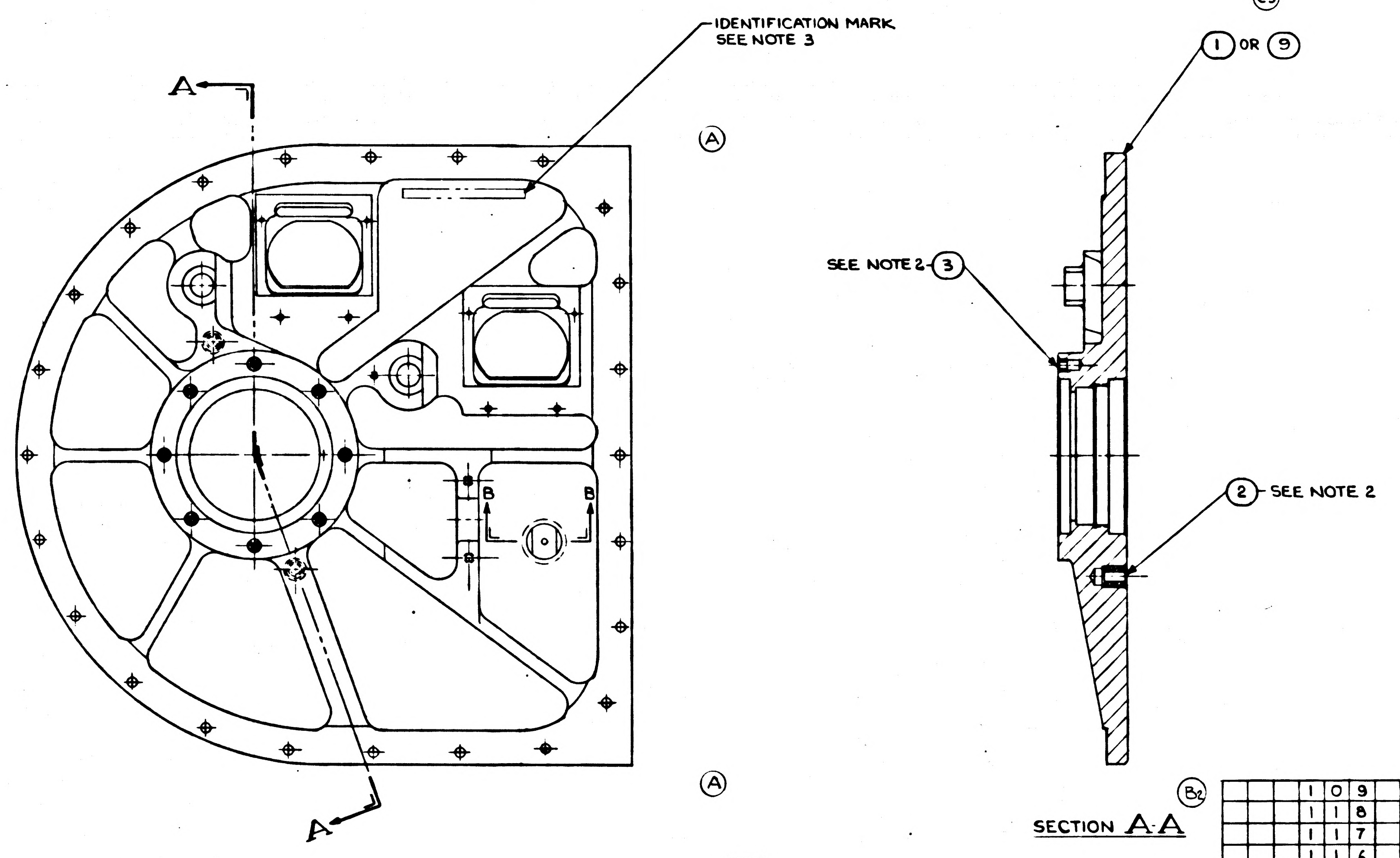
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

C 1011717

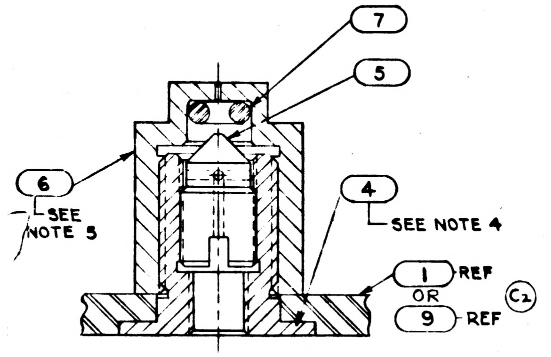
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	36 E6	SQUARE CORNER WAS ROUND TDRR NO. 01904		
B4		REVISED PER TDRR NO. 06517	26 FEB 64	
C4		REVISED PER TDRR NO. 12668	10-14-64	

REVISIONS TDRR 01584

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. INSTALL ITEMS ② & ③ IN ACCORDANCE WITH ND1002121.
3. IDENTIFY USING NASA DWG NO. REVISION LETTER, AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND1002019.
4. CEMENT ITEM ④ TO ITEM ① OR ⑨ USING ITEM ⑧ AND CURE AT 150° ± 3° F. FOR 2 HOURS
5. VIBRATION PROOF ITEM ⑥ TO ITEM ④ IN ACCORDANCE WITH MIL-S-22473 GRADE (H)



SECTION A-A



PARTIAL SECTION B-B
SCALE 4/1

Ⓑ3

* PURCHASE ITEM: SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

			001	000	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
			1	0	9			1012224			PANEL, TELESCOPE			
			1	1	8		*	1011541	74471435001		ADHESIVE, EPOXY			
			1	1	7		*	1011768-4	74453043004		PACKING, PREFORMED			
			1	1	6			1012034	57386901670		HOUSING, GAS INJECTION			
			1	1	5			1012033	57386901660		VALVE, THREADED, GAS INJECTION			
			1	1	4			1012032	57386901650		ADAPTER, THREADED, GAS INJECTION			
			8	8	3			1000115-2	—		INSERT, THREADED, SELF LOCKING			
			2	2	2			NAS1394C-3	—		INSERT, THREADED, NON SELF LOCKING			
			0	1	1			1011696	52386900840		PANEL, TELESCOPE			

QTY REQD — LIST OF PARTS AND MATERIALS

Ⓑ2
Ⓒ1

NEXT ASSY	USED ON
1011784	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCE ON: FRACTIONS ± — DECIMALS ± .005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900410
DRAWN J. Sullivan DATE 4-23-63
CHECKED T. SULLIVAN 6-10-63
APPROVAL B. MacDonald 6-10-63
APPROVAL 6-13-63
NASA APPROVAL Jack Barnard
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
TELESCOPE PANEL & INSERT,
ASSY OF

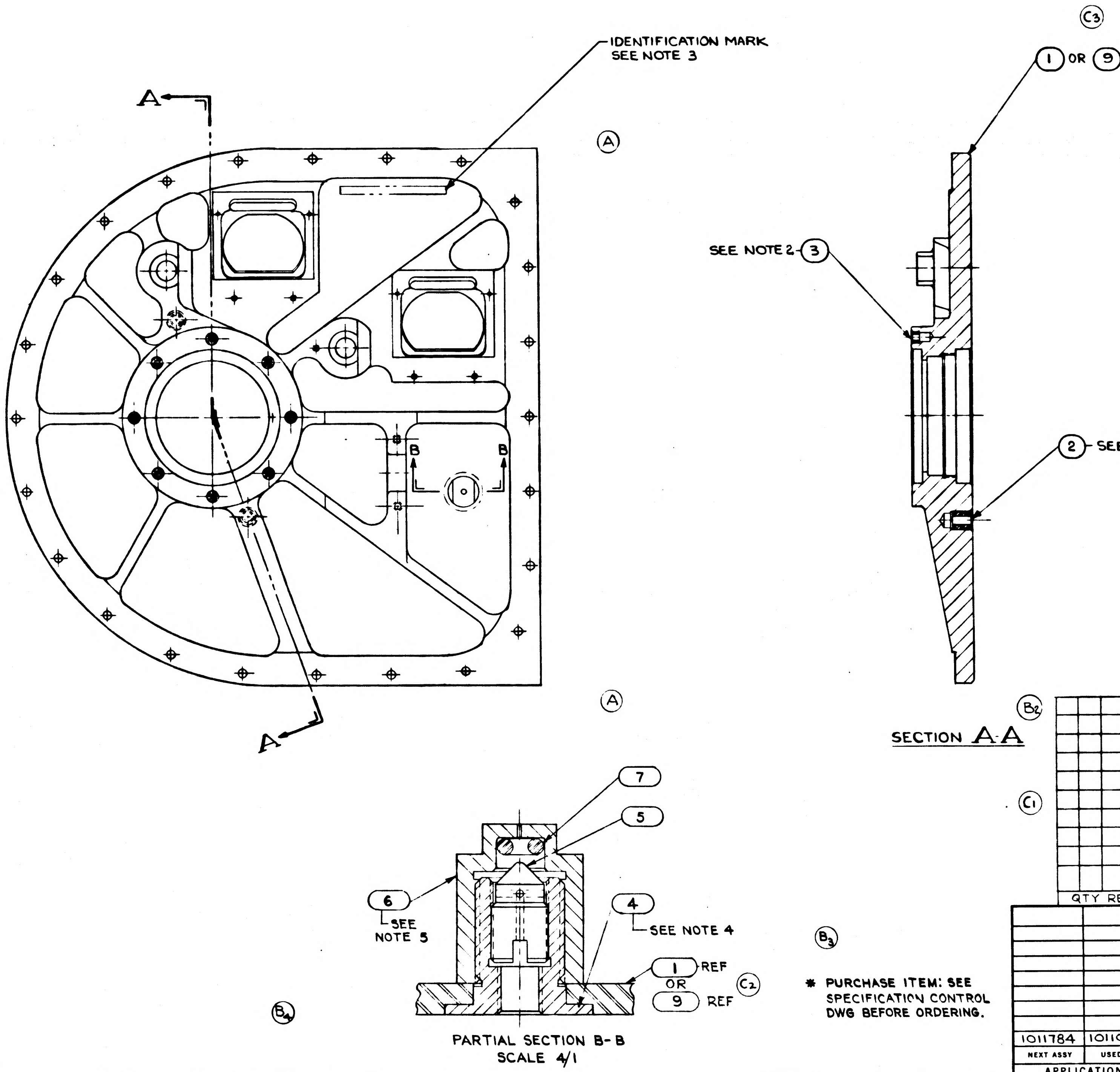
CODE IDENT NO.
SIZE D
NASA NUMBER 1011717
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011717-C

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. INSTALL ITEMS ② & ③ IN ACCORDANCE WITH ND1002121.
3. IDENTIFY USING NASA DWG NO. REVISION LETTER, AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND1002019.
4. VACUUM SEAL ITEM ④ TO ITEM ① USING ITEM ⑧ AND CURE AT 150° ± 3° F FOR 2 HOURS. (C4) (B1)
5. VACUUM SEAL AND VIBRATION PROOF ITEM ⑥ TO ITEM ④ IN ACCORDANCE WITH ND1002211 USING MIL-S-22473 GRADE "H". (D)

REVISIONS				TDRR 41584
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	3C E6	SQUARE CORNER WAS ROUND TDRR NO. 01904		
B4		REVISED PER TDRR NO. 06517	26 FEB 64	
C4		REVISED PER TDRR NO. 12668	10-14-64	
D		REVISED NOTES 4 & 5 PER TDRR No. 14431	11-25-64	



* PURCHASE ITEM: SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

QTY REQD													
			1	0	9			1012224			PANEL, TELESCOPE			
			1	1	8		*	1011541	74471435001		ADHESIVE, EPOXY			
			1	1	7		*	1011768-4	74453043004		PACKING, PREFORMED			
			1	1	6			1012034	57386901670		HOUSING, GAS INJECTION			
			1	1	5			1012033	57386901660		VALVE, THREADED, GAS INJECTION			
			1	1	4			1012032	57386901650		ADAPTER, THREADED, GAS INJECTION			
			8	8	3			1000115-2	—		INSERT, THREADED, SELF LOCKING			
			2	2	2			NAS1394C-3	—		INSERT, THREADED, NON SELF LOCKING			
			0	1	1			1011696	52386900840		PANEL, TELESCOPE			
			001	000	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011784	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± —

DO NOT SCALE THIS DRAWING

MATERIAL

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900410

DRAWN J. Schiller DATE 4-23-63
CHECKED T. SULLIVAN 6-10-63
APPROVAL E. MacDonald 6-11-63
APPROVAL P. Arnold 6-13-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

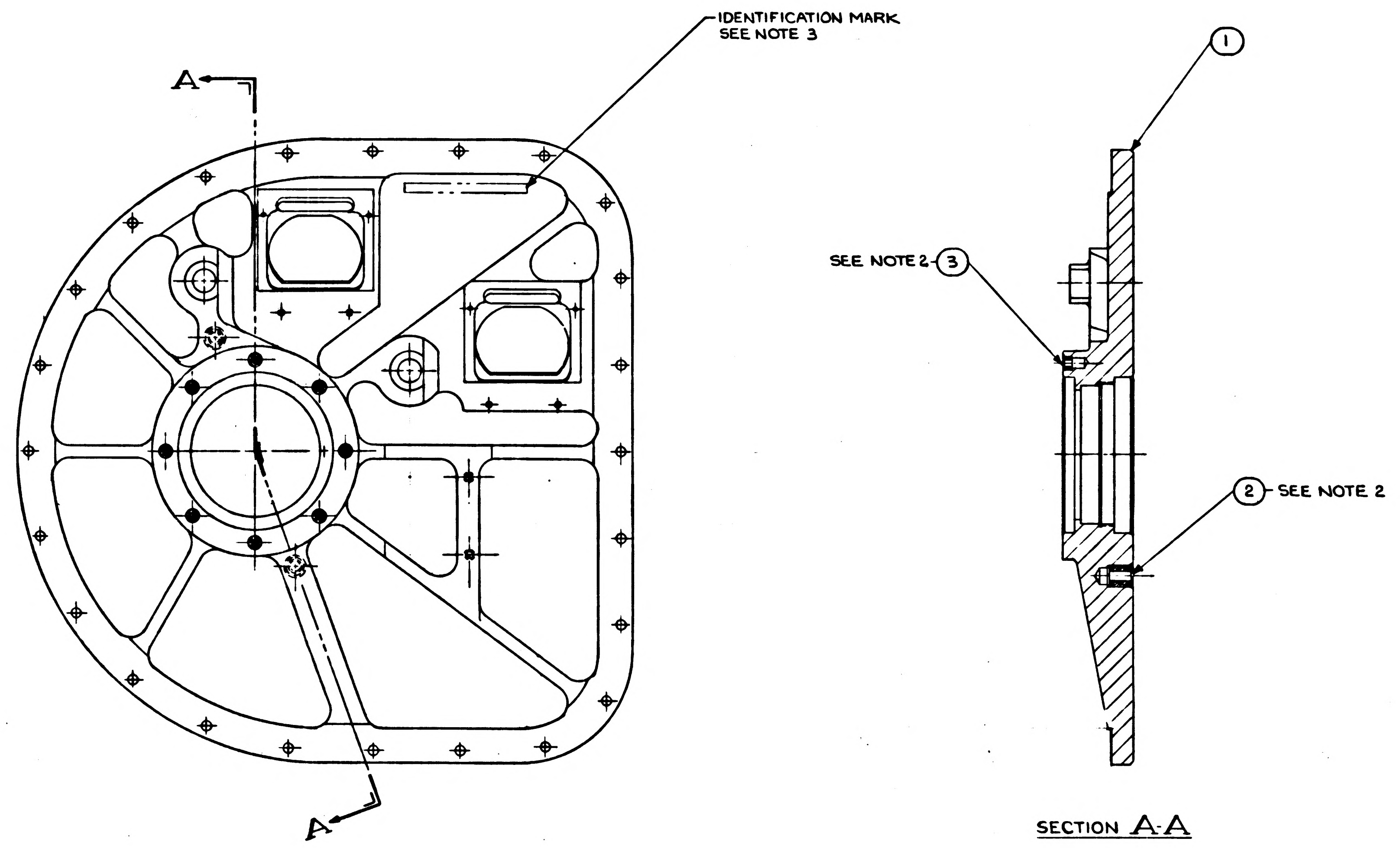
TITLE
TELESCOPE PANEL & INSERT,
ASSY OF

CODE IDENT NO. | SIZE D | NASA NUMBER 1011717
SCALE 1/1 | WEIGHT | CALC ACTUAL | SHEET 1 OF 1

1011717

REVISIONS TDRR 9 5:4				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. INSTALL ITEMS ② & ③ IN ACCORDANCE WITH ND1002121.
3. IDENTIFY USING NASA DWG NO. REVISION LETTER, AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND1002019.



SECTION A-A

3	8		1000115-2	—		INSERT, THREADED, SELF LOCKING			
2	2		NAS1394C-3	—		INSERT, THREADED, NON SELF LOCKING			
1	1		1011696	52386900840		PANEL, TELESCOPE			
ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011784	1011000
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± —

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900410
DRAWN J. Schiller DATE 4-23-63
CHECKED T. SULLIVAN 6-10-63
APPROVAL B. MacDonald 6-10-63
APPROVAL P. Brood, TL 6-13-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
TELESCOPE PANEL & INSERT,
ASSY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011717
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

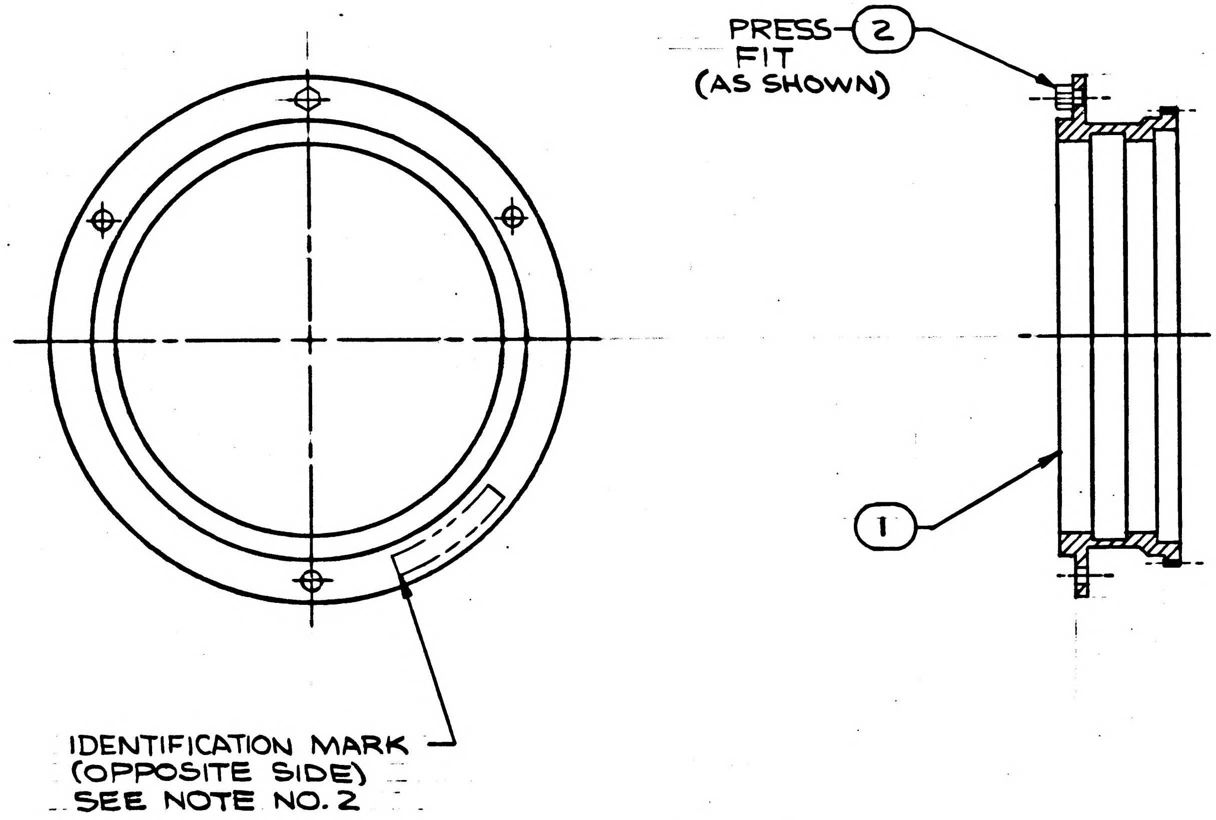
1011717

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011718

REVISIONS TDRR D2624				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019.



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	1		1011698	57386901300		PIN, DIAMOND			
1	1		1011655	33386900570		GEAR, SHAFT DRIVE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011723	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS + — – ; DECIMALS + — – ; ANGLES + — –
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900420
DRAWN R.BRUNELLE DATE 4-23-63
CHECKED 8-12-63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SHAFT DRIVE GEAR & PIN,
ASSEMBLY OF

CODE IDENT NO. | SIZE C | NASA NUMBER 1011718
SCALE 1/1 | WEIGHT | CALC ACTUAL | SHEET 1 OF 1

MASTER

E-154

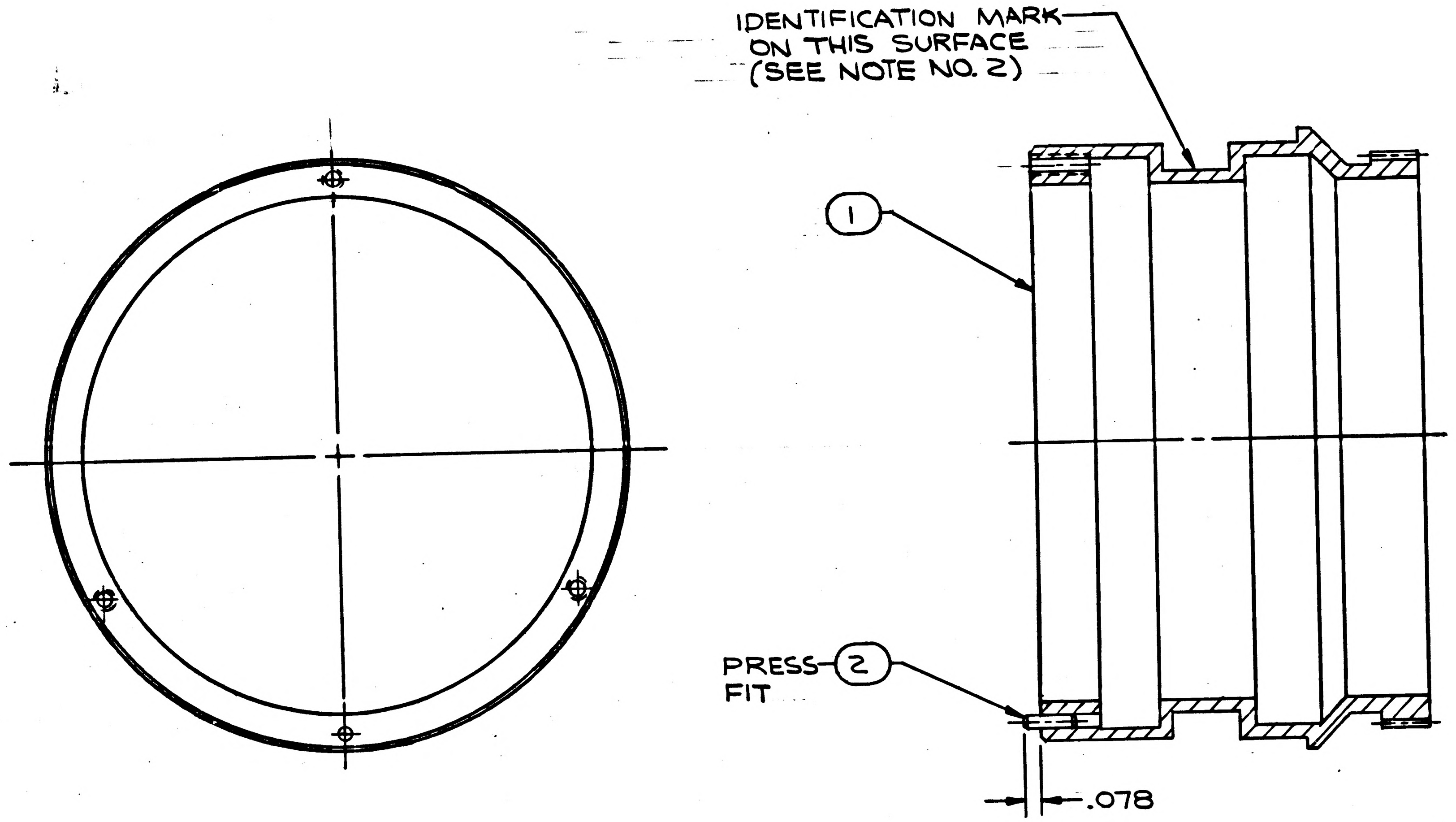
SCT

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

61L1101

REVISIONS TDRR D2624				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTE:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019.



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	1		MS9390-01			PIN, STRAIGHT HEADLESS			
1	1		1011654	33386900560		GEAR, TRUNNION DRIVE (252T-96P)			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011723	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900430
DRAWN R. BRUNELLE DATE 4-22-63
CHECKED Vincent Amato 8-15-63
APPROVAL F. Rosenbaum 8-15-63
APPROVAL J. J. Swaw 8-15-63
NASA APPROVAL W J Rhine 8-16-63
MIT APPROVAL W. Cuffe 16 Aug 62

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
TRUNNION DRIVE GEAR & PIN, ASSEMBLY OF

CODE IDENT NO.
SIZE C
NASA NUMBER 1011719
SCALE 2/1
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

MASTER

1011719

K+E E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

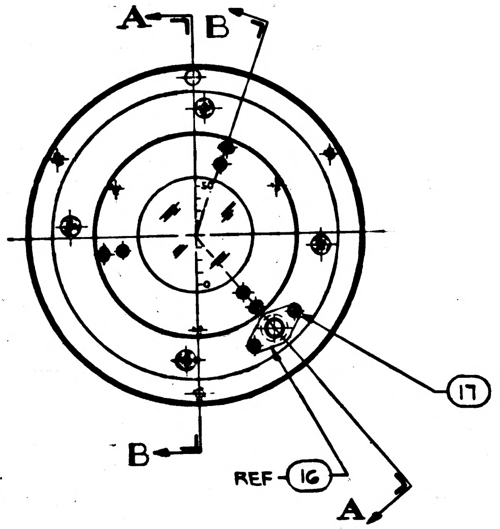
SCT

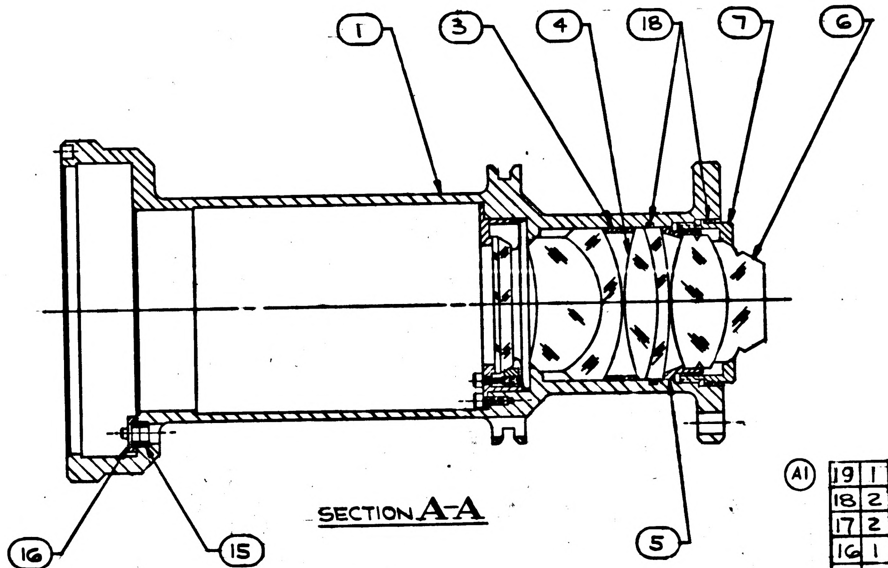
1011722

SYM	ZONE	DESCRIPTION	DATE	APPRO
A 1		REVISED PER TDRR NO. 04374	10/31/63	WK

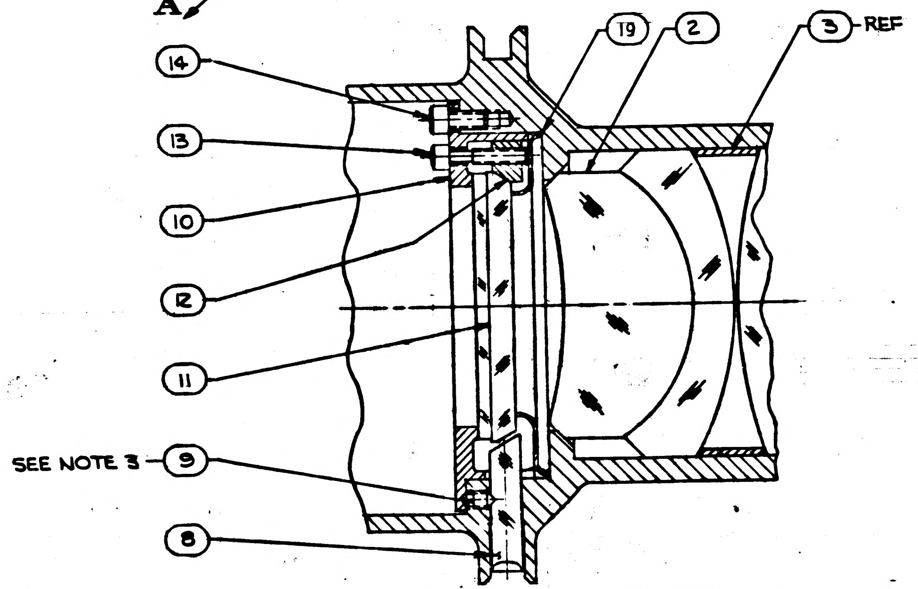
REVISIONS TDRR 0262

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. ASSEMBLE PER ATP 1011722
3. VIBRATION PROOF PER MIL-E-5400 (PAR 3.1.17e)
4. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019





SECTION A-A



PARTIAL SECTION B-B
SCALE 2/1

MASTER

✱ PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

(A1)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
19	1		1011947	56386900610		WASHER, SPRING			
18	2		1000159-12	—		PACKING, PREFORMED "O" RING			
17	2	NAS	1352C03LL4	74455157009		SCREW, CAP, SOC. HD. - SELF-LOCKING			
16	1		1011682	52386900830		PLATE, BEARING RETAINER			
15	1	✱	1011609	30105770120		BEARING, BALL, ANNULAR (DUPLEX DF)			
14	[illegible]	NAS	1352C04LL4	74455157013		SCREW, CAP, SOC. HD - SELF-LOCKING			
13	3		1011688	48386900020		SCREW, CAP, SOC HD, CAPTIVE			
12	3		1011691	57386901250		RETAINER, RETICLE			
11	1		1011760	76386900290		RETICLE, ASSY			
10	1		1011692	57386901240		MOUNT RETICLE			
9	3	AN	565RC4H2	—		SETSCREW-HEXAGON, SOCKET, HEADLESS			
8	3		1011693	25386900020		ROD, LIGHT TRANSMITTING			
7	1		1011659	57386901120		RING, LOCKING, LENS			
6	1		1011709	76386900190		LENS, ASSY OF (TELESCOPE OBJECTIVE)			
5	1		1011661	57386901140		SPACER, LENS			
4	1		1011708	76386900180		LENS, ASSY OF (TELESCOPE OBJECTIVE)			
3	1		1011660	57386901130		SPACER, LENS			
2	1		1011707	76386900170		LENS, ASSY OF (TELESCOPE OBJECTIVE)			
1	1		1011729	85386900470		OUTER TELESCOPE TUBE, PIN & INSERT, ASSY OF			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900460

DRAWN R. BRUNELLE DATE 4-30-63
CHECKED 8-12-63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OUTER TELESCOPE TUBE ASSY

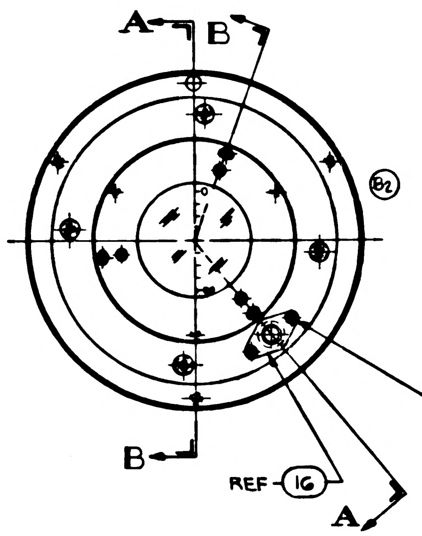
CODE IDENT NO.
SIZE D
NASA NUMBER 1011722
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET OF

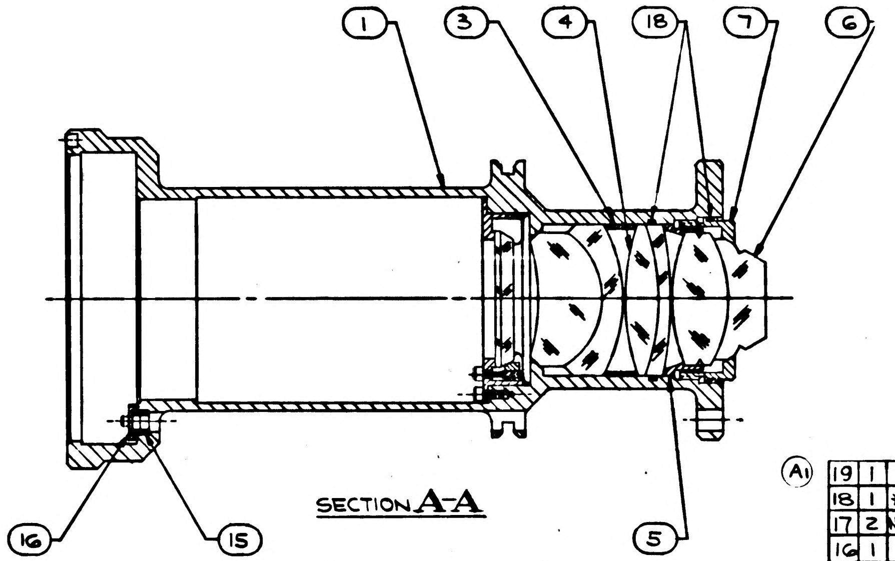
1011722 B

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLE PER ATP 1011722.
3. VIBRATION PROOF PER MIL-E-5400 (PARA 3.1.17e)
4. IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019.
5. ASSEMBLE ITEM 11 WITH ZERO AT TOP AS SHOWN. (B1)

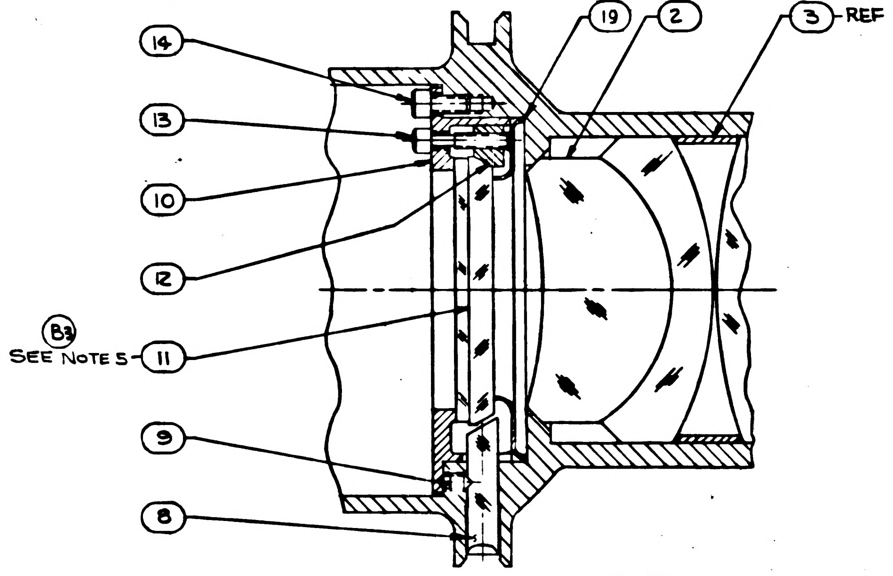
REVISIONS TDRR 02624

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A1		REVISED PER TDRR NO. 04374	10/31/63	WK
B3		REVISED PER TDRR NO. 07365	3/31/64	Jup





SECTION A-A



PARTIAL SECTION B-B
SCALE 2/1

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

MASTER

(A1)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
19	1		1011947	56386900610		WASHER, SPRING			
18	1	*	1000159-12	—+—		PACKING, PREFORMED "O" RING			
17	2	NAS	1352C03LL4	74455157009		SCREW, CAP, SOC. HD. - SELF-LOCKING			
16	1		1011682	52386900830		PLATE, BEARING RETAINER			
15	1	*	1011609	30105770120		BEARING, BALL, ANNULAR (DUPLEX DF)			
14	3	NAS	1352C04LL4	74455157013		SCREW, CAP, SOC. HD - SELF-LOCKING			
13	3		1011688	48386900020		SCREW, CAP, SOC. HD, CAPTIVE			
12	3		1011691	57386901250		RETAINER, RETICLE			
11	1		1011760	76386900290		RETICLE, ASSY			
10	1		1011692	57386901240		MOUNT RETICLE			
9	3	AN	565BC4H2	—+—		SETSCREW-HEXAGON, SOCKET, HEADLESS			
8	3		1011693	25386900020		ROD, LIGHT TRANSMITTING			
7	1		1011659	57386901120		RING, LOCKING, LENS			
6	1		1011709	76386900190		LENS, ASSY OF (TELESCOPE OBJECTIVE)			
5	1		1011661	57386901140		SPACER, LENS			
4	1		1011708	76386900180		LENS, ASSY OF (TELESCOPE OBJECTIVE)			
3	1		1011660	57386901130		SPACER, LENS			
2	1		1011707	76386900170		LENS, ASSY OF (TELESCOPE OBJECTIVE)			
1	1		1011729	85386900470		OUTER TELESCOPE TUBE, PIN & INSERT, ASSY OF			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900460

DRAWN R. BRUNELLE DATE 4-30-62
CHECKED 8-12-63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OUTER TELESCOPE TUBE ASSY

CODE IDENT NO.
SIZE D
NASA NUMBER 1011722
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011722 B

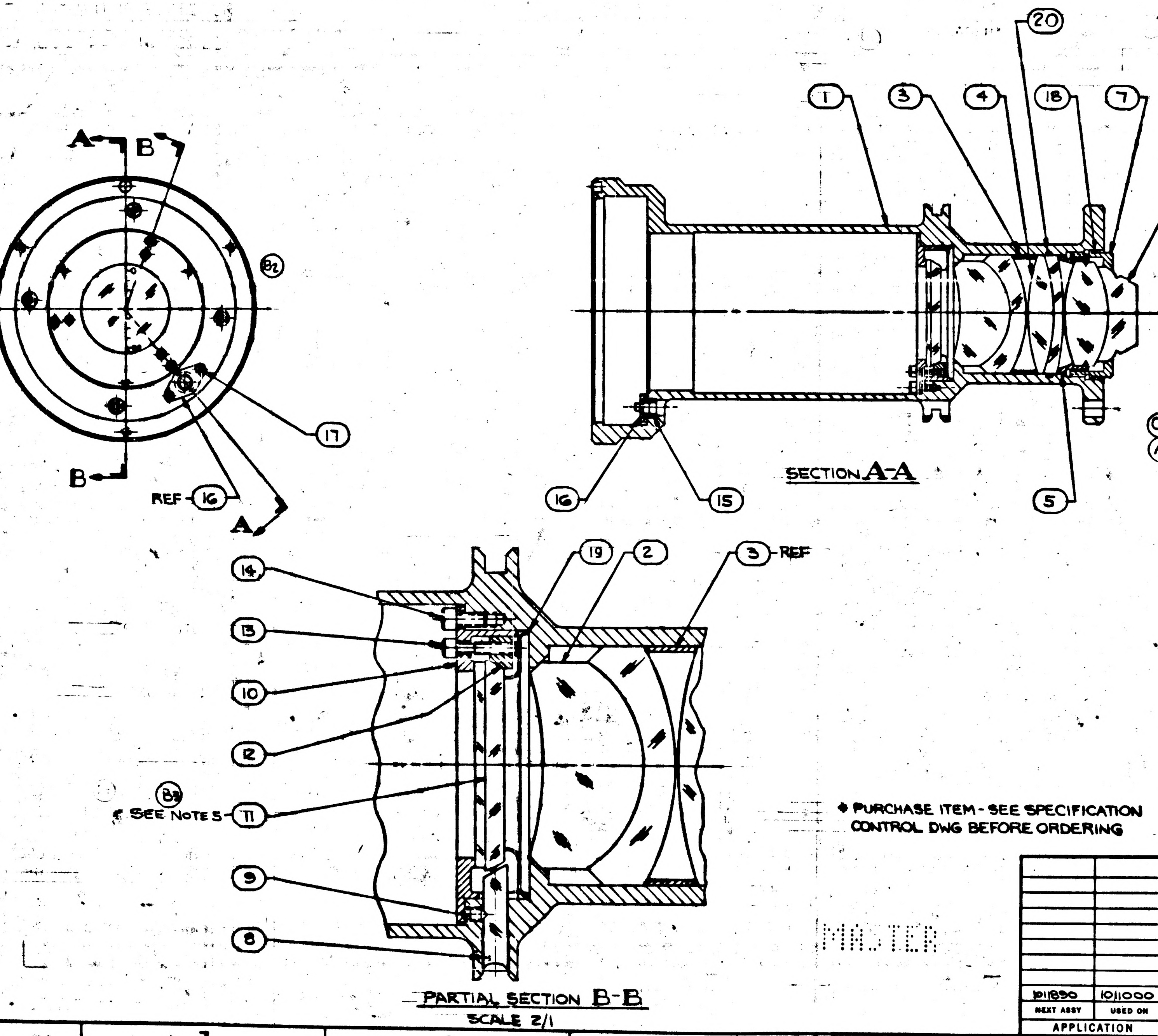
1011722 C

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLE PER ATP 1011722.
3. VIBRATION PROOF PER MIL-E-5400 (PARA 3.1.17c)
4. IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019.
5. ASSEMBLE ITEM 11 WITH ZERO AT TOP AS SHOWN. (B1)

REVISIONS TDRR 02624

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A_1		REVISED PER TDRR NO. 04374	10/30/63	WK
B_3		REVISED PER TDRR NO. 07365	3/10/64	
C_2		REVISED PER TDRR NO. 08038	4/28/64	



* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
20	1	*	1011768-32	74453043032		PACKING, PREFORMED			
19	1		1011947	56386900610		WASHER, SPRING			
18	1	*	1000159-12	—		PACKING, PREFORMED "O" RING			
17	2	NAS	1352C03LL4	74455157009		SCREW, CAP, SOC. HD. - SELF-LOCKING			
16	1		1011682	52386900850		PLATE, BEARING RETAINER			
15	1	*	1011609	30105770120		BEARING, BALL, ANNULAR (DUPLEX DF)			
14	3	NAS	1352C04LL4	74455157013		SCREW, CAP, SOC. HD - SELF LOCKING			
13	3		1011688	48386900020		SCREW, CAP, SOC. HD, CAPTIVE			
12	3		1011691	57386901250		RETAINER, RETICLE			
11	1		1011760	76386900290		RETICLE, ASSY			
10	1		1011692	57386901240		MOUNT RETICLE			
9	3	AN	565BC4H2	—		SETSCREW-HEXAGON, SOCKET, HEADLESS			
8	3		1011693	25386900020		ROD, LIGHT TRANSMITTING			
7	1		1011659	57386901120		RING, LOCKING, LENS			
6	1		1011709	76386900190		LENS, ASSY OF (TELESCOPE OBJECTIVE)			
5	1		1011661	57386901140		SPACER, LENS			
4	1		1011708	76386900180		LENS, ASSY OF (TELESCOPE OBJECTIVE)			
3	1		1011660	57386901130		SPACER, LENS			
2	1		1011707	76386900170		LENS, ASSY OF (TELESCOPE OBJECTIVE)			
1	1		1011729	85386900470		OUTER TELESCOPE TUBE, PIN & INSERT, ASSY OF			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION ELMHURST NEW YORK
KIC PN 85386900460
DRAWN E. BRUNELLE DATE 4-30-63
CHECKED 8-10-63
APPROVAL 8-15-63
APPROVAL 8-15 63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OUTER TELESCOPE TUBE ASSY

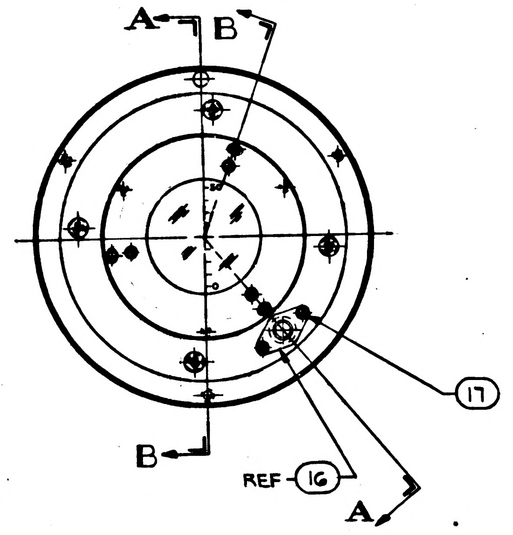
CODE IDENT NO.
SIZE D
NASA NUMBER 1011722
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET OF 1

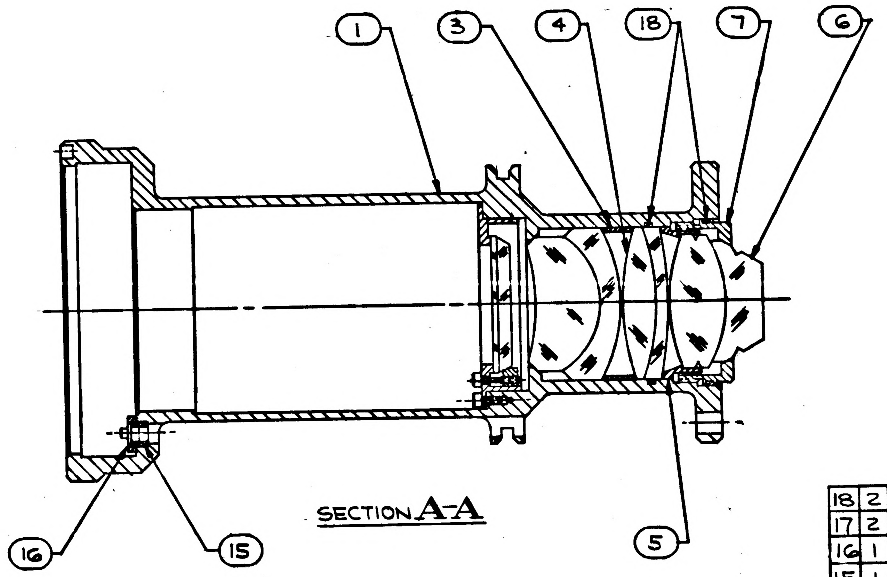
1011722

REVISIONS TDRR 02624

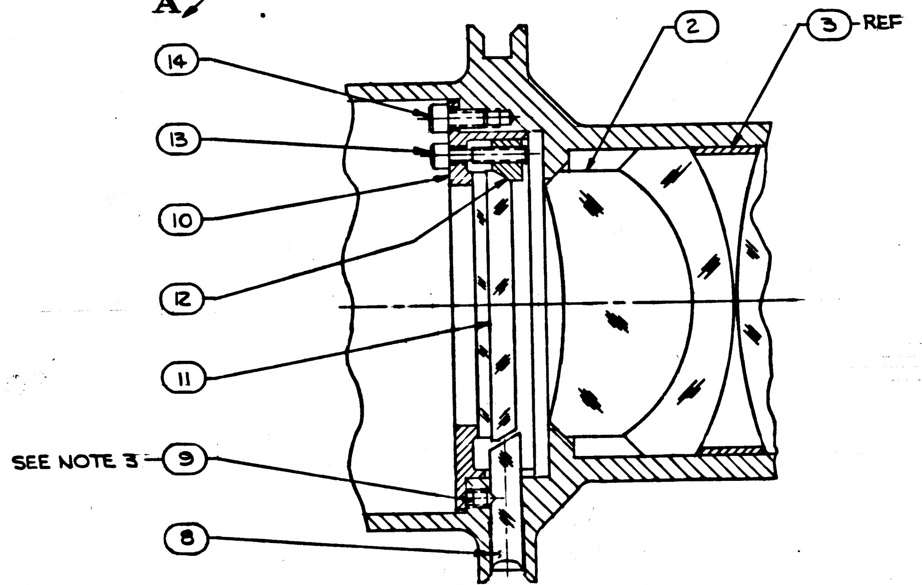
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. ASSEMBLE PER ATP 1011722
3. VIBRATION PROOF PER MIL-E-5400 (PAR 3.1.17e)
4. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019





SECTION A-A



PARTIAL SECTION B-B
SCALE 2/1

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
18	2		1000159-12	—		PACKING, PREFORMED "O" RING			
17	2	NAS	1352C03LL4	74455157009		SCREW, CAP, SOC. HD. - SELF-LOCKING			
16	1		1011682	52386900830		PLATE, BEARING RETAINER			
15	1	*	1011609	30105770120		BEARING, BALL, ANNULAR (DUPLEX DF)			
14	3	NAS	1352C04LL4	74455157013		SCREW, CAP, SOC. HD - SELF-LOCKING			
13	3		1011688	48386900020		SCREW, CAP, SOC. HD, CAPTIVE			
12	3		1011691	57386901250		RETAINER, RETICLE			
11	1		1011760	76386900290		RETICLE, ASSY			
10	1		1011692	57386901240		MOUNT RETICLE			
9	3	AN	565BC4H2	—		SETSCREW-HEXAGON, SOCKET, HEADLESS			
8	3		1011693	25386900020		ROD, LIGHT TRANSMITTING			
7	1		1011659	57386901120		RING, LOCKING, LENS			
6	1		1011709	76386900190		LENS, ASSY OF (TELESCOPE OBJECTIVE)			
5	1		1011661	57386901140		SPACER, LENS			
4	1		1011708	76386900180		LENS, ASSY OF (TELESCOPE OBJECTIVE)			
3	1		1011660	57386901130		SPACER, LENS			
2	1		1011707	76386900170		LENS, ASSY OF (TELESCOPE OBJECTIVE)			
1	1		1011729	85386900470		OUTER TELESCOPE TUBE, PIN & INSERT, ASSY OF			

LIST OF PARTS AND MATERIALS

1011890	1011000
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ; DECIMALS ± ; ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900460

DRAWN R. BRUNELLE DATE 4-30-63
CHECKED 8-12-63
APPROVAL 8-15-63
APPROVAL 8-15 63
NASA APPROVAL W J Rhine 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OUTER TELESCOPE TUBE ASSY

CODE IDENT NO. | SIZE D | NASA NUMBER 1011722
SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

MASTER

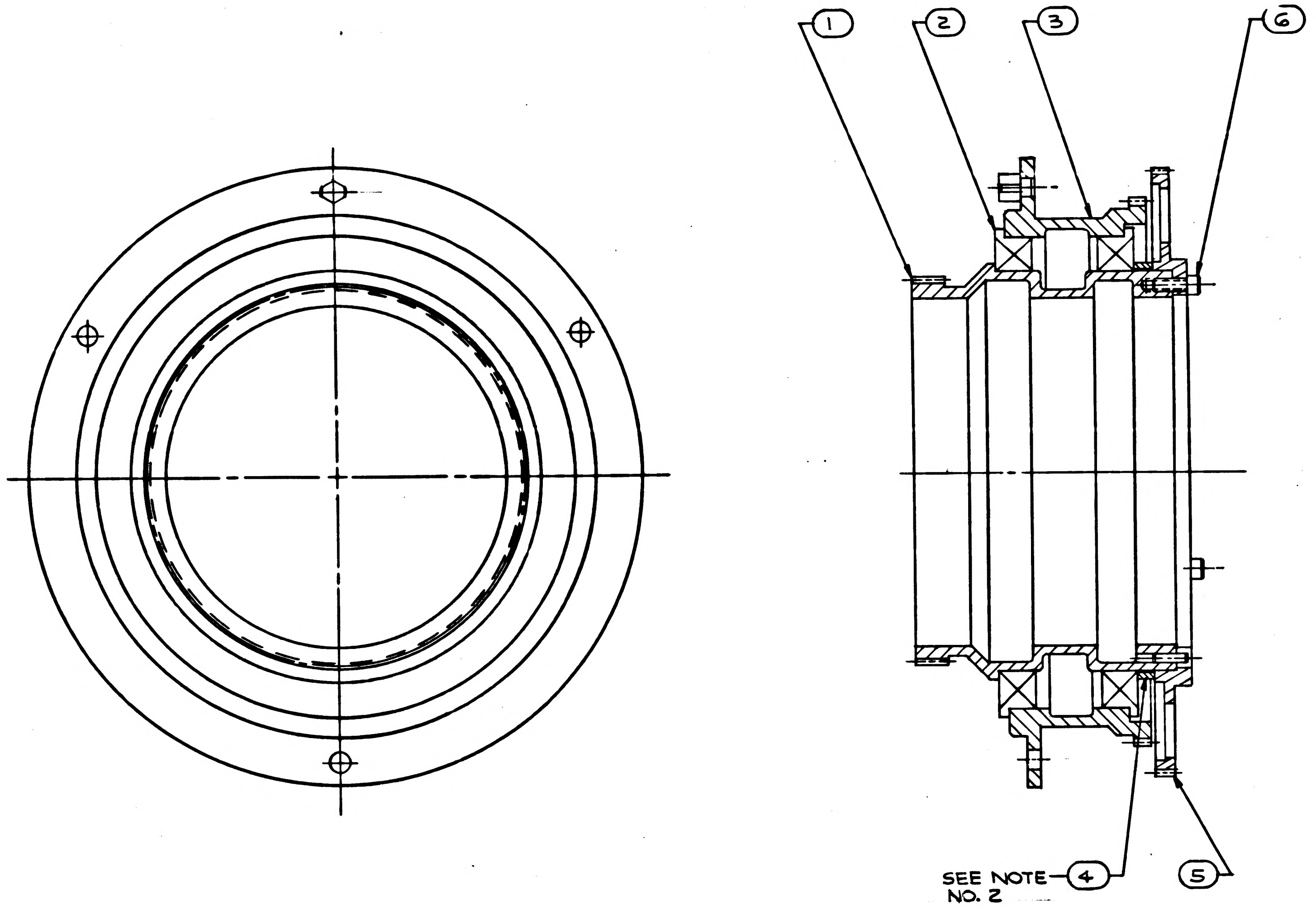
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011723

REVISIONS TDRR 02627

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. SELECT SPACER (ITEM NO. 4) FOR ZERO ENDPLAY.
3. IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
6	3	NAS	1352C02LL4	74455157006		SCREW, CAP, SOC. HD, SELF-LOCKING			
5	1		1011656	33386900580		GEAR, TRUNNION DRIVE (400T-96P)			
4	1		1011683-1 THRU 9	7938690 0201 THRU 0209		SPACER			
3	1		1011718	85386900420		SHAFT DRIVE GEAR & PIN, ASSY OF			
2	2	*	1011607-1	30205771760		BEARING, BALL, ANNULAR (FLANGED)			
1	1		1011719	85386900430		TRUNNION DRIVE GEAR & PIN, ASSY OF			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900480
DRAWN R. BRUNELLE DATE 5-2-63
CHECKED 8-12-63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
DRIVE GEAR CLUSTER,
ASSEMBLY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011723
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET OF 1

INCHES
0 2
PHOTOGRAPHIC SCALE ONLY

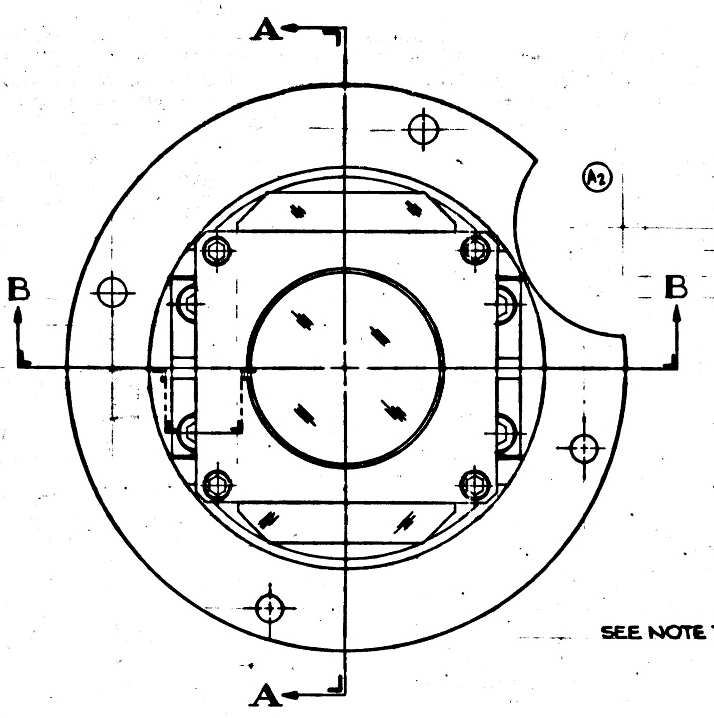
1011723

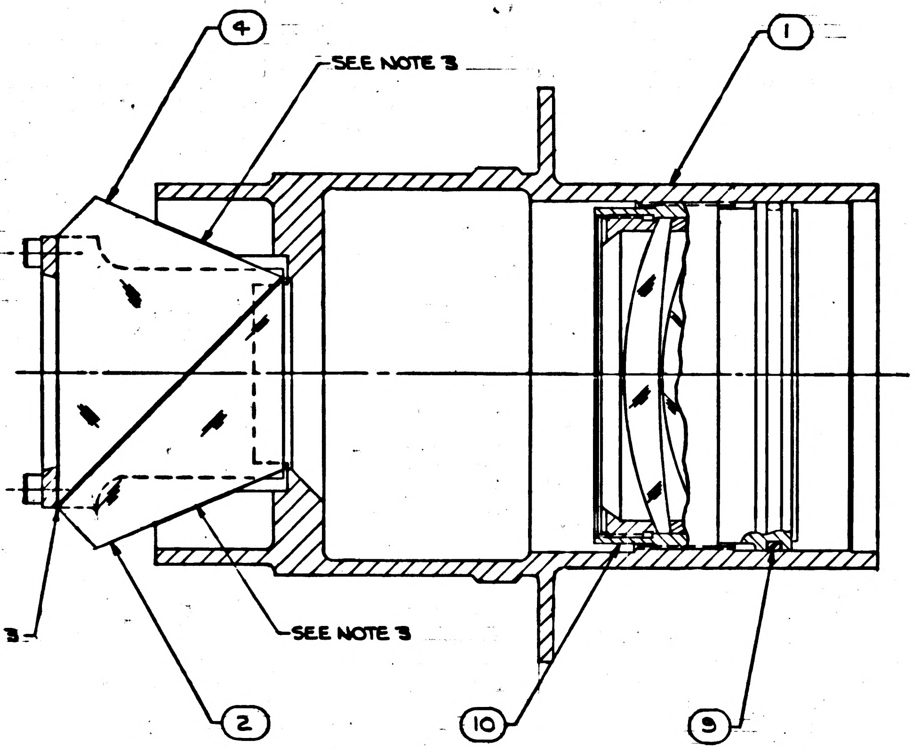
A	1011724

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A2		REVISED PER TDRR NO. 08453	8/12/64	

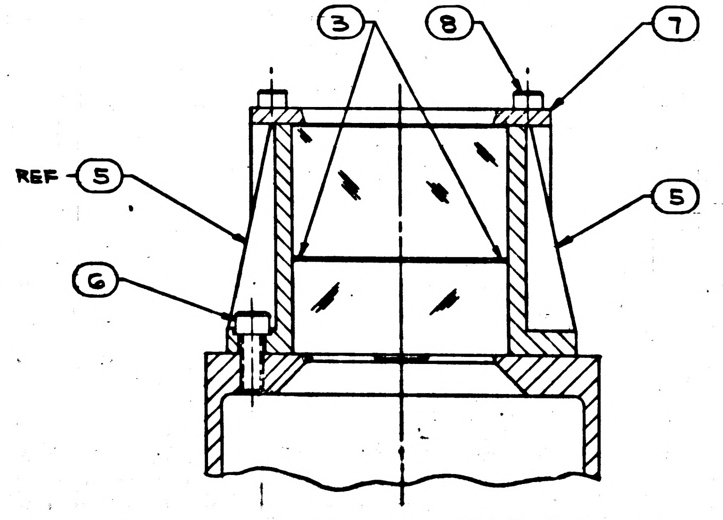
REVISIONS TDRR 02624

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. ASSEMBLE PER ATP 1011724
3. REQUIREMENTS FOR INDIUM FOIL USAGE ON SURFACES NOTED, PRESCRIBED IN ATP 1011724. INDIUM FOIL PROCUREMENT IN ACCORDANCE WITH ND 1002128.
4. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019





SECTION A-A



PARTIAL SECTION B-B

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
10	1		1011792	85386900590		HOUSING & LENS, ASSY OF			
(A1) 9	1	*	1011768-30	74453043030		PACKING, PREFORMED			
8	4	NAS	1352C04LL4	74455157013		SCREW, CAP, SOC HD-SELF-LOCKING			
7	1		1011674	52386900790		PLATE, PECHAN PRISM			
6	4	NAS	1352C06LL6	74455157019		SCREW, CAP, SOC. HD-SELF-LOCKING			
5	2		1011675	52386900800		BRACKET, PECHAN PRISM RETAINER			
4	1		1011170	28386900310		PRISM, TELESCOPE BODY			
3	2		1011837-1/2	58386900110 0120		SPRING, PRISM SPACER			
2	1		1011169	28386900300		PRISM, TELESCOPE BODY			
1	1		1011653	57386901110		TUBE, TELESCOPE, INNER			

LIST OF PARTS AND MATERIALS

1011890	1011000
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900580
DRAWN R. BRUNELLE DATE 6-5-63
CHECKED 8-13-63
APPROVAL 8-14-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
INNER TELESCOPE TUBE, ASSEMBLY OF

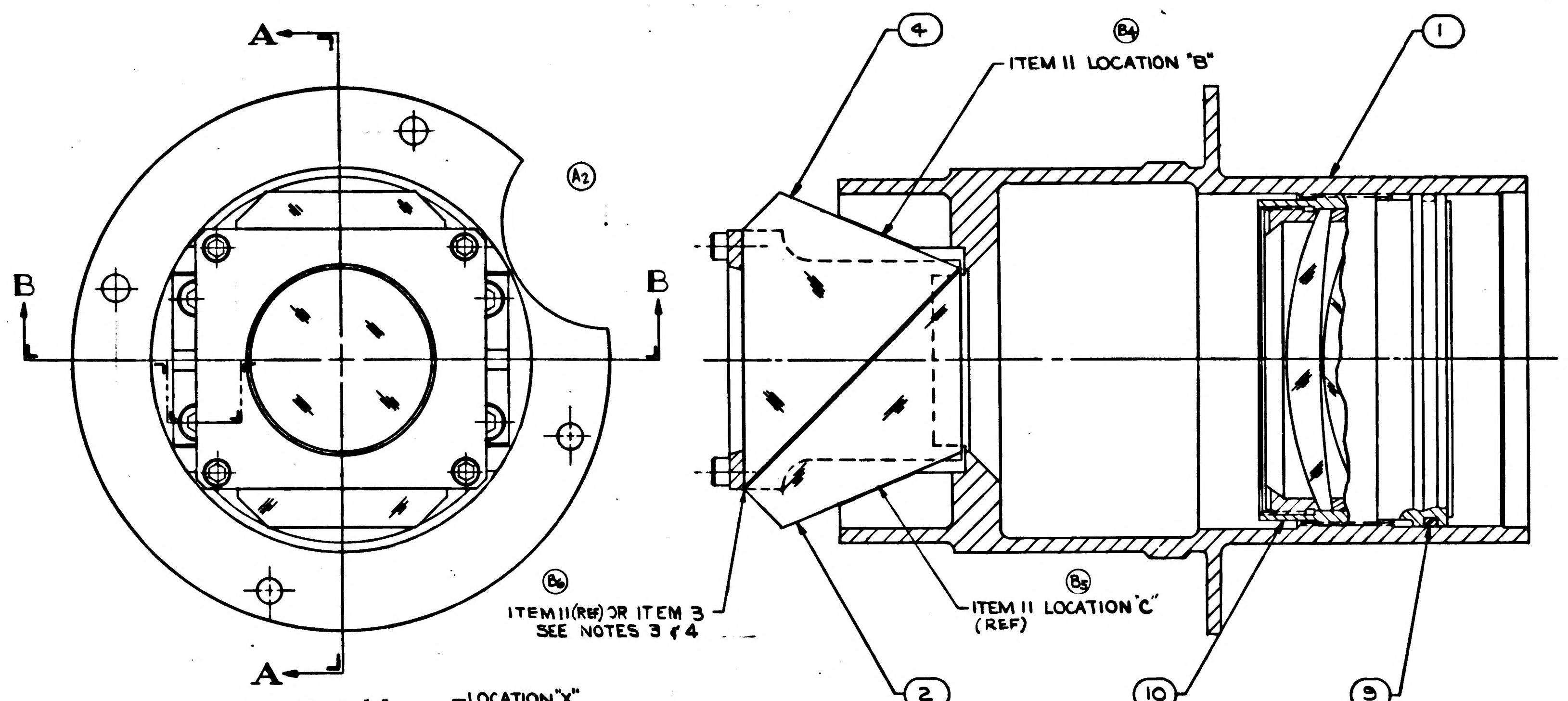
CODE IDENT NO. | SIZE D | NASA NUMBER 1011724
SCALE 2/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

1011724 A

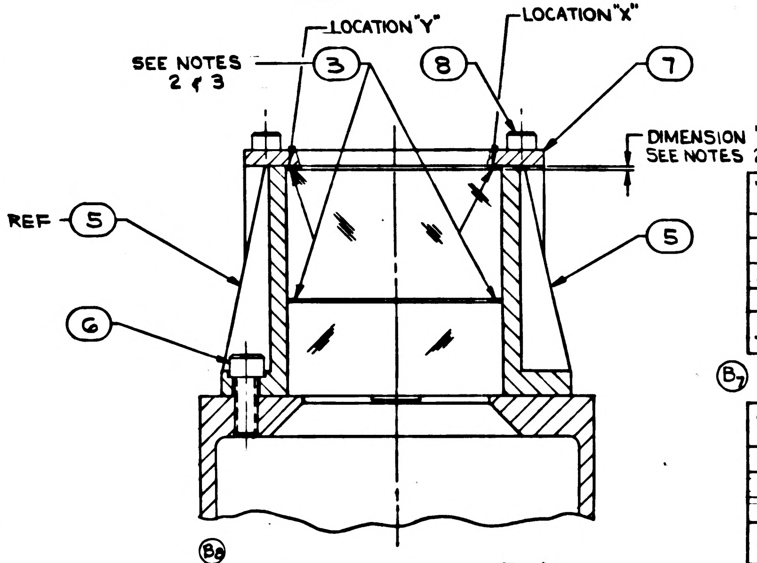
1011724 B

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS TDRR 02624				
A_2		REVISED PER TDRR NO. 08453	5/12/64	
B_8		REVISED PER TDRR NO. 08471	5/14/64	

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. SELECT ITEM 3 IN ACCORDANCE WITH TABLE, FROM DIMENSION "A" WHICH SHALL BE DETERMINED FROM AVERAGE OF MEASUREMENTS AT LOCATIONS "X" AND "Y". DIMENSION "A" IS TAKEN WITH ITEM 7 OMITTED AND WITH ONE THICKNESS OF LENS TISSUE (.002 THK) BETWEEN ITEMS 2 AND 4. INDIUM FOIL, ITEM 11, IS OMITTED AT THE POINT OF MEASUREMENT BUT INCLUDED AT LOCATIONS B & C.
3. FOR DIMENSION "A" EXCEEDING .026, ITEM 3 MUST BE USED AS SHOWN IN PARTIAL SECTION B-B AT LOCATIONS "X" AND "Y" AND INCLINED PLANE. WHEN USED AT LOCATIONS "X" AND "Y" ITEM 3 SHALL BE EXTENDED PAST ITEM 7 EQUALLY ON EACH SIDE. NO INDIUM FOIL, ITEM 11, IS TO BE USED AT LOCATIONS "X" AND "Y" WHEN ITEM 3 IS USED AT THESE POINTS. (B_1)
4. BEFORE ADDITION OF ITEM 10, CHECK ASSEMBLY FOR RESOLUTION AND STRAIN.
   - A) STRAIN PATTERN UNDER POLARISCOPE EXAMINATION SHALL SHOW NO MORE THAN FAINT GRADUATION OF COLOR.
   - B) RESOLUTION SHALL BE NO MORE THAN 10 ARC SECONDS AT THE SAME FOCUS FOR PATTERNS PARALLEL TO BOTH THE "A" AND "B" SECTION DESIGNATIONS ON THIS DRAWING.
5. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURER'S SYMBOL PER ND1002019.



SECTION A-A



PARTIAL SECTION B-B

"A" DIMENSION		1011837 SPRING IN INCLINED PLANE	
MIN	MAX	NO. REQD	DASH NO.
.003	.008	1	-1
.009	.018	2	-1
.019	.022	1	-2
.023	.026	1 1	-1 -2

(B_7)

"A" DIMENSION		1011837 SPRING IN INCLINED PLANE		1011837 SPRING AT "X" AND "Y"	
MIN	MAX	NO. REQD	DASH NO.	NO. REQD	DASH NO.
.027	.040	2	-1	1	-2
.041	.044	1	-2	1	-2
.045	.052	1 1	-1 -2	1 1	-1 -2

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
(B_3)	11	AR	*	1011777	60035158001		INDIUM FOIL			
	10	1		1011792	85386900590		HOUSING & LENS, ASSY OF			
(A_1)	9	1	*	1011768-30	74453043030		PACKING, PREFORMED			
	8	4	NAS	1352C04LL4	74455157013		SCREW, CAP, SOC HD-SELF-LOCKING			
	7	1		1011674	52386900790		PLATE, PECHAN PRISM			
	6	4	NAS	1352C06LL6	74455157019		SCREW, CAP, SOC. HD-SELF-LOCKING			
	5	2		1011675	52386900800		BRACKET, PECHAN PRISM RETAINER			
	4	1		1011170	28386900310		PRISM, TELESCOPE BODY			
(B_2)	3	AR		1011837-$\frac{1}{2}$	5838690$^{0110}_{0120}$		SPRING, PRISM SPACER			
	2	1		1011169	28386900300		PRISM, TELESCOPE BODY			
	1	1		1011653	57386901110		TUBE, TELESCOPE, INNER			

LIST OF PARTS AND MATERIALS

1011890	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ -	+ -	+ -

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900580
DRAWN R. BRUNELLE DATE 6-5-63
CHECKED 8-13-63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
INNER TELESCOPE TUBE,
ASSEMBLY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011724
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

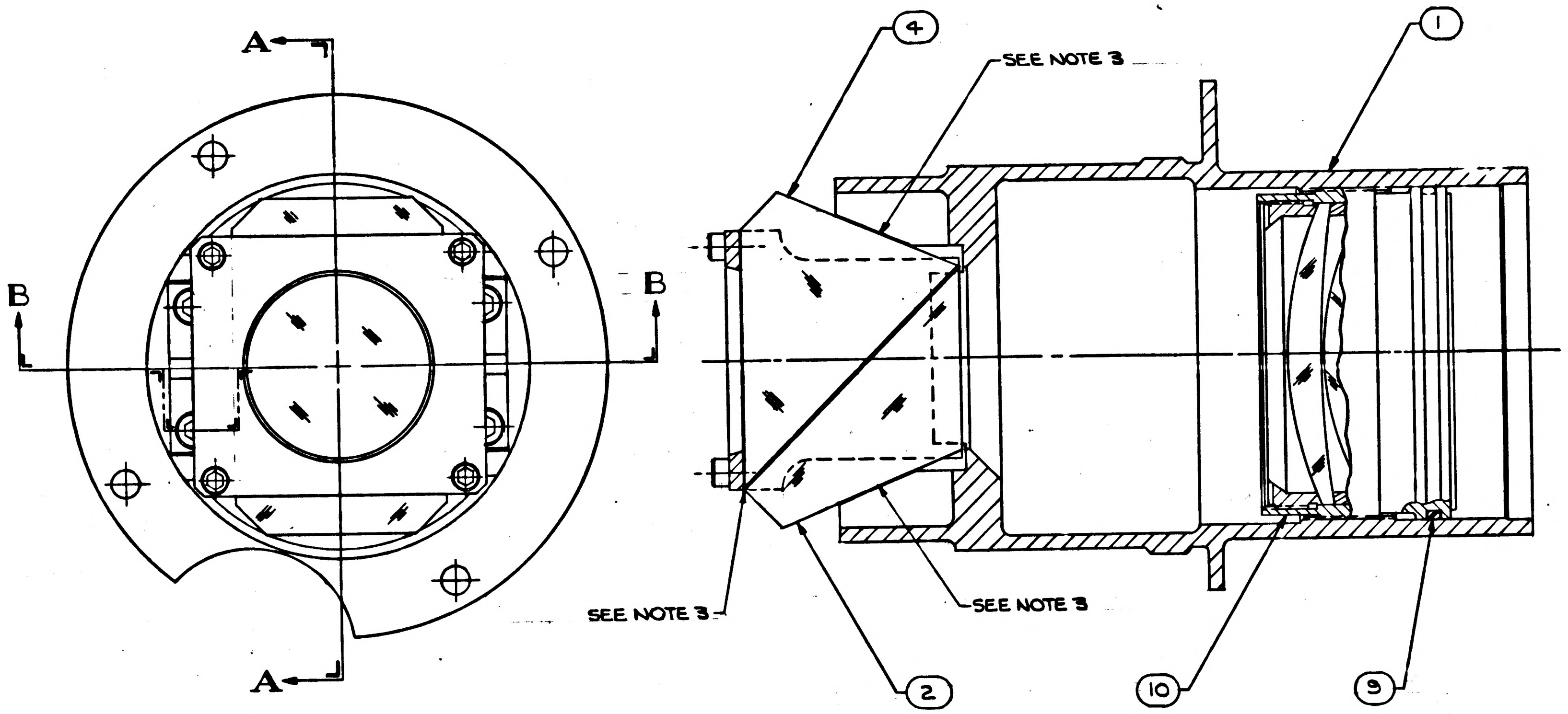
1011724 B

1011724

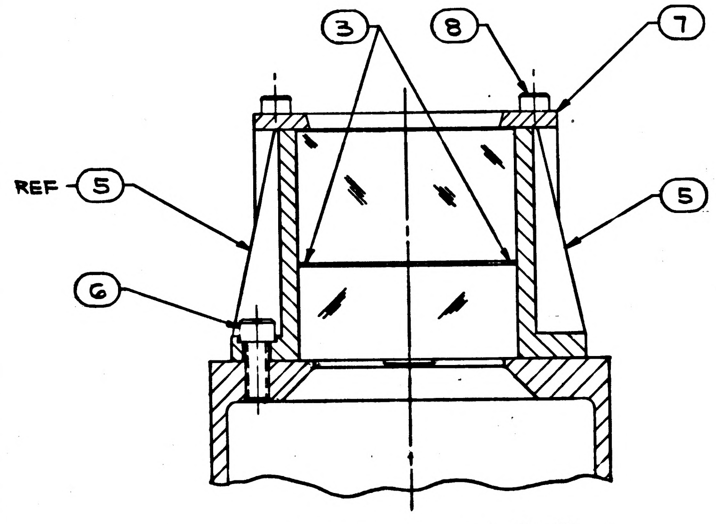
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REVISIONS TDRR 02624

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. ASSEMBLE PER ATP 1011724
3. REQUIREMENTS FOR INDIUM FOIL USAGE ON SURFACES NOTED, PRESCRIBED IN ATP 1011724. INDIUM FOIL PROCUREMENT IN ACCORDANCE WITH ND 1002128.
4. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019



SECTION A-A



PARTIAL SECTION B-B

* PURCHASE ITEM- SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
10	1		1011792	85386900590		HOUSING&LENS, ASSY OF			
9	1	*	1000159-12	—		PACKING, PREFORMED "O" RING			
8	4	NAS	1352C04LL4	74455157013		SCREW, CAP, SOC HD-SELF-LOCKING			
7	1		1011674	52386900790		PLATE, PECHAN PRISM			
6	4	NAS	1352C06LL6	74455157019		SCREW, CAP, SOC. HD-SELF-LOCKING			
5	2		1011675	52386900800		BRACKET, PECHAN PRISM RETAINER			
4	1		1011170	28386900310		PRISM, TELESCOPE BODY			
3	2		1011837-1 1011837-2	58386900110 58386900120		SPRING, PRISM SPACER			
2	1		1011169	28386900300		PRISM, TELESCOPE BODY			
1	1		1011653	57386901110		TUBE, TELESCOPE, INNER			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900580
DRAWN R.BRUNELLE DATE 6-5-63
CHECKED 8-13-63
APPROVAL 8-14-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
INNER TELESCOPE TUBE, ASSEMBLY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011724
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

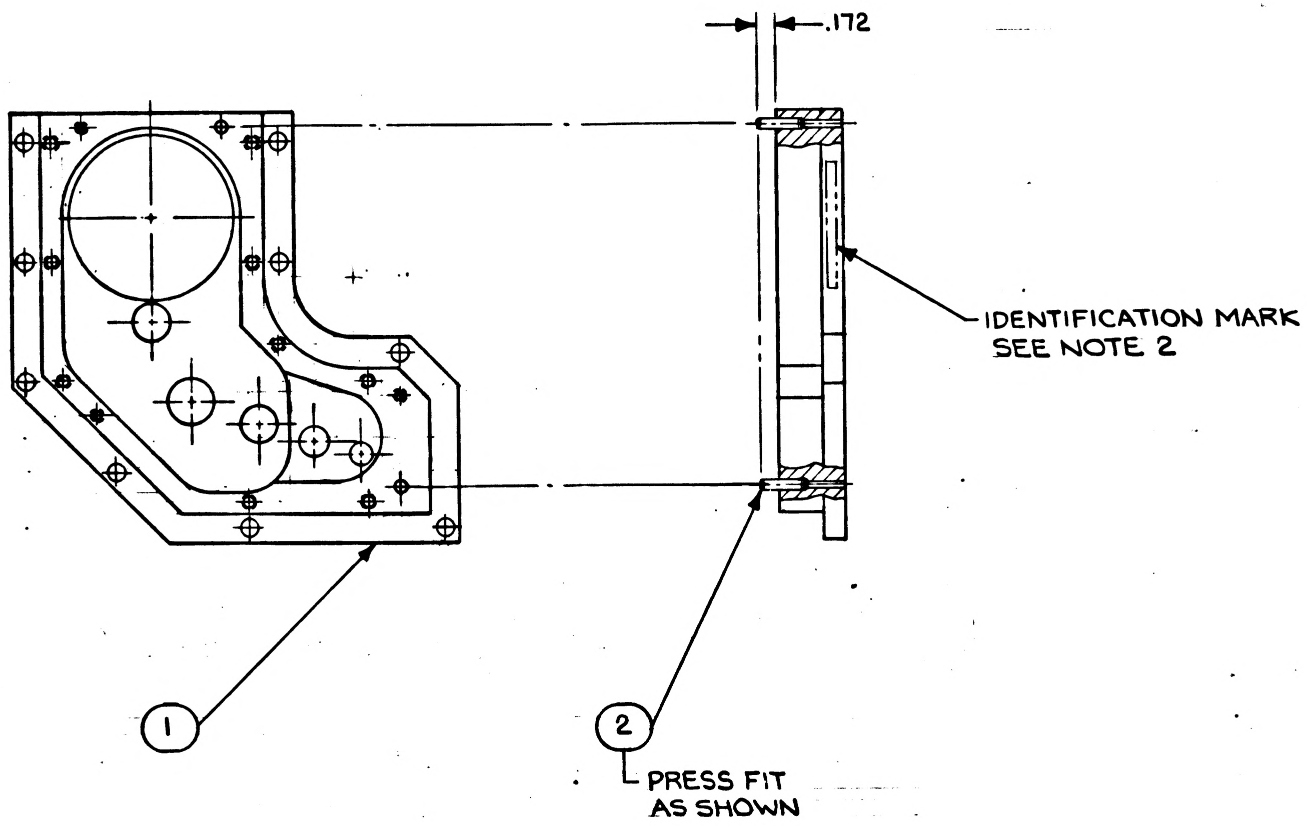
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011724

1011725

REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA DWG NO. REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORD WITH ND1002019.



2	2		AN122684			PIN, DOWEL			
1	1		1011596	52386900740		HOUSING, GEAR			
ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011706	1011000
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ~ DECIMALS ± .005 ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900610
DRAWN F. Schuller DATE 6-6-63
CHECKED Paul Pappachristou
APPROVAL G. [illegible] 8-15-63
APPROVAL J.J. Sirano 8-15-63
NASA APPROVAL W J Rhine 8-26-63
MIT APPROVAL W Kupfer 16 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING & PIN,
ASSY OF

CODE IDENT NO.
SIZE C
NASA NUMBER 1011725
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

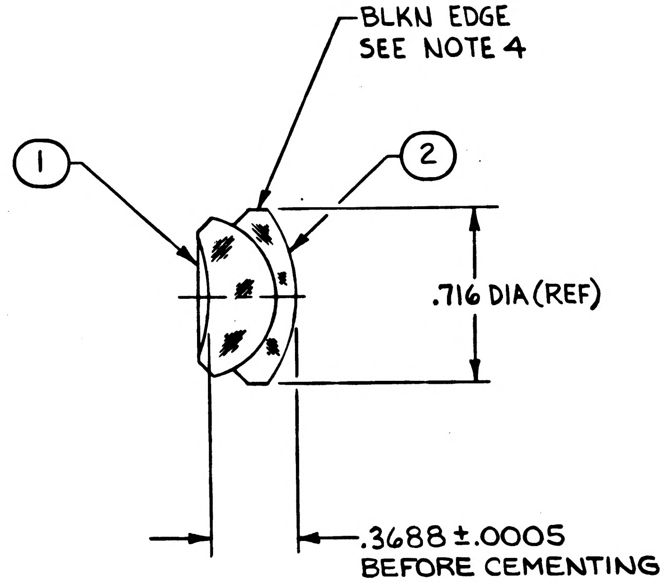
MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011726

REVISIONS TDRR 01490				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. ELEMENT IN ACCORDANCE WITH SPEC MIL-O-13830.
3. CEMENT IN ACCORDANCE WITH SPEC MIL-O-13830 PAR 3.5.11 USING ADHESIVE PER MIL-A-3920.
4. BLACKEN IN ACCORDANCE WITH SPEC MIL-O-13830 PAR 3.5.12 BLKING MATL: BLACK INK PER FED. SPEC TT-I-528.
5. CENTERING ERROR 3 MIN MAX.



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	1		1011811	28386900550		LENS, NEGATIVE			
1	1		1011810	28386900540		LENS, POSITIVE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011737	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ~ DECIMALS ± .005 ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 76386900210

DRAWN V. AMATO DATE 4-30-63
CHECKED Thornton [illegible] 5-29-63
APPROVAL Thornton [illegible] 5-29-63
APPROVAL E. [illegible] 6-5-63
NASA APPROVAL W J Rhine 6-7-63
MIT APPROVAL [illegible] 7 June 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LENS, ASSY OF
(TELESCOPE 3 X)

CODE IDENT NO.
SIZE C
NASA NUMBER 1011726
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1-2, 2-3

MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011726

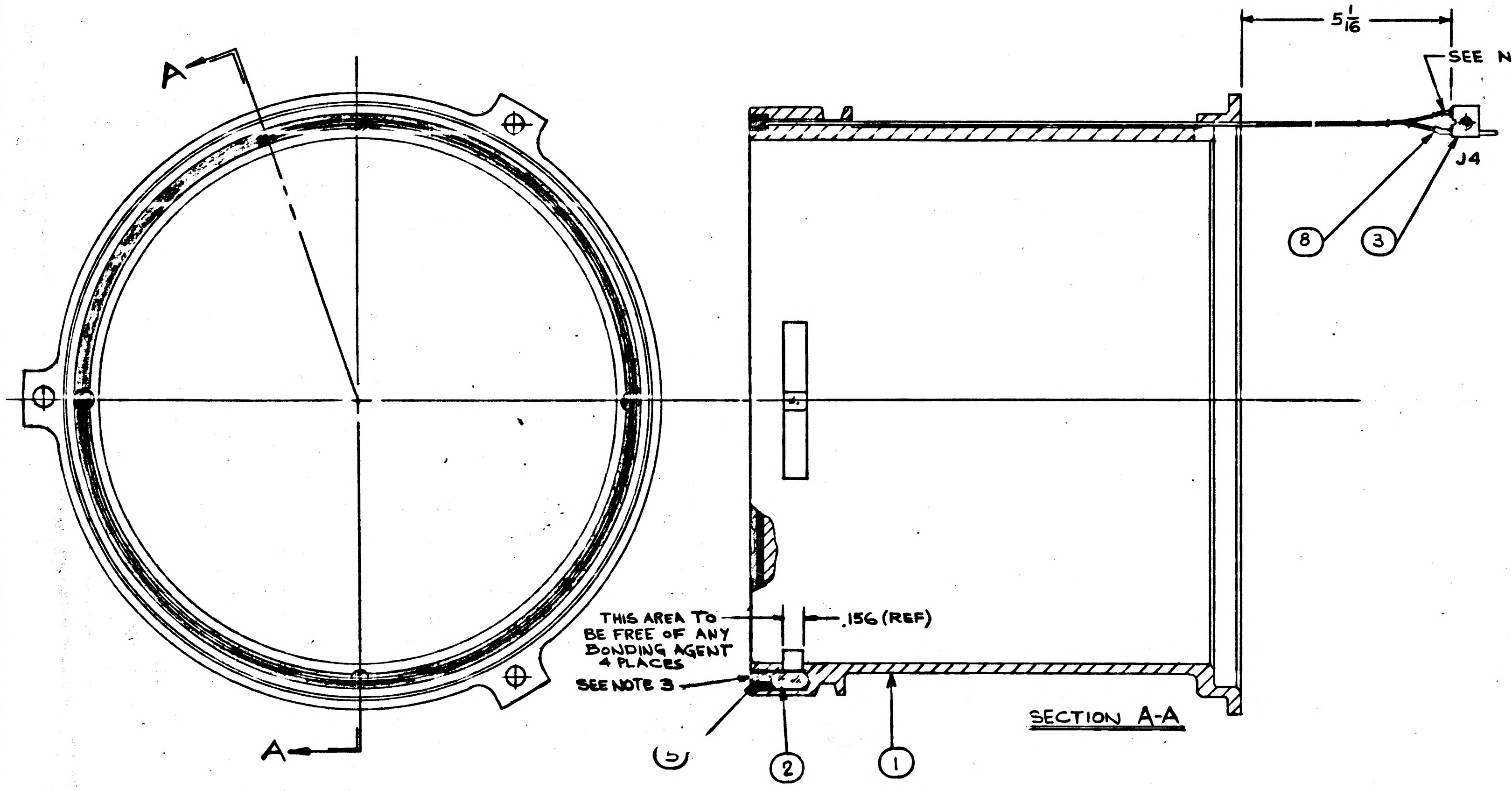
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. SEE WIRING SCHEMATIC ND1015129.
3. FILL UP GROOVE USING BONDING AGENT IN ACCORDANCE WITH ND1002004.
4. SOLDER WIRES IN ACCORDANCE WITH MSFC-PROC-158, USING TYPE SN60WARP2 SOLDER PER QQ-S-571.
5. MARK CHARACTERS 3/32 HIGH PER ND1002019 AT LOCATION SHOWN
6. LACE WIRES IN ACCORDANCE WITH ND1002032.

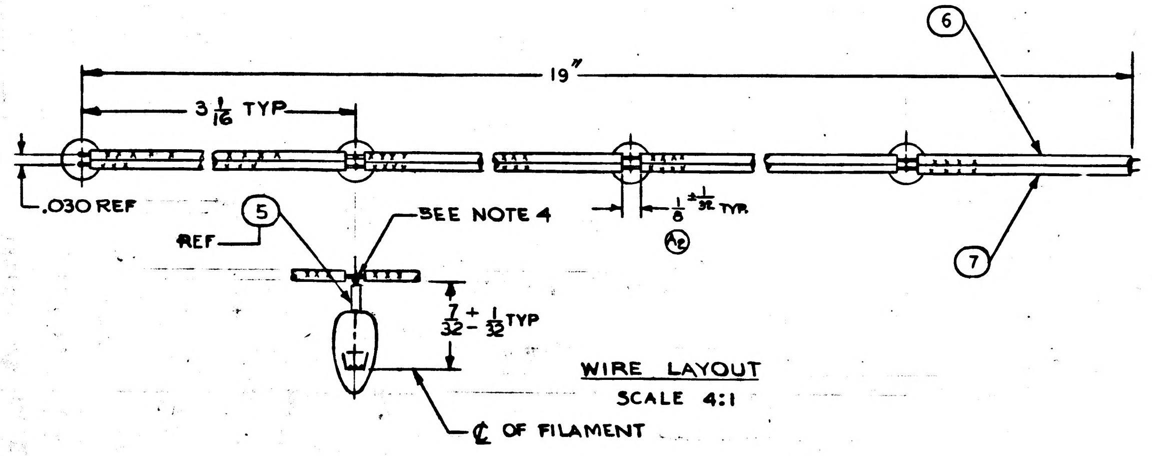
1011731 A

WIRING LEGEND			
COLOR	ITEM NO.	FROM	TO
BLACK	6	BLACK	J4-B
RED	7	RED	J4-A

REVISIONS 02945

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A_2		REVISED PER TDRR NO. 05256	10/17/63	





WIRE LAYOUT
SCALE 4:1

✱ PURCHASE ITEM
SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

MASTER

8	AR	✱	1010490-060			INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
7	AR	✱	1010416-13			WIRE, ELECTRICAL, STRANDED, INSULATED			
6	AR	✱	1010416-11			WIRE, ELECTRICAL, STRANDED, INSULATED			
5	AR	✱	1006776-25			INSULATION, SLEEVING ELECTRICAL			
4	AR	✱	1011753	60 03514 2001		TAPE, LACING AND TYING			
3	1	✱	1011748-	68502016401		CONNECTOR, ELECTRICAL (J4)			
(A1) 2	4		MS24367-715			LAMP, INCANDESCENT			
1	1		1011689	57 38690 1260		HOUSING, LAMP			
ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011890	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/16	± —	± —

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 38690 0490
PAUL PAPPACHRISTOU
DRAWN DATE
CHECKED 8-14-63
APPROVAL 8-28-63
APPROVAL 9-4-63
NASA APPROVAL 9/5/63
MIT APPROVAL 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING AND LAMP, ASSEMBLY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011731
SCALE 2/1 4/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

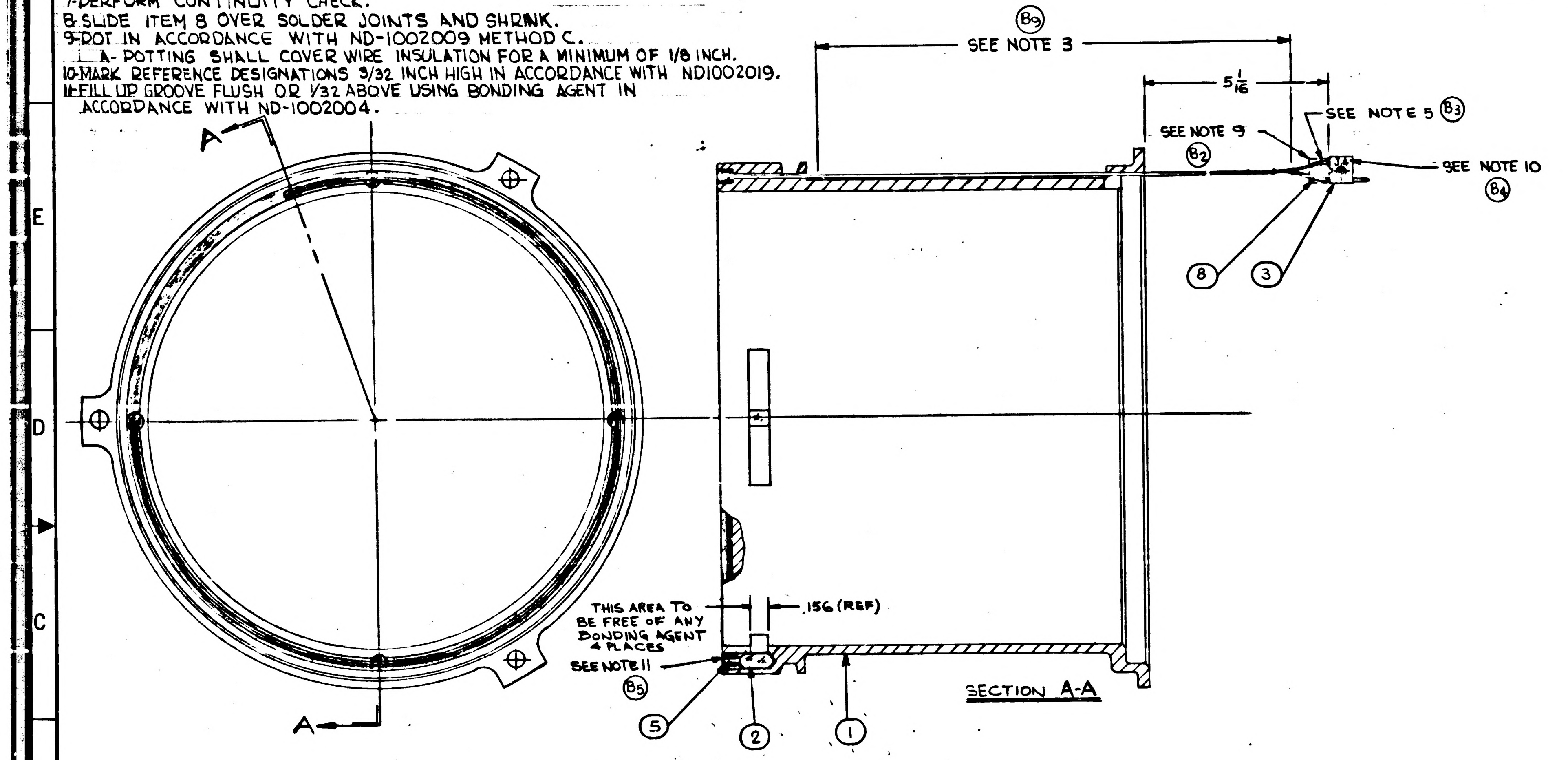
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

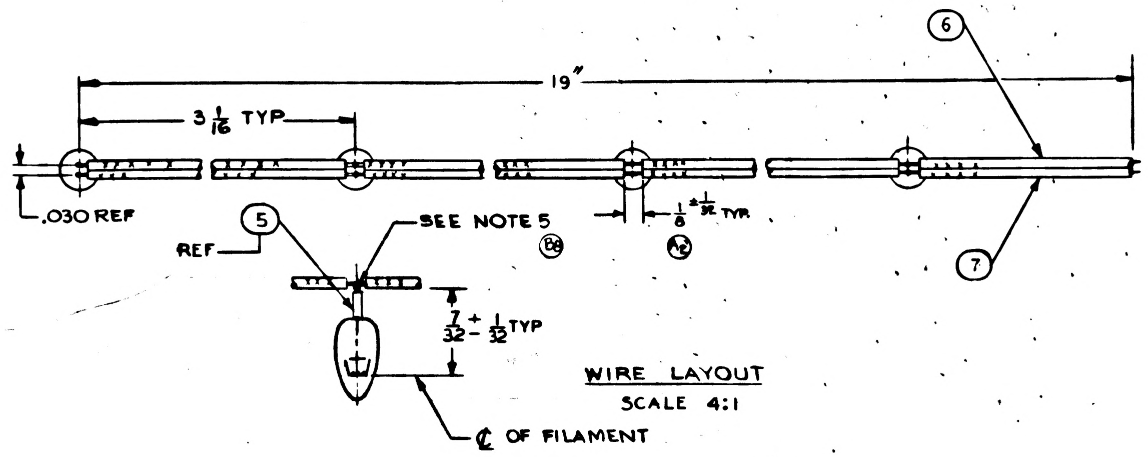
B 1011731

NOTES:
1- INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2-REFER TO WIRING SCHEMATIC, NASA DRAWING NO. 1015129.
3-TWIST CONDUCTORS IN ACCORDANCE WITH ND 1002032.
4-SLIDE ITEM 8 OVER WIRE BEYOND STRIPPED ENDS.
5-SOLDER CONDUCTORS, PER WIRING LEGEND WITH Sn60WRP2, PER QQ-S-571 PER MSFC-PROC-158. (B1)
6-LACE CONDUCTOR, USING ITEM 4, IN ACCORDANCE WITH ND-1002032.
7-PERFORM CONTINUITY CHECK.
8-SLIDE ITEM 8 OVER SOLDER JOINTS AND SHRINK.
9-POT IN ACCORDANCE WITH ND-1002009 METHOD C.
A- POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
10-MARK REFERENCE DESIGNATIONS 3/32 INCH HIGH IN ACCORDANCE WITH ND1002019.
11-FILL UP GROOVE FLUSH OR 1/32 ABOVE USING BONDING AGENT IN ACCORDANCE WITH ND-1002004.

WIRING LEGEND			
COLOR	ITEM NO.	FROM	TO
BLACK	6	BLACK	J4-B
RED	7	RED	J4-A

REVISIONS 02945				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A_2		REVISED PER TDRR NO. 05256		
B_9		REVISED PER TDRR NO. 07518		





WIRE LAYOUT
SCALE 4:1

	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
(B6)	8	2	*	1010490-060			INSULATION - SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
	7	AR	*	1010416-13			WIRE, ELECTRICAL, STRANDED, INSULATED			
	6	AR	*	1010416-11			WIRE, ELECTRICAL, STRANDED, INSULATED			
	5	AR	*	1006776-25			INSULATION, SLEEVING ELECTRICAL			
	4	AR	*	1011753	6003514 2001		TAPE, LACING AND TYING			
(B7)	3	1	*	1011748-2	68502016402		CONNECTOR, ELECTRICAL (J4)			
(A1)	2	4		MS24367-715			LAMP, INCANDESCENT			
	1	1		1011689	5738690 1260		HOUSING, LAMP			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM
SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/16; DECIMALS ± —; ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 38690 0490
PAUL PAPPACHRISTOU
DRAWN ____ DATE ____
CHECKED 8-14-63
APPROVAL 8-29-63
APPROVAL 9-4-63
NASA APPROVAL
MIT APPROVAL 9/5/6

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING AND LAMP, ASSEMBLY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011731
SCALE 2/1 4/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

1011731 B

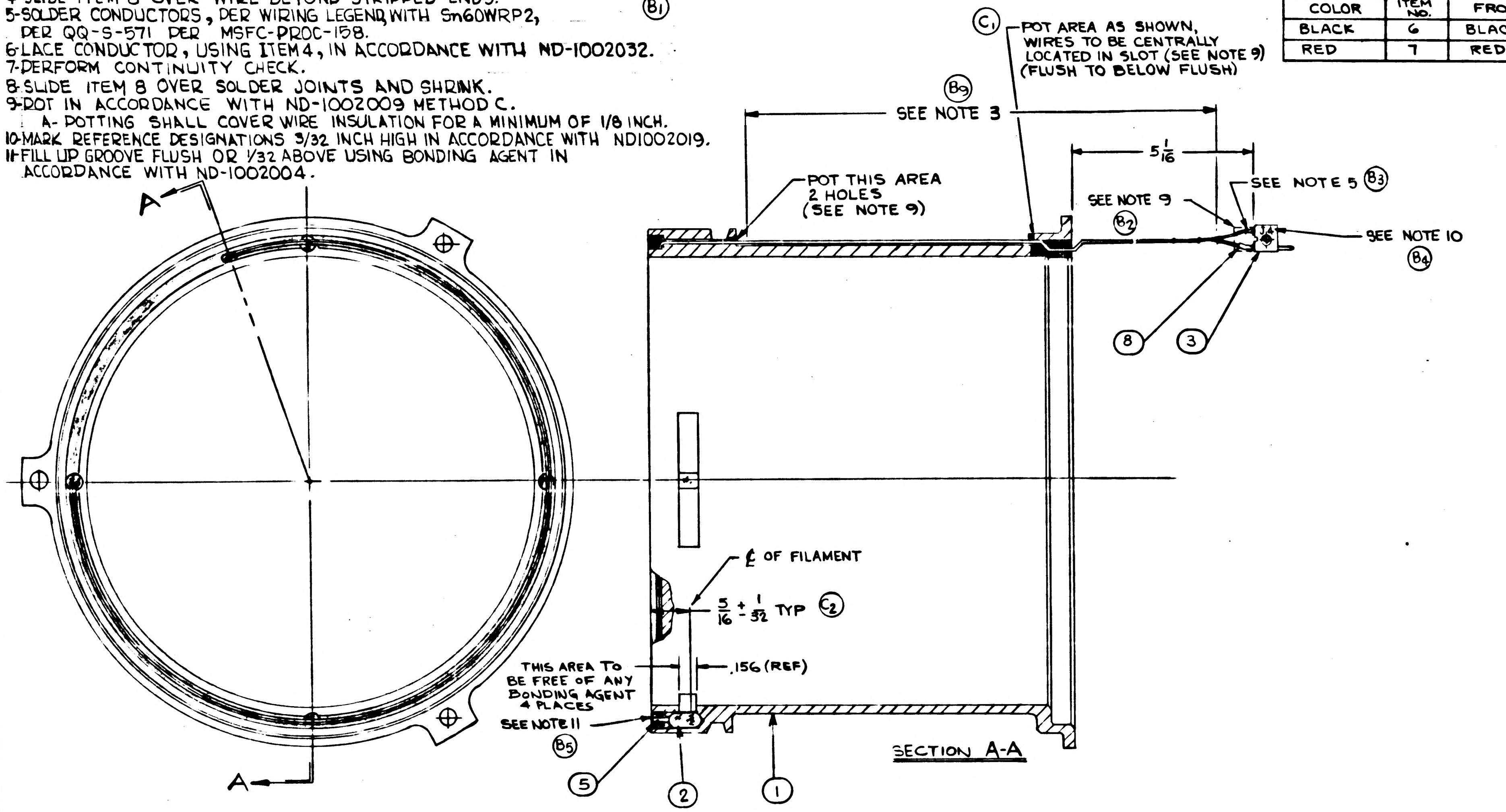
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2-REFER TO WIRING SCHEMATIC, NASA DRAWING NO. 1015129.
3-TWIST CONDUCTORS IN ACCORDANCE WITH ND 1002032.
4-SLIDE ITEM 8 OVER WIRE BEYOND STRIPPED ENDS.
5-SOLDER CONDUCTORS, PER WIRING LEGEND, WITH Sn60WRP2, PER QQ-S-571 PER MSFC-PROC-158. (B1)
6-LACE CONDUCTOR, USING ITEM 4, IN ACCORDANCE WITH ND-1002032.
7-PERFORM CONTINUITY CHECK.
8-SLIDE ITEM 8 OVER SOLDER JOINTS AND SHRINK.
9-POT IN ACCORDANCE WITH ND-1002009 METHOD C.
  A- POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
10-MARK REFERENCE DESIGNATIONS 3/32 INCH HIGH IN ACCORDANCE WITH ND1002019.
11-FILL UP GROOVE FLUSH OR 1/32 ABOVE USING BONDING AGENT IN ACCORDANCE WITH ND-1002004.

1011731 C

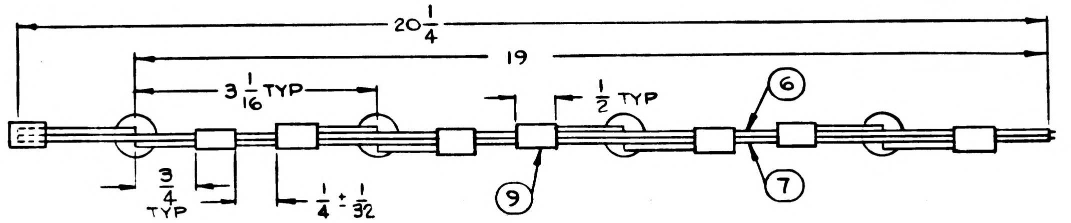
WIRING LEGEND			
COLOR	ITEM NO.	FROM	TO
BLACK	6	BLACK	J4-B
RED	7	RED	J4-A

REVISIONS 02745

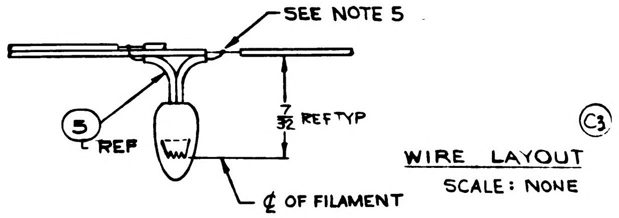
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A2		REVISED PER TDRR NO. 05256	10/17/63	JW
B9		REVISED PER TDRR NO. 07518	4-7-64	JMB
C4		REVISED PER TDRR NO. 09066	5/27/64	JMB



A
A
(C1)
POT AREA AS SHOWN, WIRES TO BE CENTRALLY LOCATED IN SLOT (SEE NOTE 9) (FLUSH TO BELOW FLUSH)
(B9)
SEE NOTE 3
$5\frac{1}{16}$
SEE NOTE 9
(B2)
SEE NOTE 5 (B3)
SEE NOTE 10 (B4)
J4
POT THIS AREA 2 HOLES (SEE NOTE 9)
⑧
③
℄ OF FILAMENT
$\frac{5}{16} \pm \frac{1}{32}$ TYP (C2)
THIS AREA TO BE FREE OF ANY BONDING AGENT 4 PLACES
.156 (REF)
SEE NOTE 11
(B5)
⑤
②
①
SECTION A-A



$20\frac{1}{4}$
19
$3\frac{1}{16}$ TYP
$\frac{1}{2}$ TYP
⑥
⑦
⑨
$\frac{3}{4}$ TYP
$\frac{1}{4} \pm \frac{1}{32}$



SEE NOTE 5
⑤ REF
$\frac{7}{32}$ REF TYP
℄ OF FILAMENT
(C3)

WIRE LAYOUT
SCALE: NONE

✱ PURCHASE ITEM
SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
C4	9	AR	✱	1010490-58			INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
B6	8	2	✱	1010490-060			INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
	7	AR	✱	1010416-13			WIRE, ELECTRICAL, STRANDED, INSULATED			
	6	AR	✱	1010416-11			WIRE, ELECTRICAL, STRANDED, INSULATED			
	5	AR	✱	1006776-25			INSULATION, SLEEVING ELECTRICAL			
	4	AR	✱	1011753	6003514 2001		TAPE, LACING AND TYING			
B7	3	1	✱	1011748-2	6850201640 2		CONNECTOR, ELECTRICAL (J4)			
A1	2	4		MS24367-715			LAMP INCANDESCENT			
	1	1		1011689	57 38690 1260		HOUSING LAMP			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/16	± —	± —

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 35 38690 0490
DRAWN PAUL PAPPACHRISTOU DATE
CHECKED 8-14-63
APPROVAL 8-28-63
APPROVAL 9-4-63
NASA APPROVAL
MIT APPROVAL 9/3/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING AND LAMP, ASSEMBLY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011731
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

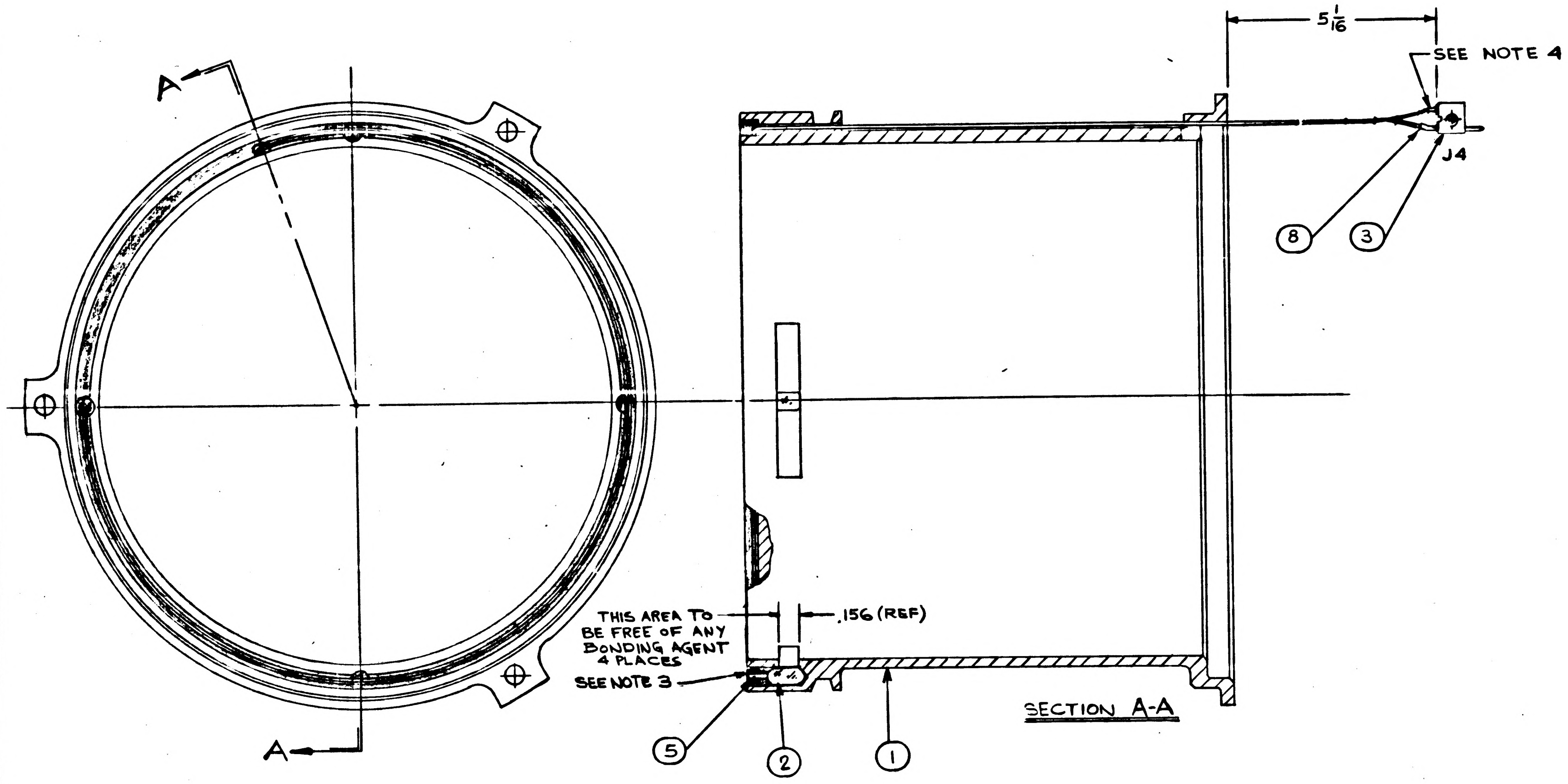
1011731 C

1011731

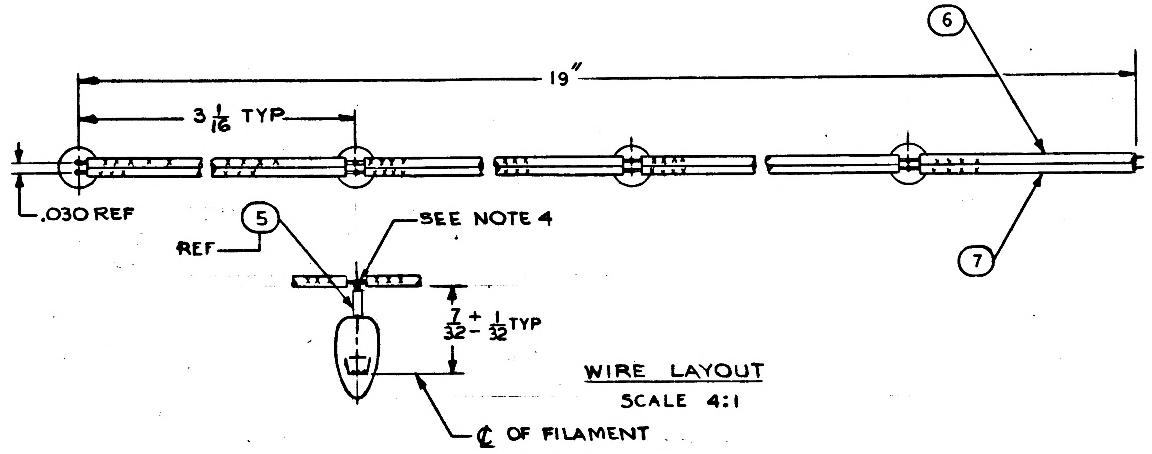
SYM	ZONE	REVISIONS 02945 DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. SEE WIRING SCHEMATIC ND1015129.
3. FILL UP GROOVE USING BONDING AGENT IN ACCORDANCE WITH ND1002004.
4. SOLDER WIRES IN ACCORDANCE WITH MSFC-PROC-158, USING TYPE SN60WARP2 SOLDER PER QQ-S-571.
5. MARK CHARACTERS 3/32 HIGH PER ND1002019 AT LOCATION SHOWN
6. LACE WIRES IN ACCORDANCE WITH ND1002032.

WIRING LEGEND			
COLOR	ITEM NO.	FROM	TO
BLACK	6	BLACK	J4-B
RED	7	RED	J4-A



SECTION A-A



WIRE LAYOUT
SCALE 4:1

* PURCHASE ITEM
SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
8	AR	*	1010490-060			INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
7	AR	*	1010416-13			WIRE, ELECTRICAL, STRANDED, INSULATED			
6	AR	*	1010416-11			WIRE, ELECTRICAL, STRANDED, INSULATED			
5	AR	*	1006776-25			INSULATION, SLEEVING ELECTRICAL			
4	AR	*	1011753	6003514 2001		TAPE, LACING AND TYING			
3	1	*	1011748-	68502016401		CONNECTOR, ELECTRICAL (J4)			
2	4	MS	24367			LAMP, INCANDESCENT			
1	1		1011689	57 38690 1260		HOUSING, LAMP			

LIST OF PARTS AND MATERIALS

1011890	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± 1/16 DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 38690 0490
PAUL PAPPACHRISTOU
DRAWN DATE
CHECKED D. Cohen 8-14-63
APPROVAL 8-28-63
APPROVAL F.J. Sinaco 9-4-63
NASA APPROVAL 9/1/63
MIT APPROVAL D. Hazel 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING AND LAMP,
ASSEMBLY OF

CODE IDENT NO. SIZE D NASA NUMBER 1011731
SCALE 2/1 4/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

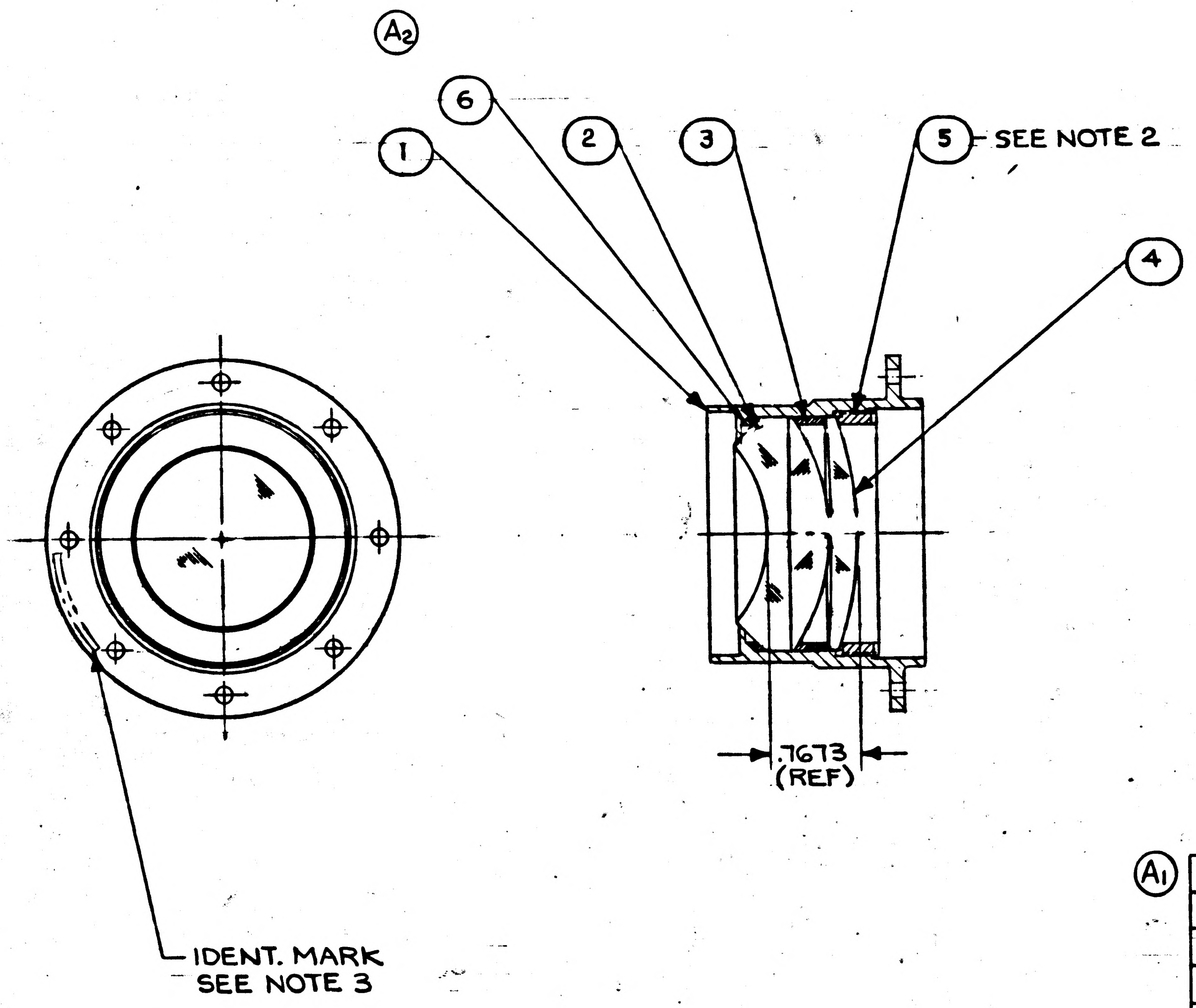
MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011732 A

REVISIONS 01370				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO. 05499	12-28 63	WK.

NOTES:
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. VIBRATION PROOF ASSY PER MIL-S-22473 GRADE H (A3)
3. IDENTIFY USING NASA DWG NO. REVISION LETTER, AND MANUFACTURERS SYMBOL IN ACCORD WITH ND1002019.



(A1)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
6	1		1011954	57386901600		SPACER, LENS			
5	1		1011805	57386901320		RING, LOCKING			
4	1		1011670	28386900520		LENS, POSITIVE			
3	1		1011807	57386901340		SPACER, LENS			
2	1		1011710	76386900200		LENS, ASSY OF			
1	1		1011803	57386901310		HOUSING, TELESCOPE LENS			

LIST OF PARTS AND MATERIALS

APPLICATION	
NEXT ASSY	USED ON
1011784	1011000

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900500

DRAWN F. Schiller DATE 5-7-63
CHECKED T. SULLIVAN 5-22-63
APPROVAL E. McDonald 5-22-63
APPROVAL E. Phorys 5-22-63
NASA APPROVAL
MIT APPROVAL WK for 24 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LENS, TELESCOPE RELAY,
ASSEMBLY OF

CODE IDENT NO.
SIZE C
NASA NUMBER 1011732
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

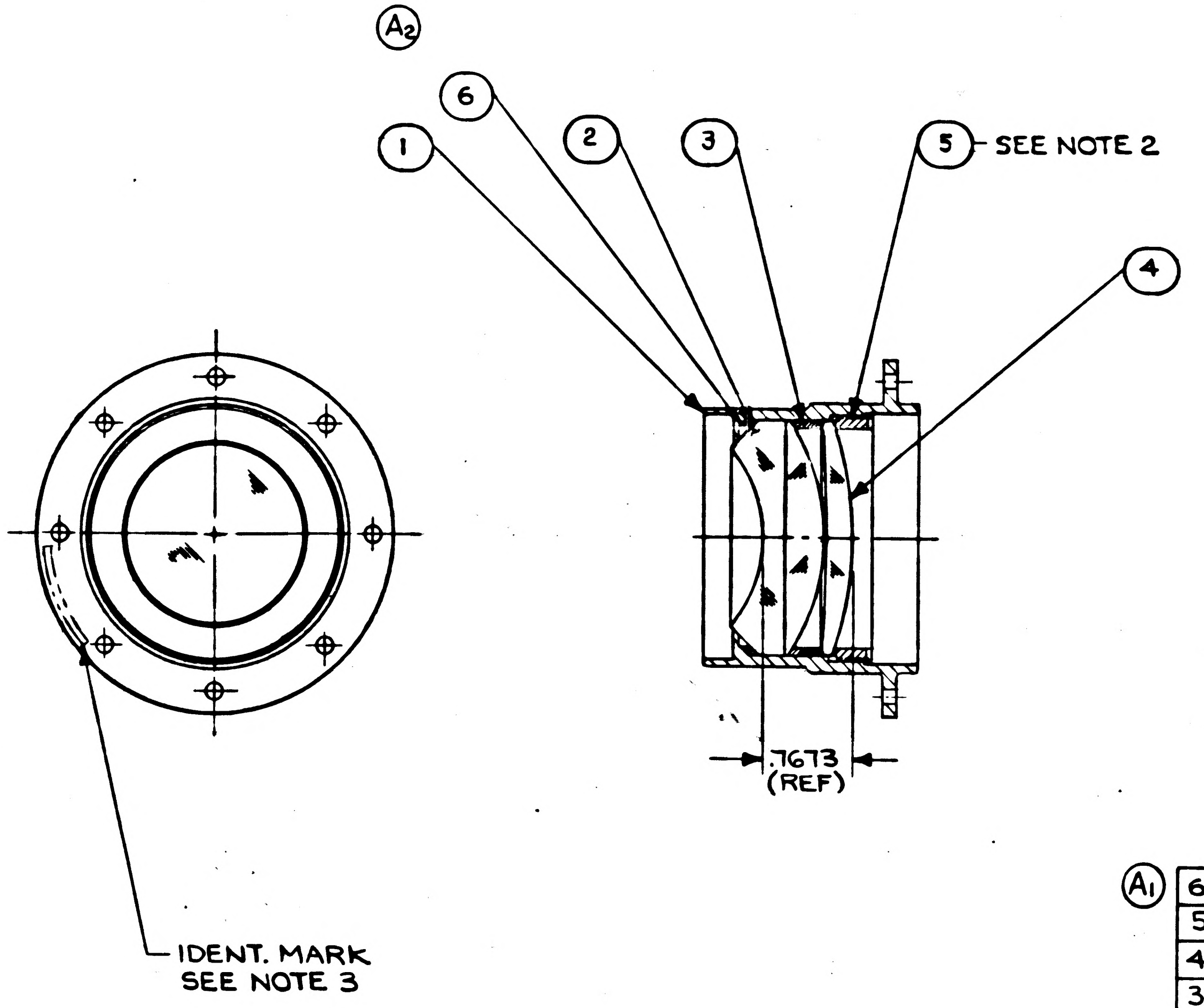
1011732 B

NOTES:

1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. APPLY TO 1/3 CIRC OF THE LAST THREAD TO ENTER Ⓐ3 THREADED HOLE, SEALING COMPOUND PER MIL-S-22473 GRADE HV Ⓑ
3. IDENTIFY USING NASA DWG NO. REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORD WITH ND1002019

REVISIONS 01370

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO. 05499	12·28 63	WK.
B		REVISED PER TDRR NO. 07525	1/7/64	Jwo



Ⓐ1

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
6	1		1011954	57386901600		SPACER, LENS			
5	1		1011805	57386901320		RING, LOCKING			
4	1		1011670	28386900520		LENS, POSITIVE			
3	1		1011807	57386901340		SPACER, LENS			
2	1		1011710	76386900200		LENS, ASSY OF			
1	1		1011803	57386901310		HOUSING, TELESCOPE LENS			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011784	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± —; DECIMALS ± —; ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900500

DRAWN F. Schiller DATE 5-7-63
CHECKED J. SULLIVAN 5-22-63
APPROVAL E. McDonald 5-22-63
APPROVAL E. Phoenix 5-22-63
NASA APPROVAL
MIT APPROVAL 24 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE

LENS, TELESCOPE RELAY, ASSEMBLY OF

CODE IDENT NO.
SIZE C
NASA NUMBER 1011732
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

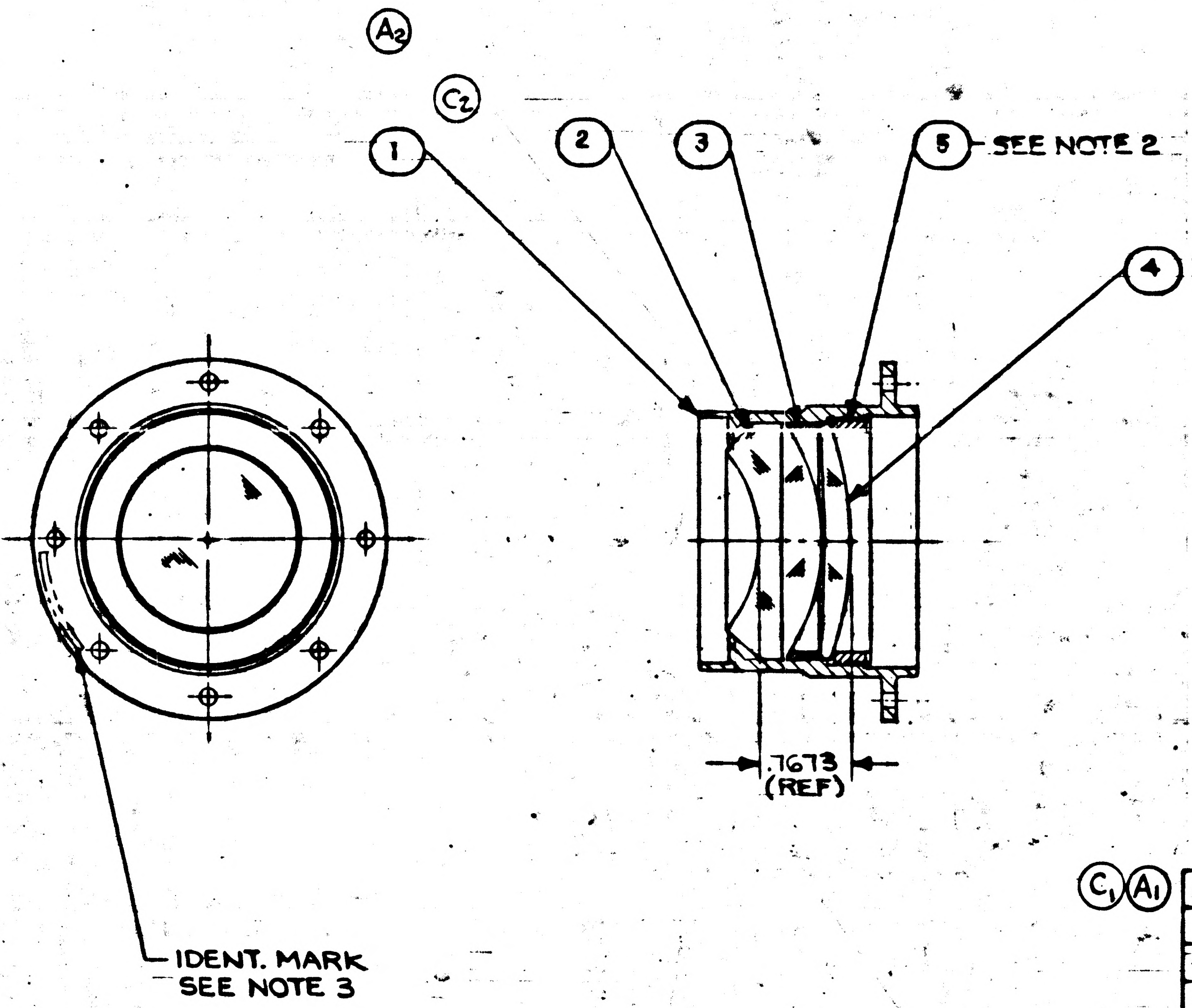
1011732 C

NOTES:

1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. APPLY TO 1/3 CIRC OF THE LAST THREAD TO ENTER (A3) THREADED HOLE, SEALING COMPOUND PER MIL-S-22473 GRADE HV (B)
3. IDENTIFY USING NASA DWG NO. REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORD WITH ND1002019

REVISIONS 01370

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A_3		REVISED PER TDRR NO. 05499	12-28-63	W.K.
B		REVISED PER TDRR NO. 07525	1/17/64	Jud
C_2		REVISED PER TDRR No. 08464	5 Nov 64	Jud



(C1) (A1)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
6									
5	1		1011805	57386901320		RING, LOCKING			
4	1		1011670	28386900520		LENS, POSITIVE			
3	1		1011807	57386901340		SPACER, LENS			
2	1		1011710	76386900200		LENS, ASSY OF			
1	1		1011803	57386901310		HOUSING, TELESCOPE LENS			

LIST OF PARTS AND MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	±	±	±

DO NOT SCALE THIS DRAWING

MATERIAL

CONTRACT

NEXT ASSY	USED ON
1011784	1011000

APPLICATION

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK

KIC PN 85386900500

DRAWN F. Dolliver DATE 5-7-63
CHECKER T. SULLIVAN 5-22-63
APPROVAL B. D. McDonald 5-22-63
APPROVAL E. Pharo 5-22-63
NASA APPROVAL Jack Bernard
MIT APPROVAL W. K. 24 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LENS, TELESCOPE RELAY, ASSEMBLY OF

CODE IDENT NO.
SIZE C
NASA NUMBER 1011732

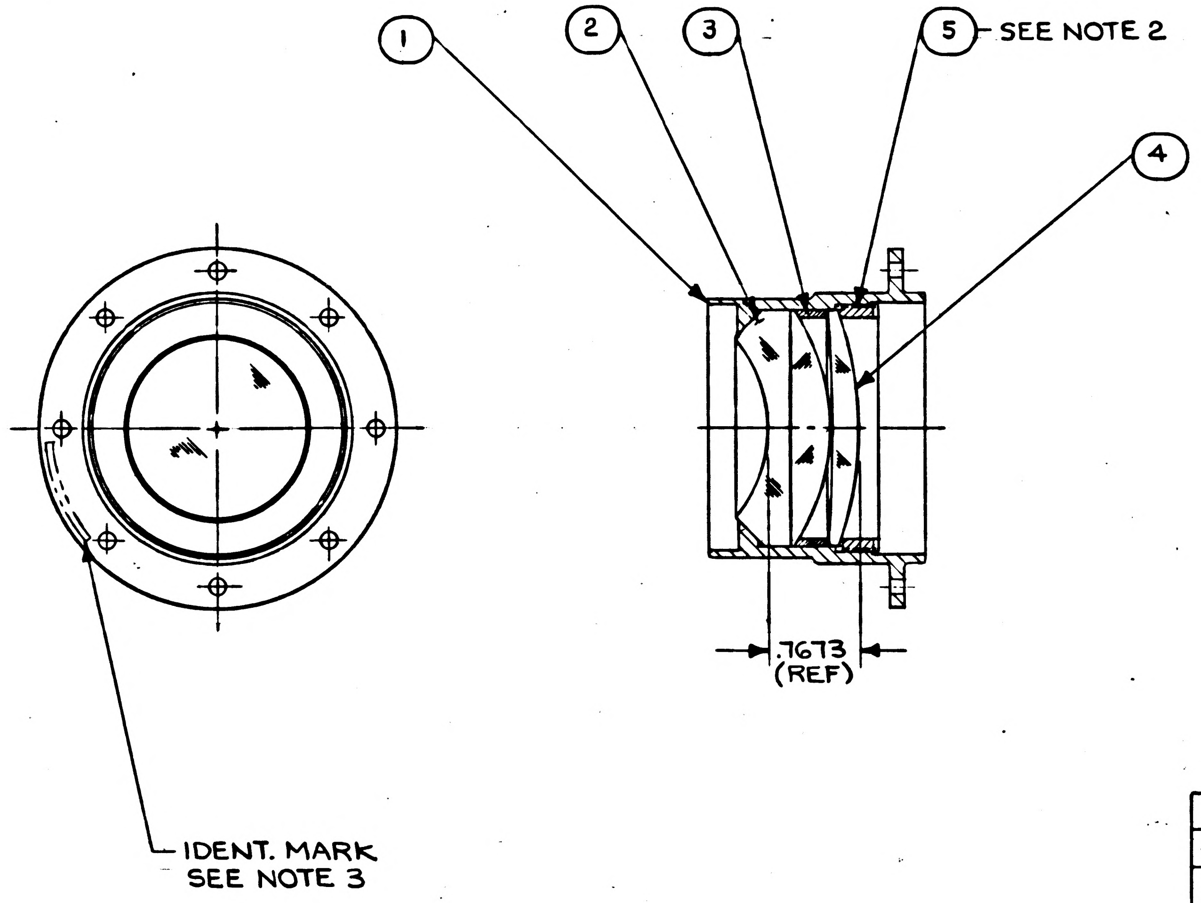
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

1011732

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. VIBRATION PROOF ASSY PER MIL-E-5400 (PAR 3.1.17 e)
3. IDENTIFY USING NASA DWG NO. REVISION LETTER, AND MANUFACTURERS SYMBOL IN ACCORD WITH ND1002019.



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
5	1		1011805	57386901320		RING, LOCKING			
4	1		1011670	28386900520		LENS, POSITIVE			
3	1		1011807	57386901340		SPACER, LENS			
2	1		1011710	76386900200		LENS, ASSY OF			
1	1		1011803	57386901310		HOUSING, TELESCOPE LENS			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011784	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900500
DRAWN F. Schilling DATE 5-7-63
CHECKED T. SULLIVAN 5-22-63
APPROVAL E. McDonald 5-22-63
APPROVAL E. Dhoruys 5-22-63
NASA APPROVAL
MIT APPROVAL 24 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LENS, TELESCOPE RELAY,
ASSEMBLY OF

CODE IDENT NO.
SIZE C
NASA NUMBER 1011732
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011732

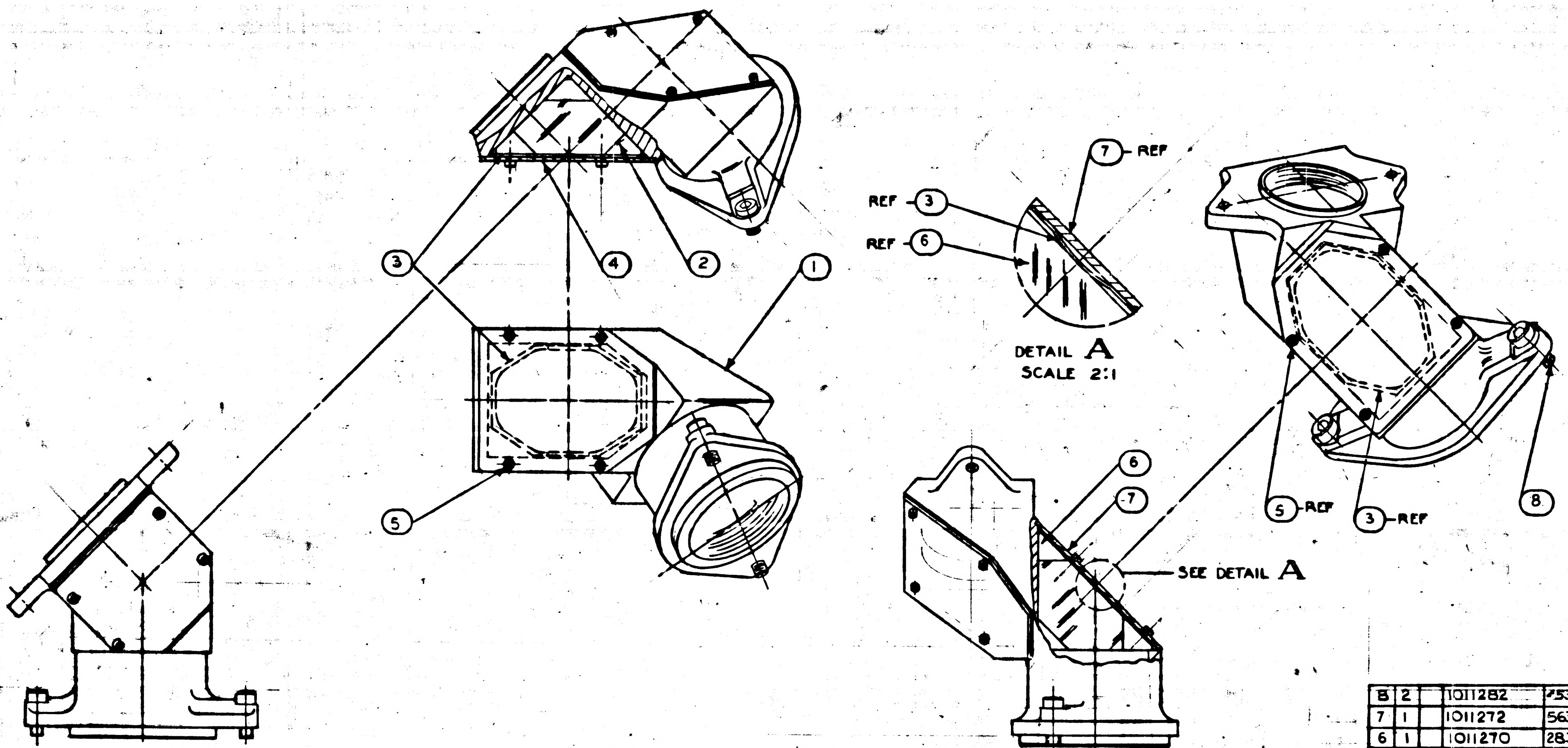
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

E-154

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
3. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019 Ⓐ

1011734 A

REVISIONS TDRR 02624				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR NO. 08614		



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
8	2		1011282	75386900140		SCREW, CAPTIVE HEX SOCKET HEAD			
7	1		1011272	56386900470		PLATE, COVER PRISM HOUSING			
6	1		1011270	28386900370		PRISM, LARGE SCT EYEPIECE			
5	8		NAS1352C02LL4	74455157006		SCREW, CAP, SOCKET HEAD SELF-LOCKING			
4	1		1011271	56386900460		PLATE, COVER PRISM HOUSING			
3	2		1011883	56386900490		SPRING, ELLIPTICAL SCT PRISM			
2	1		1011269	28386900360		PRISM, SMALL SCT EYEPIECE			
1	1		1011257	50386900060		HOUSING SCT PRISM			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON: FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900880

DRAWN E.DRAPALLA DATE 7-2-63
CHECKED W. CABAN 7-26-63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, SCT PRISM, ASSY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011734
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET OF 1

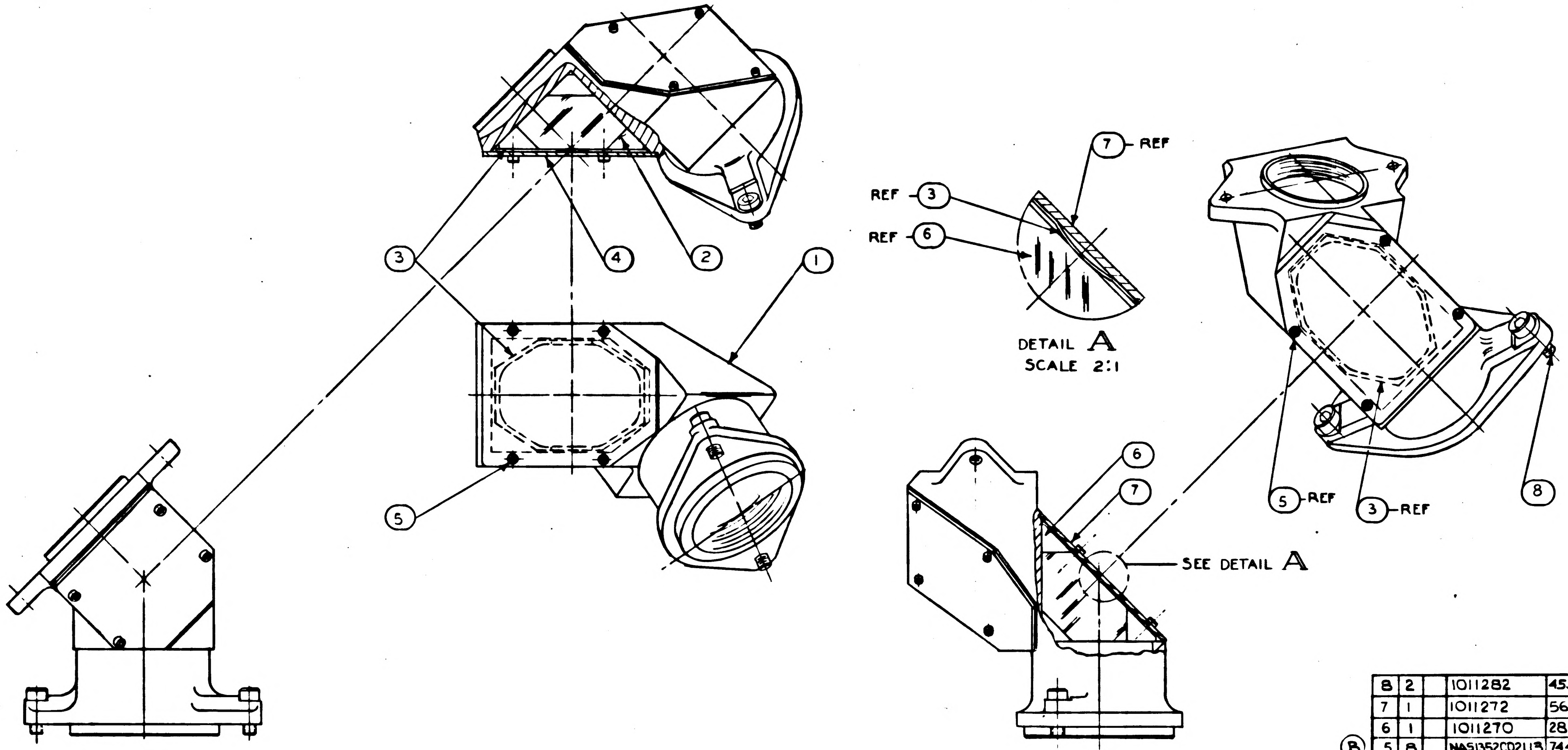
MASTER

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
3. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019 Ⓐ

B	1011734

REVISIONS TDRR 02624

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR NO. 08614	5-19-64	
B		REVISED PER TDRR No. 10991	7-14-64	



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
8	2		1011282	45386900140		SCREW, CAPTIVE HEX SOCKET HEAD			
7	1		1011272	56386900470		PLATE, COVER PRISM HOUSING			
6	1		1011270	28386900370		PRISM, LARGE SCT EYEPIECE			
5	8	Ⓑ	NAS1352C02LL3	74455157005		SCREW, CAP, SOCKET HEAD SELF-LOCKING			
4	1		1011271	56386900460		PLATE, COVER PRISM HOUSING			
3	2		1011883	56386900490		SPRING, ELLIPTICAL SCT PRISM			
2	1		1011269	28386900360		PRISM, SMALL SCT EYEPIECE			
1	1		1011257	50386900060		HOUSING SCT PRISM			

LIST OF PARTS AND MATERIALS

1011000	1011000
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± —	± —

DO NOT SCALE THIS DRAWING

MATERIAL —

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900880

DRAWN E. DRAPALA DATE 7-2-63
CHECKED W. CABAN 7-24-63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

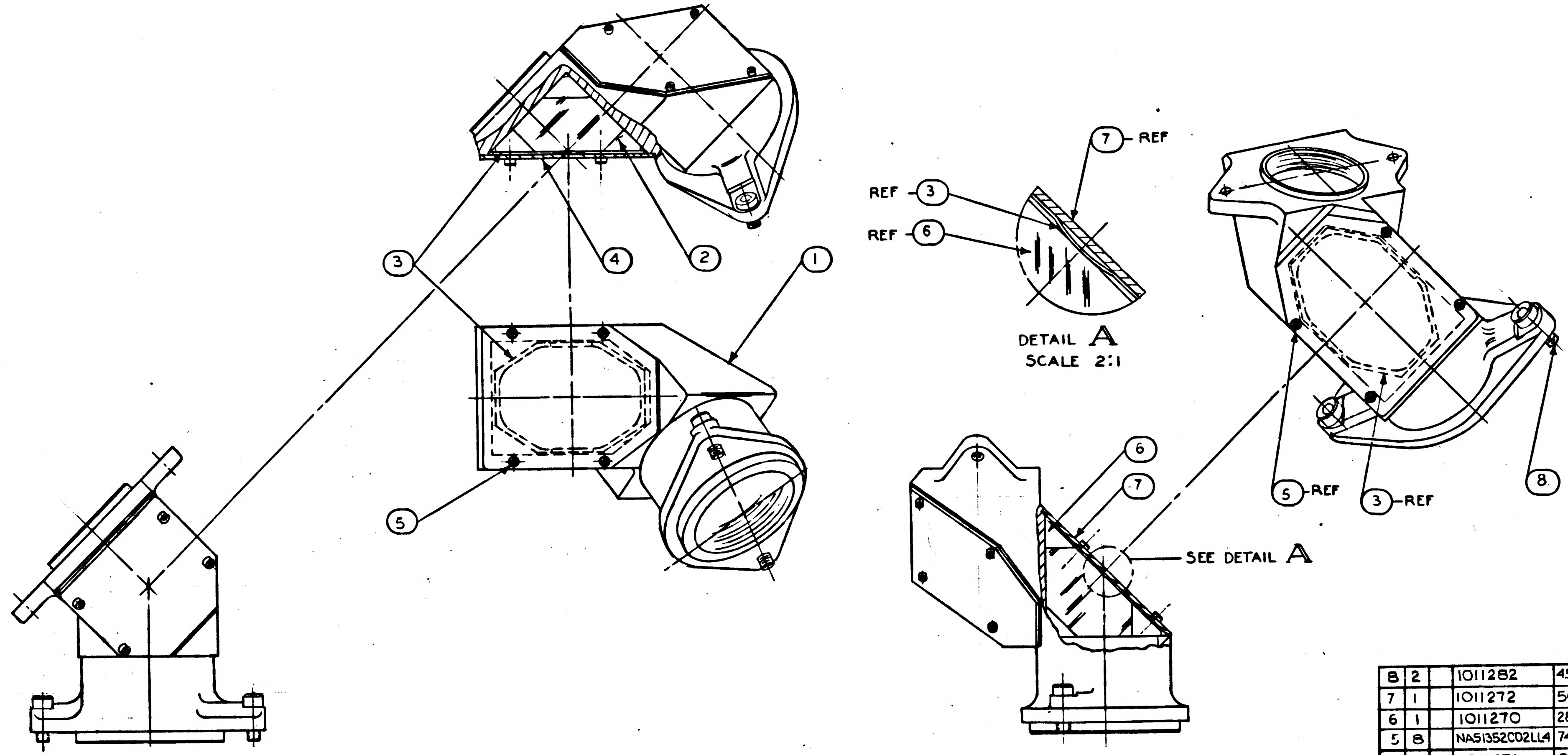
TITLE
HOUSING, SCT PRISM,
ASSY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011734
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011734

REVISIONS TDRR 02624				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLE IN ACCORDANCE WITH ATP 1011734.
3. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
8	2		1011282	45386900140		SCREW, CAPTIVE HEX SOCKET HEAD			
7	1		1011272	56386900470		PLATE, COVER PRISM HOUSING			
6	1		1011270	28386900370		PRISM, LARGE SCT EYEPIECE			
5	8		NAS1352C02LL4	74455157006		SCREW, CAP, SOCKET HEAD SELF-LOCKING			
4	1		1011271	56386900460		PLATE, COVER PRISM HOUSING			
3	2		1011883	56386900490		SPRING, ELLIPTICAL SCT PRISM			
2	1		1011269	28386900360		PRISM, SMALL SCT EYEPIECE			
1	1		1011257	50386900060		HOUSING SCT PRISM			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± —; DECIMALS ± —; ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900880

DRAWN E.DRAPALA DATE 7-2-63
CHECKED W.CABAN 7-24-63
APPROVAL F. Reichmann 8-15-63
APPROVAL D. Sisaro 8-15-63
NASA APPROVAL W. J. Wilson 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, SCT PRISM,
ASSY OF

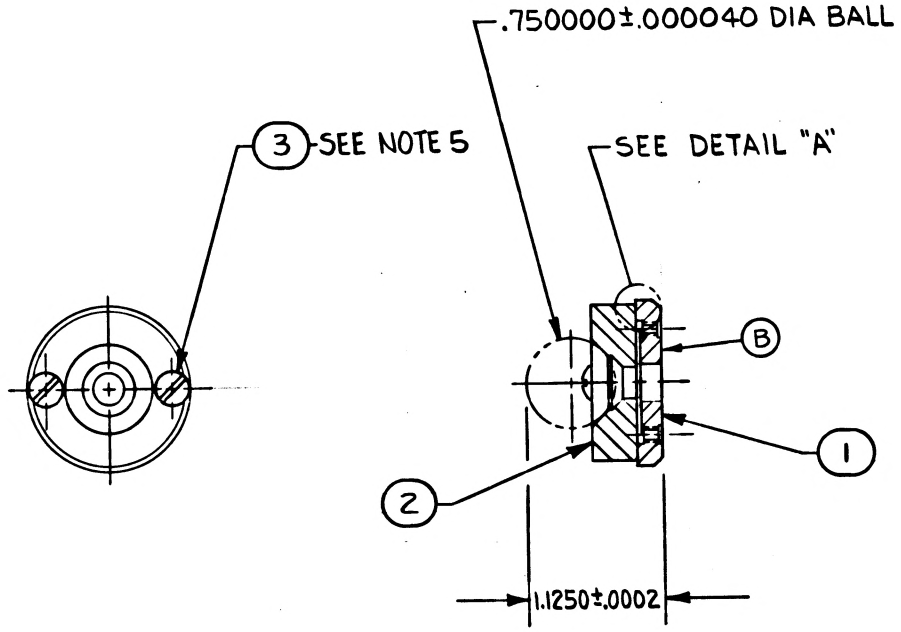
CODE IDENT NO.
SIZE D
NASA NUMBER 1011734
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

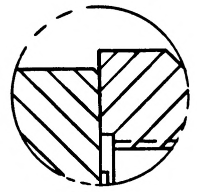
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011738 A

SYM	ZONE	REVISIONS TDRR 01583 DESCRIPTION	DATE	APPROVAL
A	A-4	NEXT ASSY NO. WAS 1011000 TDRR 02241	7-17-63	WK 7-24-63

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. LAP INTERFACE OF ITEMS ① & ② TO OBTAIN AREA CONTACT OF NOT LESS THAN 75%.
3. GRIND OR LAP SURFACE "B" TO OBTAIN DIMENSION INDICATED.
4. DRY FILM LUBRICATE PER MIL-L-25504.
5. AFTER GRINDING OR LAPPING IS COMPLETED VIBRATION PROOF ITEM ③ AS PER MIL-E-5400 (PAR 3.1.17e).





DETAIL "A"
SCALE 4/1

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
3	2		1011571	57386900900		SCREW, SHOULDER			
2	1		1011568	57386900870		INSERT, BALL MOUNT, PLANE			
1	1		1011567	57386900860		INSERT, BALL MOUNT, PLANE BASE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
Ⓐ 1011889	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900530
DRAWN V. AMATO DATE 5-16-63
CHECKED W.W. Lang 5-27-63
APPROVAL 5-27-63
APPROVAL 6-3-63
NASA APPROVAL
MIT APPROVAL 6/14/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
INSERT, BALL MOUNT, PLANE, ASSY OF

CODE IDENT NO.
SIZE C
NASA NUMBER 1011738
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

1011738 A

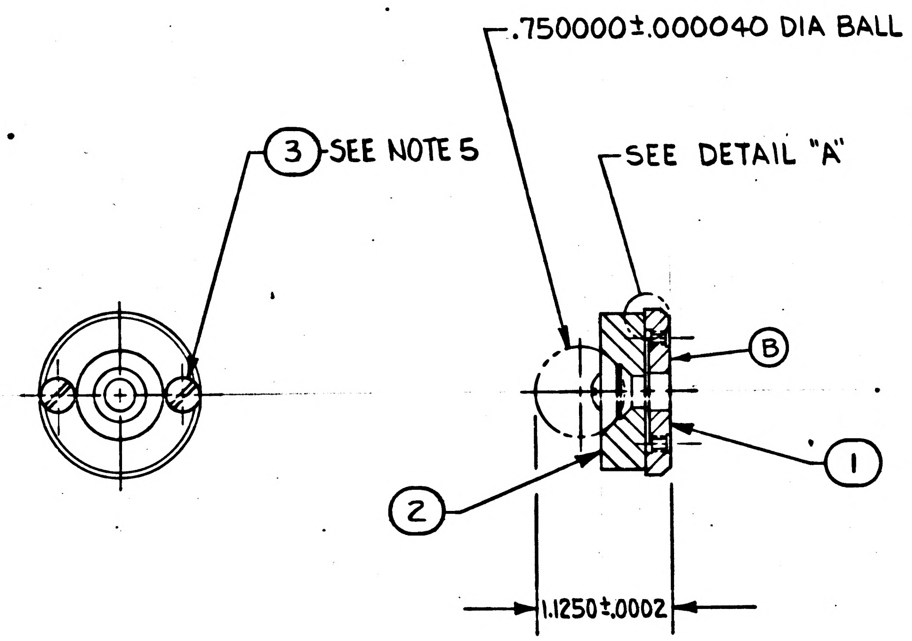
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

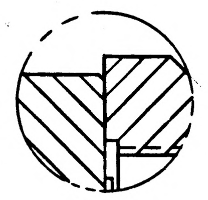
B	1011738

REVISIONS TDRR 01583

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	A-4	NEXT ASSY NO. WAS 1011000 TDRR 02241	7-17-63	WK 7-24-63
B 2	D-6	1) REVISED NOTE NO. 2 2) REVISED NOTE NO. 3 TDRR NO. 02243	7-30-63	WK 8/6/63

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. LAP INTERFACE OF ITEMS ① & ② TO OBTAIN AREA CONTACT (B1) OF NOT LESS THAN 75%. AFTER LAPPING SERIALIZE PARTS TO INSURE THE MATCHING OF LAPPED PARTS AFTER LUBRICATION. DRYFILM LUBRICATE THESE SURFACES PER MIL-L-8937 FORM "A" WITH THICKNESS (B2) OF LUBRICANT ON EACH SURFACE .0001 TO .0002 IN
3. GRIND OR LAP SURFACE 'B' TO OBTAIN DIMENSION INDICATED AFTER APPLICATION OF LUBRICATION FILM
4. DRY FILM LUBRICATE PER MIL-L-25504
5. AFTER GRINDING OR LAPPING IS COMPLETED VIBRATION PROOF ITEM ③ AS PER MIL-E-5400 (PAR 3.1.17e)





DETAIL "A"
SCALE 4/1

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
3	2		1011571	57386900900		SCREW, SHOULDER			
2	1		1011568	57386900870		INSERT, BALL MOUNT, PLANE			
1	1		1011567	57386900860		INSERT, BALL MOUNT, PLANE BASE			

LIST OF PARTS AND MATERIALS

	NEXT ASSY	USED ON
Ⓐ	1011889	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	± ~	± ~

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900530

DRAWN V. AMATO DATE 5-16-63
CHECKED W.W. Lang 5-27-63
APPROVAL E. [illegible] 5-27-63
APPROVAL R.V. Dias 6-3-63
NASA APPROVAL [illegible]
MIT APPROVAL [illegible] 6/14/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
INSERT, BALL MOUNT,
PLANE, ASSY OF

CODE IDENT NO.
SIZE C
NASA NUMBER 1011738
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

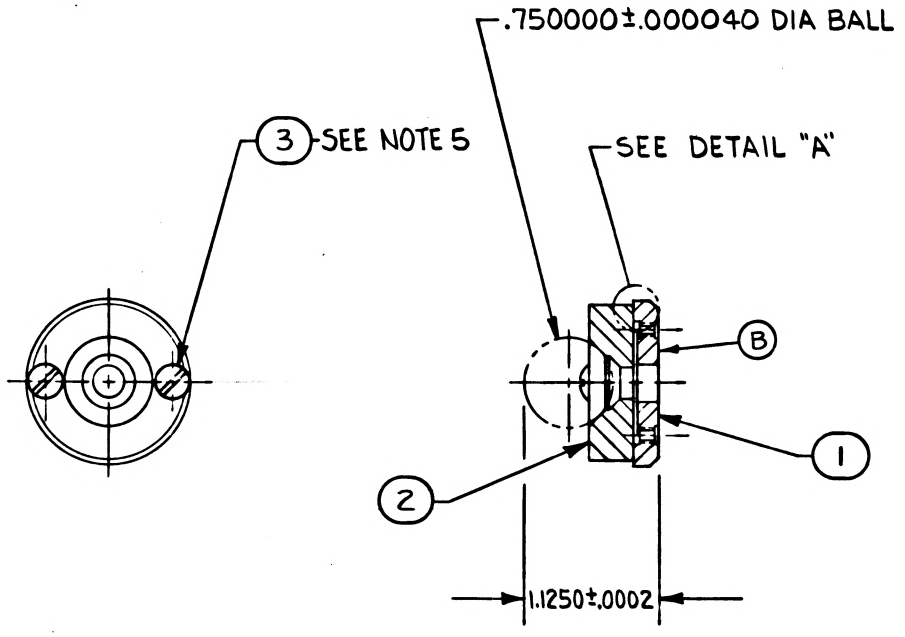
MASTER

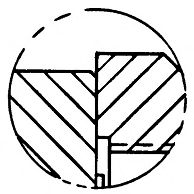
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011738

REVISIONS TDRR 01583				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. LAP INTERFACE OF ITEMS ① & ② TO OBTAIN AREA CONTACT OF NOT LESS THAN 75%.
3. GRIND OR LAP SURFACE "B" TO OBTAIN DIMENSION INDICATED.
4. DRY FILM LUBRICATE PER MIL-L-25504.
5. AFTER GRINDING OR LAPPING IS COMPLETED VIBRATION PROOF ITEM ③ AS PER MIL-E-5400 (PAR 3.1.17e).





DETAIL "A"
SCALE 4/1

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
3	2		1011571	57386900900		SCREW, SHOULDER			
2	1		1011568	57386900870		INSERT, BALL MOUNT, PLANE			
1	1		1011567	57386900860		INSERT, BALL MOUNT, PLANE BASE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	± ~	± ~

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900530

DRAWN V. AMATO DATE 5-16-63
CHECKED W.W. Lang 5-27-63
APPROVAL E. J. MacDonald 5-27-63
APPROVAL R. H. Gross 6-3-63
NASA APPROVAL
MIT APPROVAL 6/4/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
INSERT, BALL MOUNT,
PLANE, ASSY OF

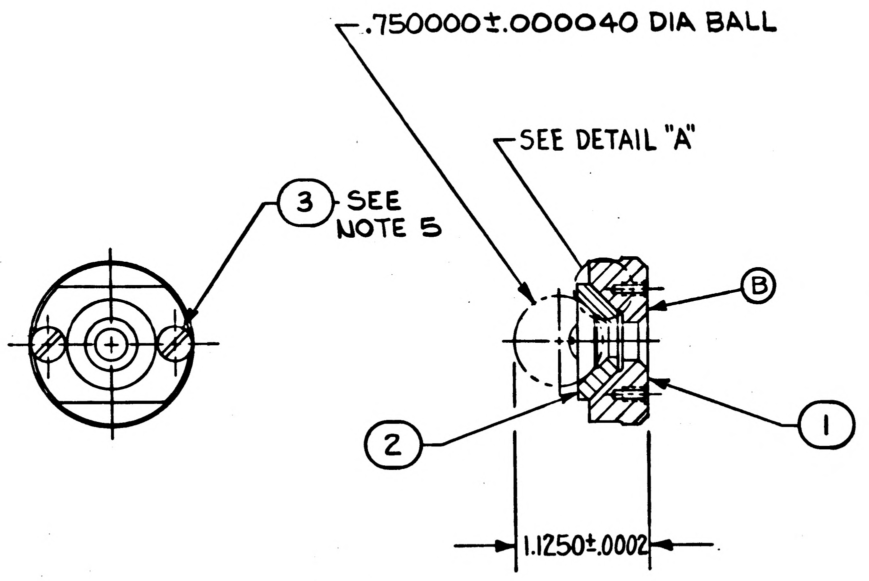
CODE IDENT NO.
SIZE C
NASA NUMBER 1011738
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

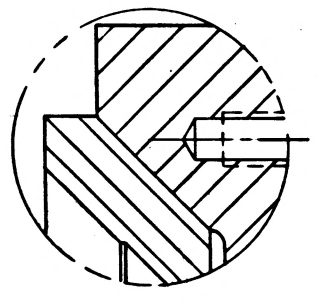
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011739 A

REVISIONS			TORR 01583	
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	A-4	NEXT ASSY NO. WAS 1011000 TDRR 02241	7-17-63	WK 7-24-63

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. LAP INTERFACE OF ITEMS ① & ② TO OBTAIN AREA CONTACT OF NOT LESS THAN 75%.
3. GRIND OR LAP SURFACE "B" TO OBTAIN DIMENSION INDICATED.
4. DRY FILM LUBRICATE PER MIL-L-25504.
5. AFTER GRINDING OR LAPPING IS COMPLETED VIBRATION PROOF ITEM ③ AS PER MIL-E-5400 (PAR 3.1.17e).





DETAIL "A"
SCALE 4/1

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
3	2		1011571	57386900900		SCREW, SHOULDER			
2	1		1011570	57386900890		INSERT, BALL MOUNT, LINE			
1	1		1011569	57386900880		INSERT, BALL MOUNT, LINE BASE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
Ⓐ 1011889	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900540
DRAWN V. AMATO DATE 5-16-63
CHECKED W. W. Lang 5-27-63
APPROVAL Ed MacDonald 5-27-63
APPROVAL R. H. [illegible] 6-3-63
NASA APPROVAL Jack Barney
MIT APPROVAL [illegible] 6/14/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
INSERT, BALL MOUNT, LINE, ASSY OF

CODE IDENT NO.
SIZE C
NASA NUMBER 1011739
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

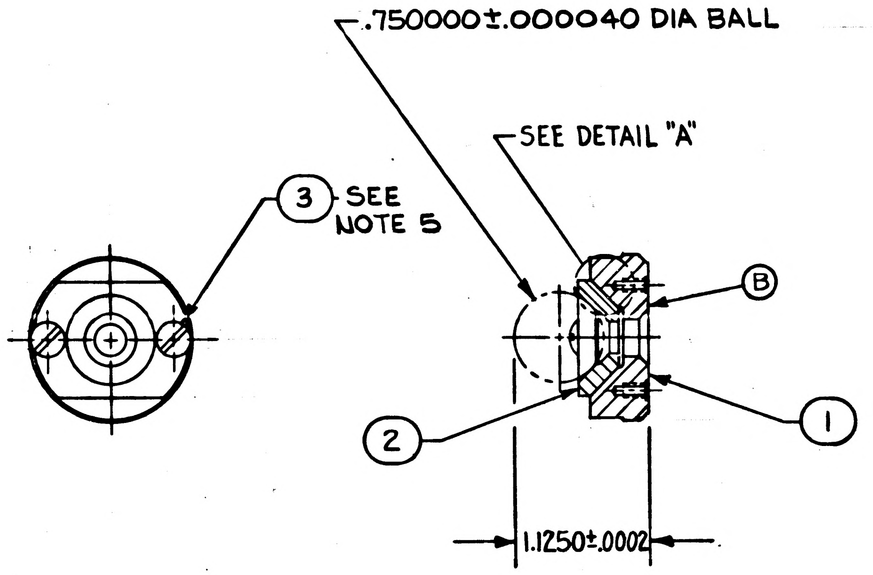
1011739 A

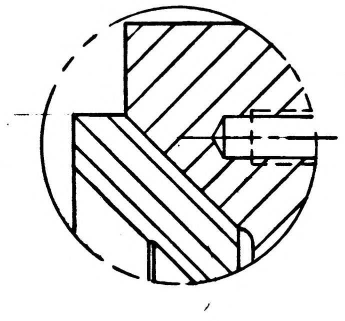
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011739 B

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. LAP INTERFACE OF ITEMS ① & ② TO OBTAIN AREA
(B1) CONTACT OF NOT LESS THAN 75%. AFTER LAPPING SERIALIZE PARTS TO INSURE THE MATCHING OF LAPPED PARTS AFTER LUBRICATION. DRYFILM LUBRICATE THESE SURFACES FOR MIL-L-8937 FORM "A" WITH THICKNESS OF LUBRICANT ON EACH SURFACE .0001 TO
(B2) .0002 IN
3. GRIND OR LAP SURFACE "B" TO OBTAIN DIMENSION INDICATED AFTER APPLICATION OF LUBRICATION FILM
4. DRY FILM LUBRICATE PER MIL-L-25504
5. AFTER GRINDING OR LAPPING IS COMPLETED VIBRATION PROOF ITEM ③ AS PER MIL-E-5400 (PAR 3.1.17e)

REVISIONS		TORR 01583		
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	A-4	NEXT ASSY NO. WAS 1011000 TDRR 02241	7-17-63	WK 7-24-63
B2	D-6	1) REVISED NOTE NO. 2 2) REVISED NOTE NO. 3 TDRR NO. 02244	7-30-63	WK 8/6/63





DETAIL "A"
SCALE 4/1

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
3	2		1011571	57386900900		SCREW, SHOULDER			
2	1		1011570	57386900890		INSERT, BALL MOUNT, LINE			
1	1		1011569	57386900880		INSERT, BALL MOUNT, LINE BASE			

LIST OF PARTS AND MATERIALS

	NEXT ASSY	USED ON
A	1011889	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES: FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900540

DRAWN V. AMATO DATE 5-16-63
CHECKED W. W. Lang 5-27-63
APPROVAL [illegible] 5-27-63
APPROVAL R. N. [illegible] 6-3-63
NASA APPROVAL Jack Barnard
MIT APPROVAL [illegible] 6/14/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
INSERT, BALL MOUNT,
LINE, ASSY OF

CODE IDENT NO. | SIZE C | NASA NUMBER 1011739
SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

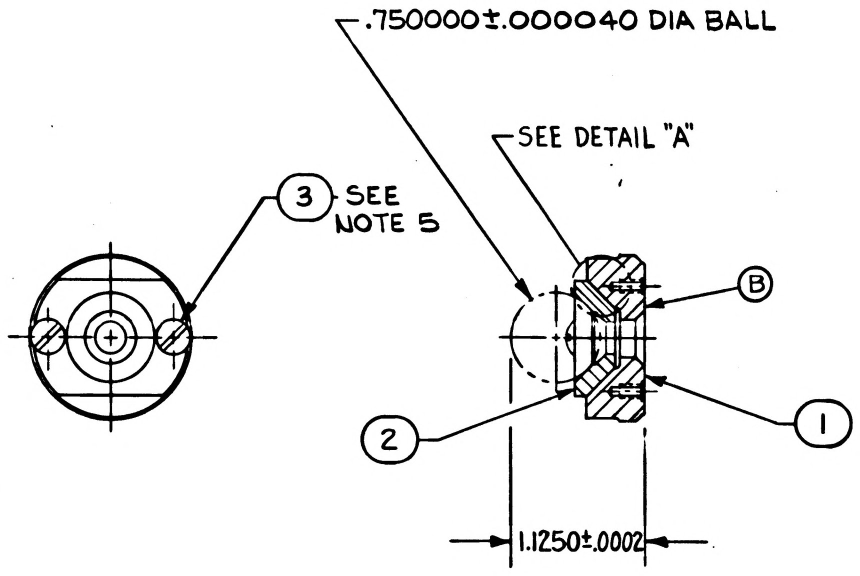
E-154

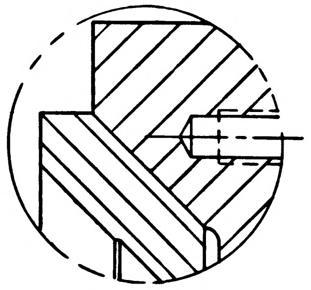
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011739

REVISIONS TORR 01583				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. LAP INTERFACE OF ITEMS ① & ② TO OBTAIN AREA CONTACT OF NOT LESS THAN 75%.
3. GRIND OR LAP SURFACE "B" TO OBTAIN DIMENSION INDICATED.
4. DRY FILM LUBRICATE PER MIL-L-25504.
5. AFTER GRINDING OR LAPPING IS COMPLETED VIBRATION PROOF ITEM ③ AS PER MIL-E-5400 (PAR 3.1.17e).





DETAIL "A"
SCALE 4/1

3	2		1011571	57386900900		SCREW, SHOULDER			
2	1		1011570	57386900890		INSERT, BALL MOUNT, LINE			
1	1		1011569	57386900880		INSERT, BALL MOUNT, LINE BASE			
ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011000	1011000
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

	FRACTIONS	DECIMALS	ANGLES
TOL ON	± ~	± ~	± ~

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900540

DRAWN V. AMATO DATE 5-16-63
CHECKED W.W. Lang 5-27-63
APPROVAL Ed MacDonald 5-27-63
APPROVAL K.H. Gras 6-3-63
NASA APPROVAL Jack Barrow
MIT APPROVAL 6/14/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
INSERT, BALL MOUNT,
LINE, ASSY OF

CODE IDENT NO. | SIZE C | NASA NUMBER 1011739
SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011739

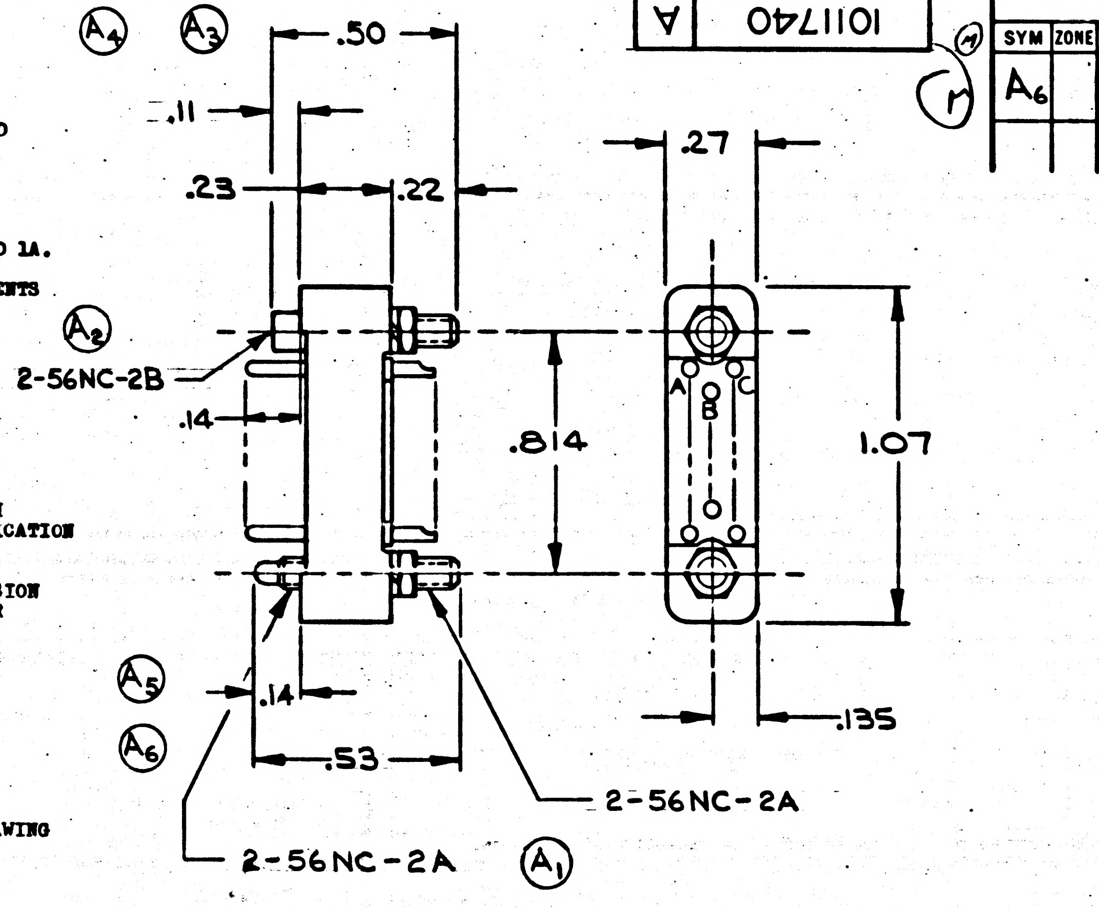
1011740 A

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A6		REVISED PER TDRR NO. 06922	17 MAR 64	WK

REVISIONS 02560

REQUIREMENTS:

1. **GENERAL:**
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.
   - D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052.
   - E. PARTS SHALL MEET ~~THE~~ APPLICABLE REQUIREMENTS OF MIL-C-8384.
2. **INSPECTION AND ACCEPTANCE:**
   - A. MECHANICAL REQUIREMENTS:
     1. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION PER MIL-STD-129.
     2. PARTS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER PER MIL-STD-130, EXCEPT INK OR PAINT NOT ACCEPTABLE.
     3. MECHANICAL DIMENSIONS AS SHOWN.
     4. CONTACTS 20 #22 PINS .030 ± .001 IN. DIAMETER.
     5. ALL PINS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.
     6. ENGAGEMENT: SCREWLOCKS, POLARIZED.
     7. THIS DRAWING SHALL MATE WITH A MATCHING PART NASA DRAWING 1011758 (REF).
     8. WIRE TERMINATION: SOLDER CUP TO ACCOMMODATE #22 AWG STRANDED WIRE.
     9. INSERTION AND WITHDRAWAL FORCE 2 TO 11 OZ/PIN WITH MATING CONNECTOR.
   - B. ELECTRICAL REQUIREMENTS:
     1. INSULATION RESISTANCE: 1000 MEGOHMS MIN. AT 1000 VDC
     2. SERVICE RATING: SEA LEVEL 530 V RMS
     3. DIELECTRIC STRENGTH: SEA LEVEL 1600 V RMS
3. **DESIGN REQUIREMENTS:**
   - A. MOUNTING: PANEL
   - B. SERVICE RATING: 70,000 FEET 140 V RMS
   - C. DIELECTRIC STRENGTH: 70,000 FEET 425 V RMS
   - D. INSULATION (BODY): GLASS FILLED DIALLYL PHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN)
   - E. CONTACTS: PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204, TYPE II, CLASS 2
   - F. SCREWLOCKS: STAINLESS STEEL, PASSIVATED
   - G. CONTACT RATING: 3 AMPS
   - H. CONTACT CENTER TO CENTER: 3/32 ± .002
   - I. SURFACE-CREEPAGE DISTANCE: 1/16 MIN.
   - J. AIR SPACE: .040 MIN.
   - K. CONTACT RESISTANCE: 20 MV MAX AT 3 AMPS



TOLERANCES:-
TWO PLACE DECIMAL, ±.010
THREE PLACE DECIMAL, ±.005

MASTER

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ -	+ -	+ -

DO NOT SCALE THIS DRAWING

MATERIAL

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 68502016801

DRAWN E. DiZZO DATE 4-8-63
CHECKED
APPROVAL 8/9/63
APPROVAL 8-12-63
NASA APPROVAL 8-14-63
MIT APPROVAL 14 Aug 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE CONNECTOR, ELECTRICAL
RECTANGULAR, 20 #22 PIN CONTACTS
SPECIFICATION CONTROL
DRAWING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011740
SCALE ~
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

B | 1011740

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A6		REVISED PER TDRR NO. 06922	17 MAR 64	WK
B		REVISED PER TDRR 10742	4/29/64	L.E.L

REVISIONS 02560

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.
   - D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052
   - E. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-C-8384.
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     1. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION PER MIL-STD-129.
     2. PARTS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER PER MIL-STD-130, EXCEPT INK OR PAINT NOT ACCEPTABLE.
     3. MECHANICAL DIMENSIONS AS SHOWN.
     4. CONTACTS 20 #22 PINS .030 ± .001 IN. DIAMETER.
     5. ALL PINS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.
     6. ENGAGEMENT: SCREWLOCKS POLARIZED
     7. THIS DRAWING SHALL MATE WITH A MATCHING PART NASA DRAWING 1011758 (REF).
     8. WIRE TERMINATION: SOLDER CUP TO ACCOMMODATE #22 AWG STRANDED WIRE.
     9. INSERTION AND WITHDRAWAL FORCE 2 TO 11 OZ/PIN WITH MATING CONNECTOR.
   - B. ELECTRICAL REQUIREMENTS:

1. INSULATION RESISTANCE:	1000 MEGOHMS MIN. AT 1000 VDC
2. SERVICE RATING:	SEA LEVEL 530 V RMS
3. DIELECTRIC STRENGTH:	SEA LEVEL 1600 V RMS

3. DESIGN REQUIREMENTS:

A. MOUNTING:	PER TABLE I
B. SERVICE RATING:	70,000 FEET 140 V RMS
C. DIELECTRIC STRENGTH:	70,000 FEET 425 V RMS
D. INSULATION (BODY):	GLASS FILLED DIALLYL PHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN)
E. CONTACTS:	PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204, TYPE II, CLASS 2
F. SCREWLOCKS AND STUDS	STAINLESS STEEL, PASSIVATED
G. CONTACT RATING:	3 AMPS
H. CONTACT CENTER TO CENTER:	3/32 ± .002
I. SURFACE-CREEPAGE DISTANCE:	1/16 MIN.
J. AIR SPACE:	.040 MIN.
K. CONTACT RESISTANCE:	20 MV MAX AT 3 AMPS

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

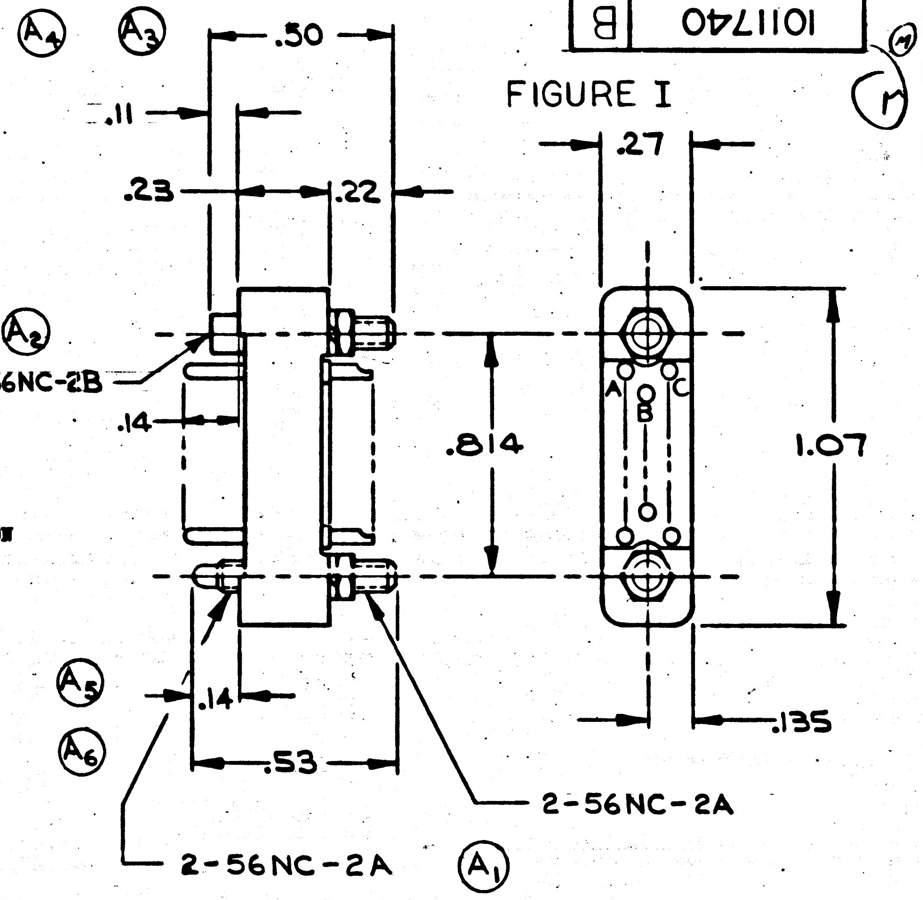


FIGURE I

TABLE I

DASH NO.	MOUNTING HARDWARE
1011740-1	CHASSIS MOUNTS PER FIGURE I
1011740-2	SCREWLOCKS PER FIG. II

TOLERANCES:-
TWO PLACE DECIMAL, ±.010
THREE PLACE DECIMAL, ±.005

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ −	+ −	+ −

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 68502016801

DRAWN E. Dizzo DATE 4-8-63
CHECKED M. Bucyrus
APPROVAL C. F. Costy 8/9/63
APPROVAL E. Manny 8-12-63
NASA APPROVAL W. J. Rhine 8-14-63
MIT APPROVAL W. Kupfer 14 Aug 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE CONNECTOR, ELECTRICAL RECTANGULAR, 20 #22 PIN CONTACTS SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011740
SCALE ~
WEIGHT CALC ACTUAL
SHEET 1 OF 2

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

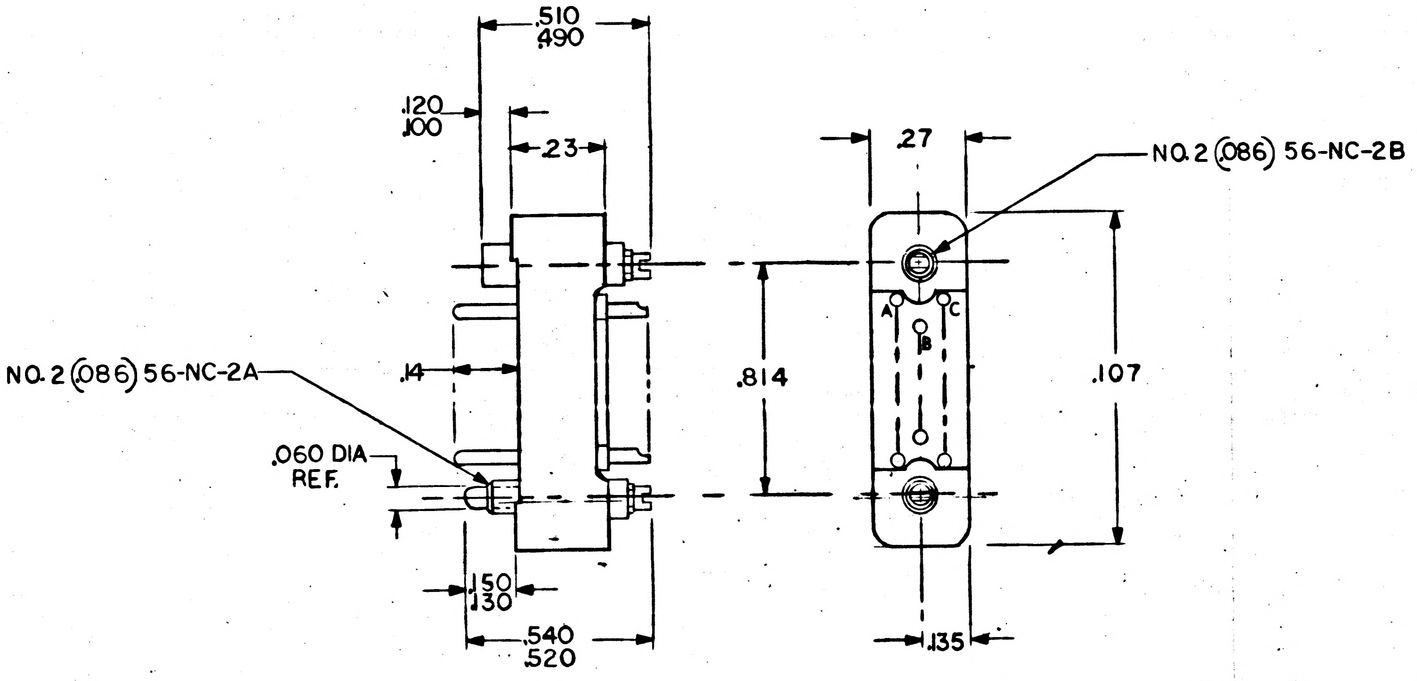
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1011740 B

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
B	THIS SHEET ADDED PER TDRR 10772		

FIGURE II



Ⓑ THIS SHEET ADDED

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT

DRAWN A. Addario Jr DATE 25 Jun 64
CHECKED A. Marts 6-29-64
APPROVAL E. [illegible] (wpm) 6/29/64
APPROVAL
NASA APPROVAL
MIT APPROVAL 6/29/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CONNECTOR, ELECTRICAL
RECTANGULAR, 20 #22 PIN
CONTACTS
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011740
SCALE NONE
WT
SHEET 2 OF 2

MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

C | 1011740

REQUIREMENTS:

1. **GENERAL:**
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.
   - D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052
   - E. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-C-8384.
2. **INSPECTION AND ACCEPTANCE:**
   - A. MECHANICAL REQUIREMENTS:
     1. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION PER MIL-STD-129.
     2. PARTS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER PER MIL-STD-130, EXCEPT INK OR PAINT NOT ACCEPTABLE.
     3. MECHANICAL DIMENSIONS AS SHOWN.
     4. CONTACTS 20 #22 PINS .030 ± .001 IN. DIAMETER.
     5. ALL PINS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.
     6. ENGAGEMENT: SCREWLOCKS POLARIZED
     7. THIS DRAWING SHALL MATE WITH A MATCHING PART NASA DRAWING 1011758 (REF).
     8. WIRE TERMINATION: SOLDER CUP TO ACCOMMODATE #22 AWG STRANDED WIRE.
     9. INSERTION AND WITHDRAWAL FORCE 2 TO 11 OZ/PIN WITH MATING CONNECTOR.
   - B. ELECTRICAL REQUIREMENTS:

1. INSULATION RESISTANCE:	1000 MEGOHMS MIN. AT 1000 VDC
2. SERVICE RATING:	SEA LEVEL 530 V RMS
3. DIELECTRIC STRENGTH:	SEA LEVEL 1600 V RMS

C. MATING TORQUE: UNIT SHALL WITHSTAND A MATING TORQUE OF 2 1/4 TO 2 1/2 IN. LBS. MAXIMUM WITHOUT DEGRADATION OF PERFORMANCE

A. MOUNTING:	PER TABLE I
B. SERVICE RATING:	70,000 FEET 140 V RMS
C. DIELECTRIC STRENGTH:	70,000 FEET 425 V RMS
D. INSULATION (BODY):	GLASS FILLED DIALLYL PHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN)
E. CONTACTS:	PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204, TYPE II, CLASS 2 OVER COPPER FLASH
F. SCREWLOCKS AND STUDS	STAINLESS STEEL, PASSIVATED
G. CONTACT RATING:	3 AMPS
H. CONTACT CENTER TO CENTER:	3/32 ± .002
I. SURFACE-CREEPAGE DISTANCE:	1/16 MIN.
J. AIR SPACE:	.040 MIN.

K. CONTACT RESISTANCE:
1. 20 MV MAX AT 3 AMPS
2. 25 MICROVOLTS MAXIMUM AT 250 MICROAMPS D.C. AFTER 500 INSERTIONS AND WITHDRAWALS.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

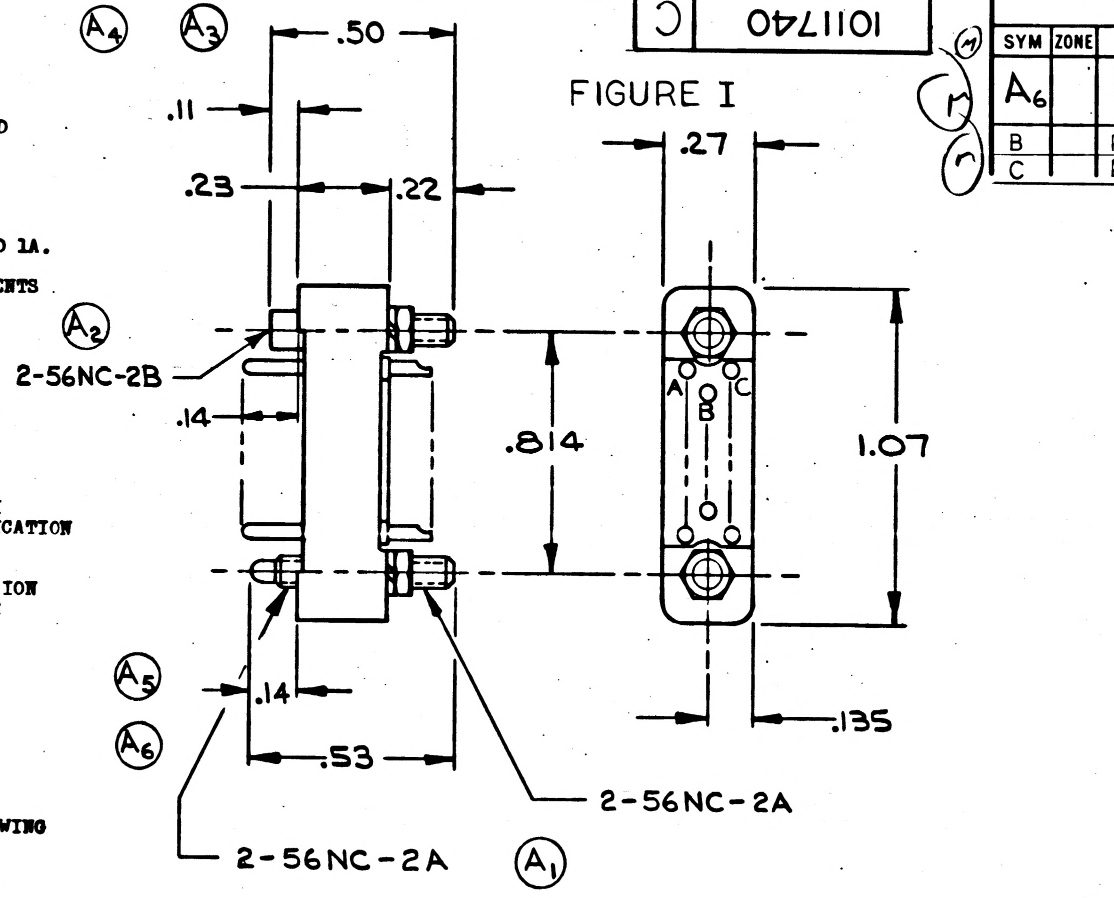


FIGURE I

TABLE I

DASH NO.	MOUNTING HARDWARE
1011740-1	CHASSIS MOUNTS PER FIGURE I
1011740-2	SCREWLOCKS PER FIG. II

TOLERANCES:-
TWO PLACE DECIMAL, ±.010
THREE PLACE DECIMAL, ±.005

MASTER

REVISIONS 02560

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A6		REVISED PER TDRR NO. 06922	17 MAR 64	Wk
B		REVISED PER TDRR 10742	6/29/64	L.E.K
C		REVISED PER TDPR 14882	12-22-64	Wk

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ -	+ -	+ -

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 68502016801

DRAWN E. Rizzo DATE 4-8-63
CHECKED
APPROVAL C.F. Costey 8/9/63
APPROVAL 8-12-63
NASA APPROVAL W. J. 8-14-63
MIT APPROVAL 14 Aug 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE CONNECTOR, ELECTRICAL RECTANGULAR, 20 #22 PIN CONTACTS SPECIFICATION CONTROL DRAWING

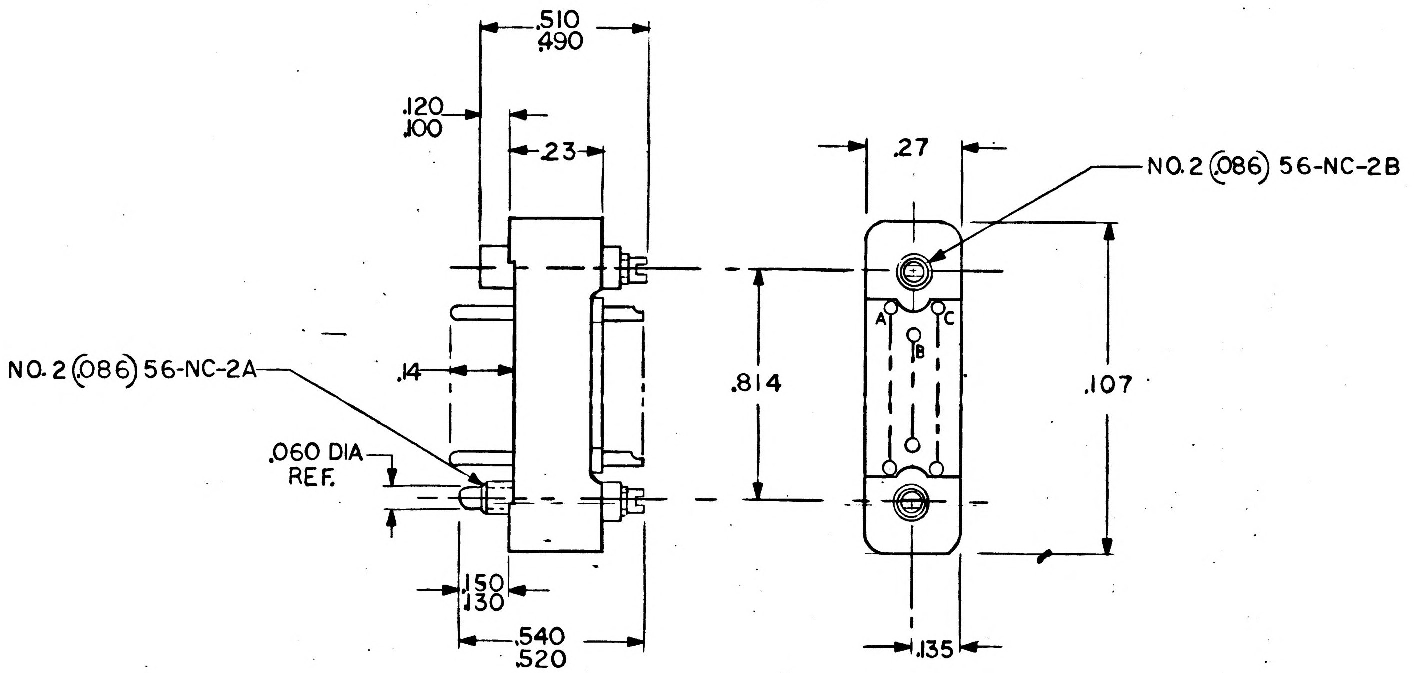
CODE IDENT NO. | SIZE C | NASA NUMBER 1011740
SCALE ~ | WEIGHT CALC ACTUAL | SHEET 1 OF 2

E-154

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
B	THIS SHEET ADDED PER TDRR 10792		wl(
C	REVISED PER TDRR 14882	12-22-64	WK

FIGURE II



Ⓑ THIS SHEET ADDED

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN A. Addario Jr DATE 25 June 64
CHECKED A. Moarts 6-29-64
APPROVAL E. Thorup (wpm) 6-29-64
APPROVAL
NASA APPROVAL J Barnard
MIT APPROVAL L G Lerong 6/29/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CONNECTOR, ELECTRICAL
RECTANGULAR, 20 #22 PIN
CONTACTS
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. | SIZE C | NASA DRAWING NO. 1011740
SCALE NONE | WT | SHEET 2 OF 2

MASTER

1011740 D

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKAGING TO BE IN ACCORDANCE WITH ND 1002215 CLASS I
   - D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052
   - E. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-C-8384.
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     1. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION PER ND 1002019
     2. PARTS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER PER ND1002019
     3. MECHANICAL DIMENSIONS AS SHOWN.
     4. CONTACTS 20 #22 PINS .030 ± .001 IN. DIAMETER.
     5. ALL PINS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.
     6. ENGAGEMENT: SCREWLOCKS POLARIZED
     7. THIS DRAWING SHALL MATE WITH A MATCHING PART NASA DRAWING 1011758 (REF).
     8. WIRE TERMINATION: SOLDER CUP TO ACCOMMODATE #22 AWG STRANDED WIRE.
     9. INSERTION AND WITHDRAWAL FORCE 2 TO 11 OZ/PIN WITH MATING CONNECTOR.
   - B. ELECTRICAL REQUIREMENTS:

1. INSULATION RESISTANCE:	1000 MEGOHMS MIN. AT 1000 VDC
2. SERVICE RATING:	SEA LEVEL 530 V RMS
3. DIELECTRIC STRENGTH:	SEA LEVEL 1600 V RMS

   - C. MATING TORQUE: UNIT SHALL WITHSTAND A MATING TORQUE OF 2 1/4 TO 2 1/2 IN. LBS. MAXIMUM WITHOUT DEGRADATION OF PERFORMANCE

A. MOUNTING:	PER TABLE I
B. SERVICE RATING:	70,000 FEET 140 V RMS
C. DIELECTRIC STRENGTH:	70,000 FEET 425 V RMS
D. INSULATION (BODY):	GLASS FILLED DIALLYL PHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN)
E. CONTACTS:	PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204, TYPE II, CLASS 2 OVER COPPER FLASH
F. SCREWLOCKS AND STUDS	STAINLESS STEEL, PASSIVATED
G. CONTACT RATING:	3 AMPS
H. CONTACT CENTER TO CENTER:	3/32 ± .002
I. SURFACE-CREEPAGE DISTANCE:	1/16 MIN.
J. AIR SPACE:	.040 MIN.

K. CONTACT RESISTANCE:
1. 20 MV MAX AT 3 AMPS
2. 25 MICROVOLTS MAXIMUM AT 250 MICROAMPS D.C. AFTER 500 INSERTIONS AND WITHDRAWALS.

L. LOCK WASHER & NUT: CRES PER FED SPEC QQ-S-763 CLASS 302, OR 303 PASSIVATE IN ACCORDANCE WITH MIL-STD-171 PARA. 5.4.1

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

FIGURE I

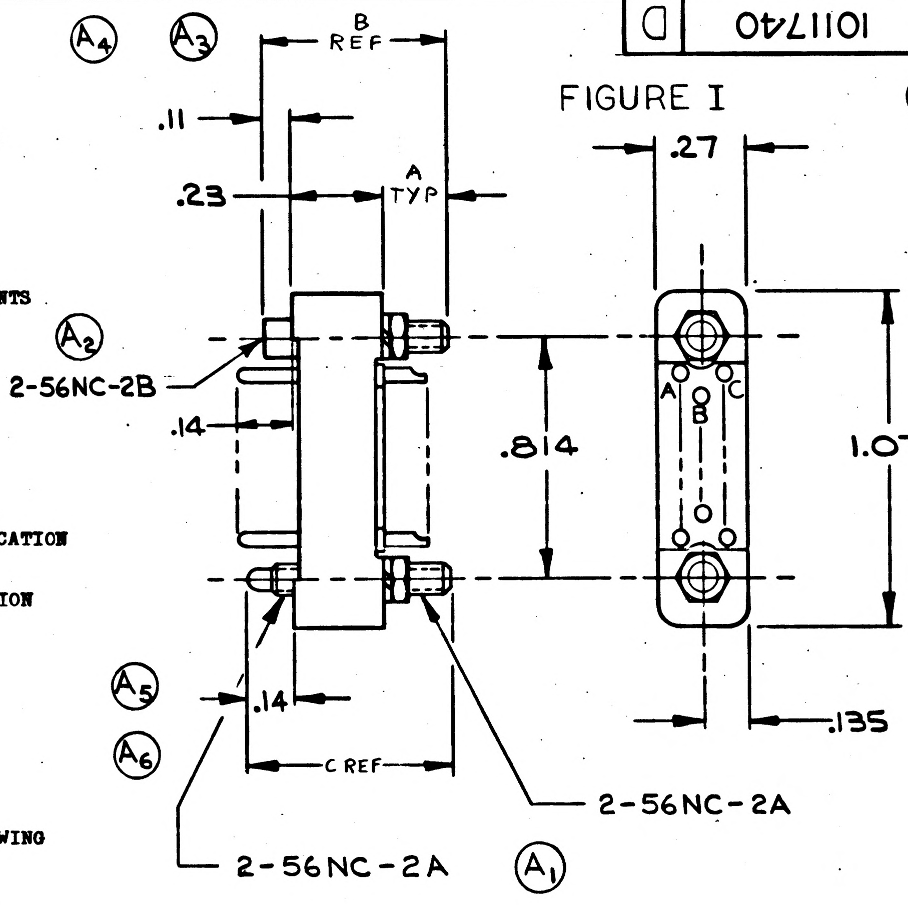


TABLE I

DASH NO.	MOUNTING HARDWARE	A	B	C
1011740-1	CHASSIS MOUNTS PER FIGURE II	.16	.50	.53
1011740-2	SCREWLOCKS PER FIG. II	—	—	—
1011740-3	CHASIS MOUNTS PER FIGURE I	.25	.59	.62

TOLERANCES:–
TWO PLACE DECIMAL, ±.010
THREE PLACE DECIMAL, ±.005

MASTER

REVISIONS 02560

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A6		REVISED PER TDRR NO. 06922	17 MAR 64	WK
B		REVISED PER TDRR 10742	4/29/64	L.E.K
C		REVISED PER TDPR 14882	12-22-64	WK
D		REVISED PER TDRR 15770	2/2/65	WK

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ –	+ –	+ –

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC
PN

DRAWN E. Rizzo DATE 4-8-63
CHECKED
APPROVAL C.F. Costey 8/9/63
APPROVAL E. Thomas 8-12-63
NASA APPROVAL W. J. Rhine 8-14-63
MIT APPROVAL W Kupfer 14 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE CONNECTOR, ELECTRICAL
RECTANGULAR, 20 #22 PIN CONTACTS
SPECIFICATION CONTROL
DRAWING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011740
SCALE ~
WEIGHT CALC ACTUAL
SHEET 1 OF 2

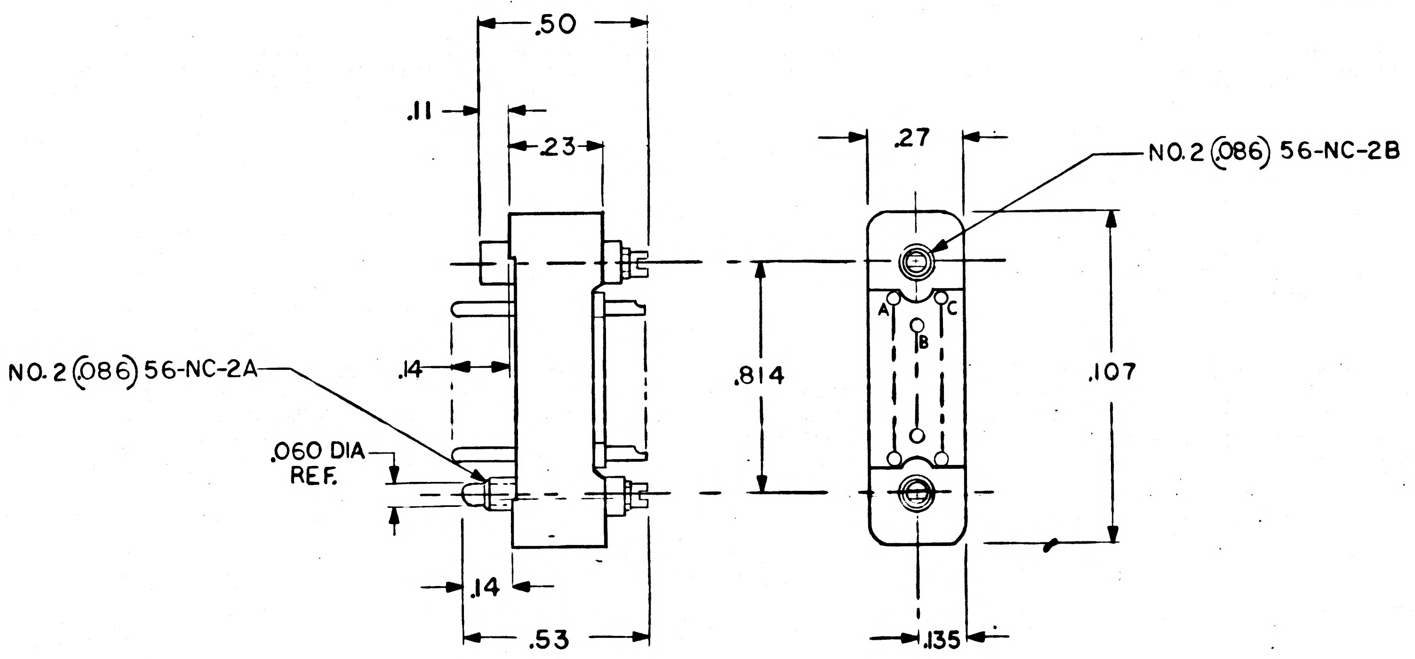
E-184

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

D 1011740

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
B	THIS SHEET ADDED PER TDRR 10772		wk
C	REVISED PER TDPR 14882	12-22-64	wk
D	REVISED PER TDRR 15770	2/2/65	wk

FIGURE II



B THIS SHEET ADDED

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN A. Addario Jr. DATE 25 June 64
CHECKED A. Mearts 6-29-64
APPROVAL E. Thomp (wpm) 6-29-64
APPROVAL
NASA APPROVAL
MIT APPROVAL 6/29/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CONNECTOR, ELECTRICAL RECTANGULAR, 20 #22 PIN CONTACTS
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011740
SCALE NONE
WT
SHEET 2 OF 2

MASTER

REVISIONS 02560				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REQUIREMENTS:

1. GENERAL:

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.

D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052

E. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-C-8384.

2. INSPECTION AND ACCEPTANCE:

A. MECHANICAL REQUIREMENTS:

1. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION PER MIL-STD-129.
2. PARTS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER PER MIL-STD-130, EXCEPT INK OR PAINT NOT ACCEPTABLE.
3. MECHANICAL DIMENSIONS AS SHOWN.
4. CONTACTS 20 #22 PINS .030 ± .001 IN. DIAMETER.
5. ALL PINS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.
6. ENGAGEMENT: SCREWLOCKS, POLARIZED.
7. THIS DRAWING SHALL MATE WITH A MATCHING PART NASA DRAWING 1011758 (REF).
8. WIRE TERMINATION: SOLDER CUP TO ACCOMMODATE #22 AWG STRANDED WIRE.
9. INSERTION AND WITHDRAWAL FORCE 2 TO 11 OZ/PIN WITH MATING CONNECTOR.

B. ELECTRICAL REQUIREMENTS:

1. INSULATION RESISTANCE: 1000 MEGOHMS MIN. AT 1000 VDC
2. SERVICE RATING: SEA LEVEL 530 V RMS
3. DIELECTRIC STRENGTH: SEA LEVEL 1600 V RMS

3. DESIGN REQUIREMENTS:

A. MOUNTING: PANEL

B. SERVICE RATING: 70,000 FEET 140 V RMS

C. DIELECTRIC STRENGTH: 70,000 FEET 425 V RMS

D. INSULATION (BODY): GLASS FILLED DIALLYL PHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN)

E. CONTACTS: PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204, TYPE II, CLASS 2

F. SCREWLOCKS: STAINLESS STEEL, PASSIVATED

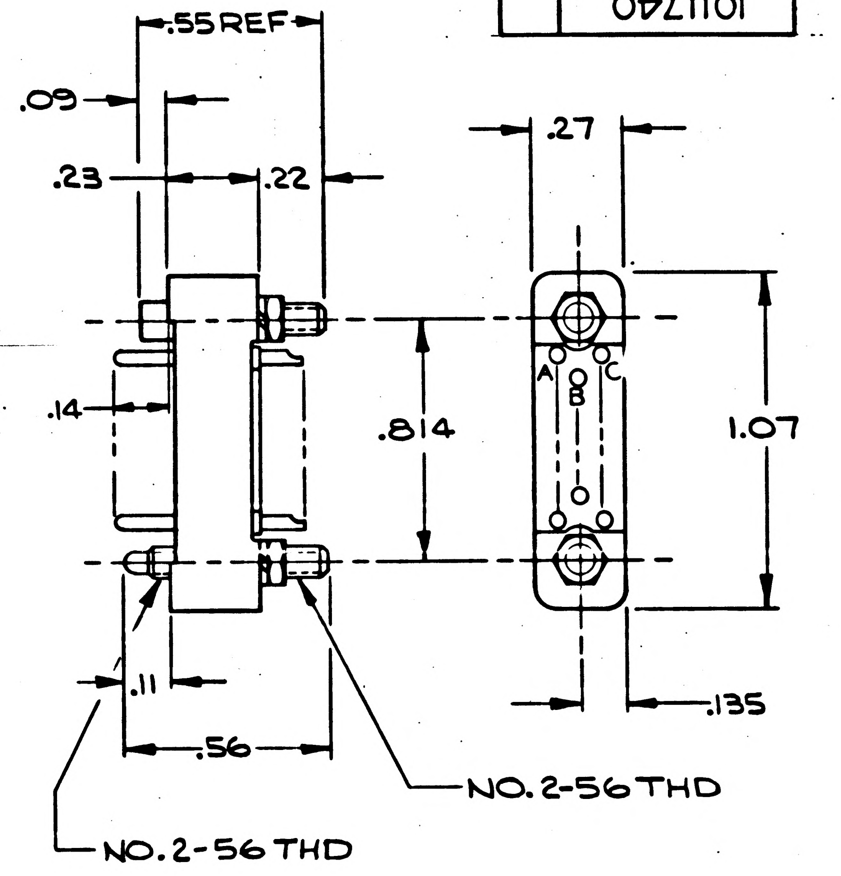
G. CONTACT RATING: 3 AMPS

H. CONTACT CENTER TO CENTER: 3/32 ± .002

I. SURFACE-CREEPAGE DISTANCE: 1/16 MIN.

J. AIR SPACE: .040 MIN.

K. CONTACT RESISTANCE: 20 MV MAX AT 3 AMPS



TOLERANCES:~
TWO PLACE DECIMAL, ±.010
THREE PLACE DECIMAL, ±.005

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± | DECIMALS ± | ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 68502016801

DRAWN E. Rizzo DATE 4-8-63
CHECKED
APPROVAL 8/9/63
APPROVAL 8-12-63
NASA APPROVAL 8-14-63
MIT APPROVAL 14 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE CONNECTOR, ELECTRICAL
RECTANGULAR, 20 #22 PIN CONTACTS
SPECIFICATION CONTROL
DRAWING

CODE IDENT NO. | SIZE C | NASA NUMBER 1011740
SCALE ~ | WEIGHT CALC ACTUAL | SHEET 1 OF 1

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011741 A

REVISIONS 02560				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A6		REVISED PER TDRR NO. 06510	26 FEB 64	

REQUIREMENTS:

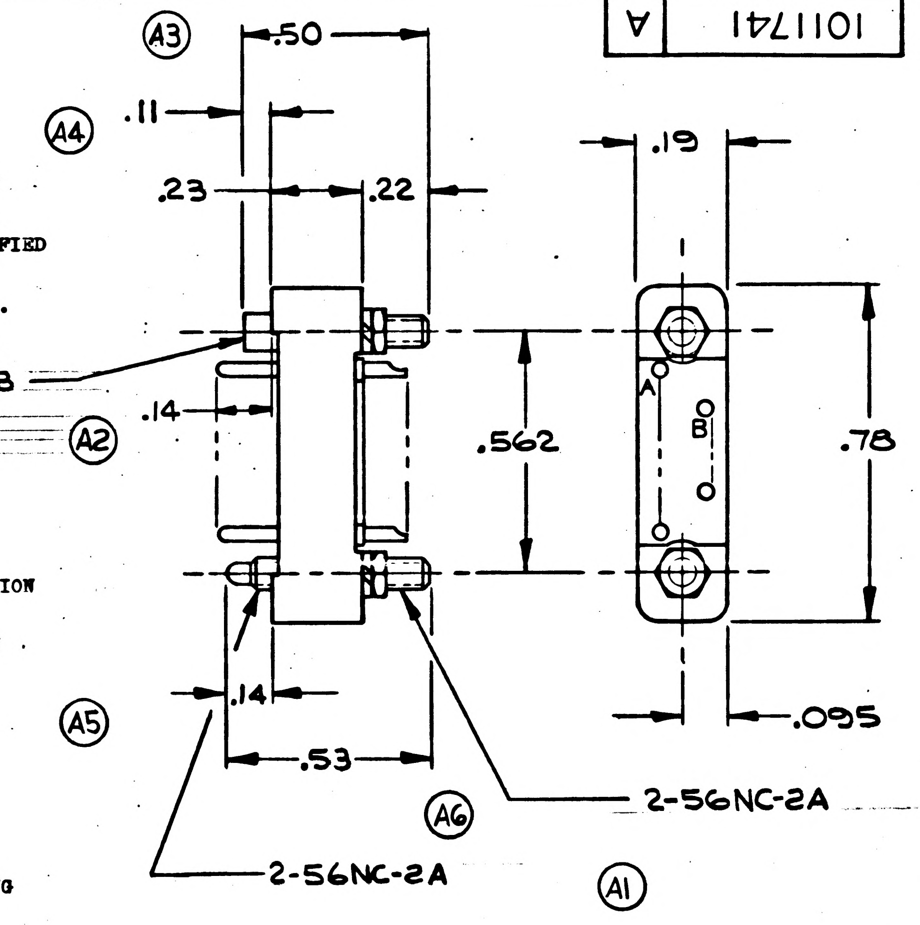
1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.
   - D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052
   - E. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-C-8384.
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     1. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION PER MIL-STD-129.
     2. PARTS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER PER MIL-STD-130, EXCEPT INK OR PAINT NOT ACCEPTABLE.
     3. MECHANICAL DIMENSIONS AS SHOWN.
     4. CONTACTS 7 #22 PINS .030 ± .001 IN. DIAMETER.
     5. ALL PINS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.
     6. ENGAGEMENT: SCREWLOCKS, POLARIZED.
     7. THIS DRAWING SHALL MATE WITH A MATCHING PART NASA DRAWING 1011757 (REF).
     8. WIRE TERMINATION: SOLDER CUP TO ACCOMMODATE #22 AWG STRANDED WIRE.
     9. INSERTION AND WITHDRAWAL FORCE 2 TO 11 OZ/PIN WITH MATING CONNECTOR.
   - B. ELECTRICAL REQUIREMENTS:

1. INSULATION RESISTANCE:	1000 MEGOHMS MIN AT 1000 VDC
2. SERVICE RATING:	SEA LEVEL 530 V RMS
3. DIELECTRIC STRENGTH:	SEA LEVEL 1600 V RMS

3. DESIGN REQUIREMENTS:

A. MOUNTING:	PANEL
B. SERVICE RATING:	70,000 FEET 140 V RMS
C. DIELECTRIC STRENGTH:	70,000 FEET 425 V RMS
D. INSULATION (BODY):	GLASS FILLED DIALLYL PHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN)
E. CONTACTS:	PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204, TYPE II, CLASS 2
F. SCREWLOCKS:	STAINLESS STEEL, PASSIVATED
G. CONTACT RATING:	3 AMPS
H. CONTACT CENTER TO CENTER:	3/32 ± .002
I. SURFACE-CREEPAGE DISTANCE:	1/16 MIN.
J. AIR SPACE:	.040 MIN.
K. CONTACT RESISTANCE:	20 MV MAX AT 3 AMPS

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



TOLERANCES:–
TWO PLACE DECIMAL, ±.010
THREE PLACE DECIMAL, ±.005

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ –	+ –	+ –

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 68502-17001

DRAWN E. Pizzo DATE 4-8-63
CHECKED
APPROVAL 8/9/63
APPROVAL 8-12-63
NASA APPROVAL W J 8-14-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE CONNECTOR ELECTRICAL
RECTANGULAR, 7 #22 PIN CONTACTS
SPECIFICATION CONTROL
DRAWING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011741
SCALE ~
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-184

1011741 A

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011741 B

REVISIONS 02560				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A6		REVISED PER TDRR NO. 06510	26 FEB 64	
B		REVISED PER TDRR 14635	12-8-64	WK

REQUIREMENTS:

1. GENERAL:
    A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
    B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
    C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.
    D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052
    E. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-C-8384. (A2)
2. INSPECTION AND ACCEPTANCE:
    A. MECHANICAL REQUIREMENTS:
        1. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION PER MIL-STD-129.
        2. PARTS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER PER MIL-STD-130, EXCEPT INK OR PAINT NOT ACCEPTABLE.
        3. MECHANICAL DIMENSIONS AS SHOWN.
        4. CONTACTS 7 #22 PINS .030 ± .001 IN. DIAMETER.
        5. ALL PINS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.
        6. ENGAGEMENT: SCREWLOCKS, POLARIZED.
        7. THIS DRAWING SHALL MATE WITH A MATCHING PART NASA DRAWING 1011757 (REF).
        8. WIRE TERMINATION: SOLDER CUP TO ACCOMMODATE #22 AWG STRANDED WIRE.
        9. INSERTION AND WITHDRAWAL FORCE 2 TO 11 OZ/PIN WITH MATING CONNECTOR.
        10. MATING TORQUE: UNIT SHALL HAVE A MATING TORQUE OF 2 1/4 TO 2 1/2 IN-LBS. WITHOUT DEGRADATION OF PERFORMANCE.

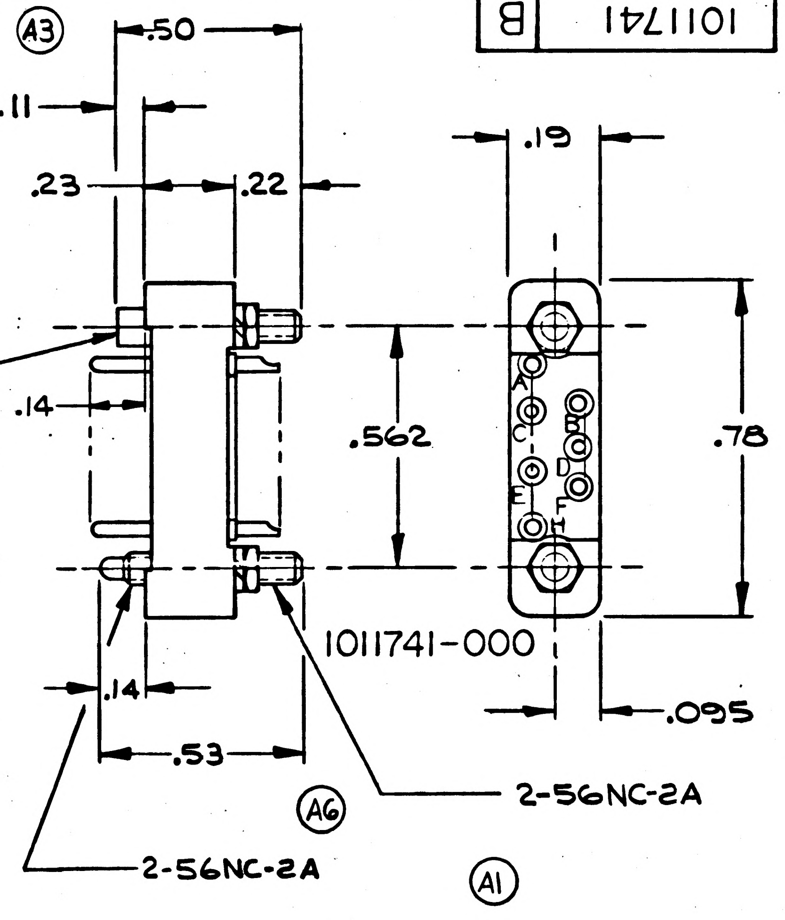
1. INSULATION RESISTANCE:	1000 MEGOHMS MIN AT 1000 VDC
2. SERVICE RATING:	SEA LEVEL 530 V RMS
3. DIELECTRIC STRENGTH:	SEA LEVEL 1600 V RMS

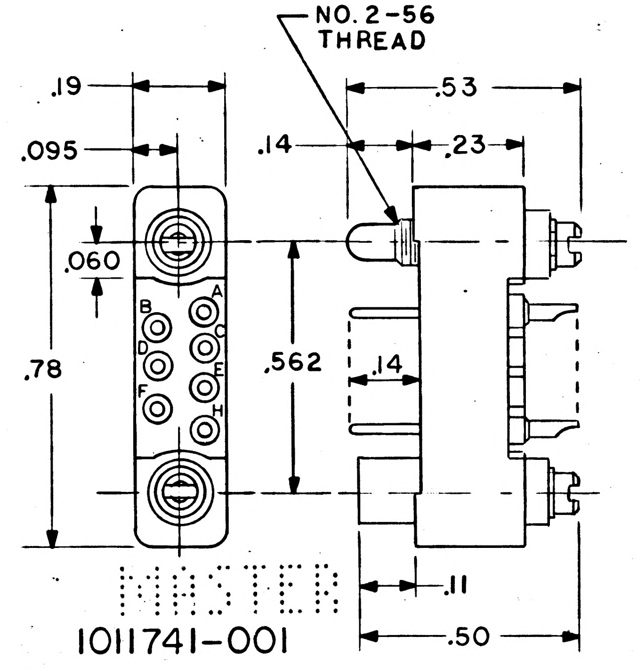
3. DESIGN REQUIREMENTS:

A. MOUNTING:	PANEL
B. SERVICE RATING:	70,000 FEET 140 V RMS
C. DIELECTRIC STRENGTH:	70,000 FEET 425 V RMS
D. INSULATION (BODY):	GLASS FILLED DIALLYL PHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN)
E. CONTACTS:	PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204, TYPE II, CLASS 2 OVER COPPER FLASH
F. MOUNTING HARDWARE	STAINLESS STEEL, PASSIVATED
G. CONTACT RATING:	3 AMPS
H. CONTACT CENTER TO CENTER:	3/32 ± .002
I. SURFACE-CREEPAGE DISTANCE:	1/16 MIN.
J. AIR SPACE:	.040 MIN.

K. CONTACT RESISTANCE:
1. 20 MV MAX AT 3 AMPS
2. 25 MICROVOLTS MAX AT 250 MICRO AMPS DC AFTER 500 WITHDRAWALS AND INSERTIONS.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.





1011741-001

DRAWING NO.	CONTACTS	TYPE
1011741-000	PINS	RECEPTACLE CHASSIS MOUNT
1011741-001	PINS	PLUG

TOLERANCES:
XX = ±.010
XXX = ±.005

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ −	+ −	+ −

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 68502-17001
DRAWN E.P. 220 DATE 4-8-63
CHECKED
APPROVAL 8/9/63
APPROVAL E. Thomas 8-12-63
NASA APPROVAL W J 8-14-63
MIT APPROVAL 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE CONNECTOR ELECTRICAL
RECTANGULAR, 7 #22 PIN CONTACTS
SPECIFICATION CONTROL
DRAWING

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011741

SCALE ~ WEIGHT CALC ACTUAL SHEET 1 OF 1

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011741

REVISIONS 02560

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REQUIREMENTS:

1. GENERAL:

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

   C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.

   D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052

   E. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-C-8384.

2. INSPECTION AND ACCEPTANCE:

   A. MECHANICAL REQUIREMENTS:

      1. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION PER MIL-STD-129.

      2. PARTS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER PER MIL-STD-130, EXCEPT INK OR PAINT NOT ACCEPTABLE.

      3. MECHANICAL DIMENSIONS AS SHOWN.

      4. CONTACTS 7 #22 PINS .030 ± .001 IN. DIAMETER.

      5. ALL PINS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.

      6. ENGAGEMENT: SCREWLOCKS, POLARIZED.

      7. THIS DRAWING SHALL MATE WITH A MATCHING PART NASA DRAWING 1011757 (REF).

      8. WIRE TERMINATION: SOLDER CUP TO ACCOMMODATE #22 AWG STRANDED WIRE.

      9. INSERTION AND WITHDRAWAL FORCE 2 TO 11 OZ/PIN WITH MATING CONNECTOR.

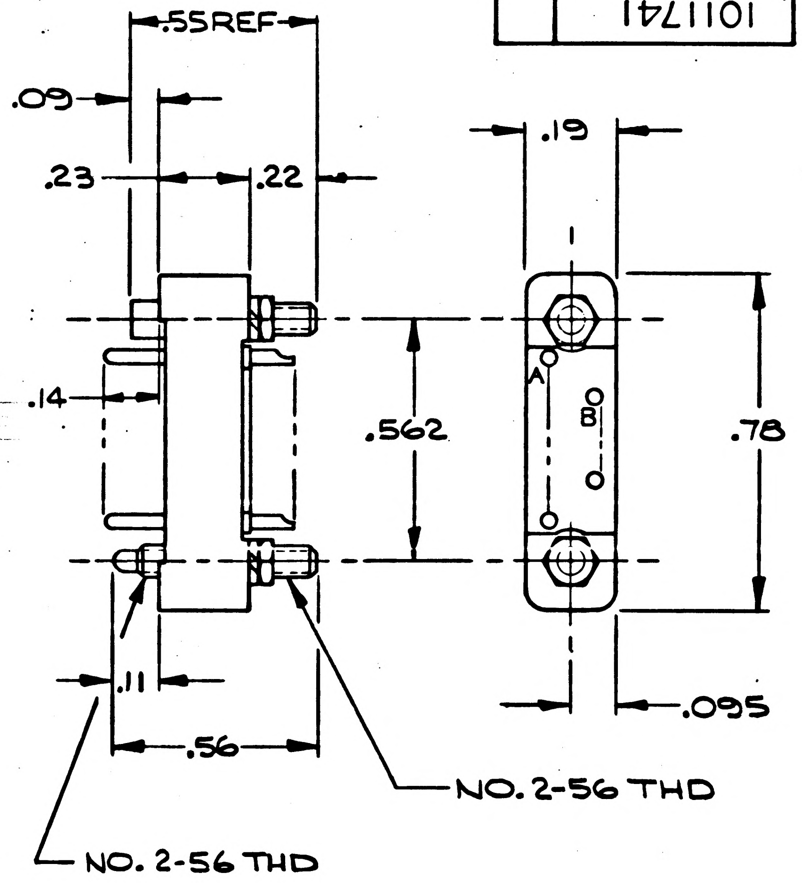
   B. ELECTRICAL REQUIREMENTS:

1. INSULATION RESISTANCE:	1000 MEGOHMS MIN AT 1000 VDC
2. SERVICE RATING:	SEA LEVEL 530 V RMS
3. DIELECTRIC STRENGTH:	SEA LEVEL 1600 V RMS

3. DESIGN REQUIREMENTS:

A. MOUNTING:	PANEL
B. SERVICE RATING:	70,000 FEET 140 V RMS
C. DIELECTRIC STRENGTH:	70,000 FEET 425 V RMS
D. INSULATION (BODY):	GLASS FILLED DIALLYL PHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN)
E. CONTACTS:	PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204, TYPE II, CLASS 2
F. SCREWLOCKS:	STAINLESS STEEL, PASSIVATED
G. CONTACT RATING:	3 AMPS
H. CONTACT CENTER TO CENTER:	3/32 ± .002
I. SURFACE-CREEPAGE DISTANCE:	1/16 MIN.
J. AIR SPACE:	.040 MIN.
K. CONTACT RESISTANCE:	20 MV MAX AT 3 AMPS

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



TOLERANCES:-
TWO PLACE DECIMAL, ±.010
THREE PLACE DECIMAL, ±.005

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

	FRACTIONS	DECIMALS	ANGLES
TOL ON	+ -	+ -	+ -

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 68502-17001

DRAWN E. Pizzo DATE 4-8-63
CHECKED
APPROVAL 8/9/63
APPROVAL 8-12-63
NASA APPROVAL W J 8-14-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE CONNECTOR ELECTRICAL
RECTANGULAR, 7 #22 PIN CONTACTS
SPECIFICATION CONTROL
DRAWING

CODE IDENT NO. | SIZE C | NASA NUMBER 1011741
SCALE ~ | WEIGHT CALC ACTUAL | SHEET 1 OF 1

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011741

2-38

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1011744

SYM	DESCRIPTION	DATE	APPROVAL

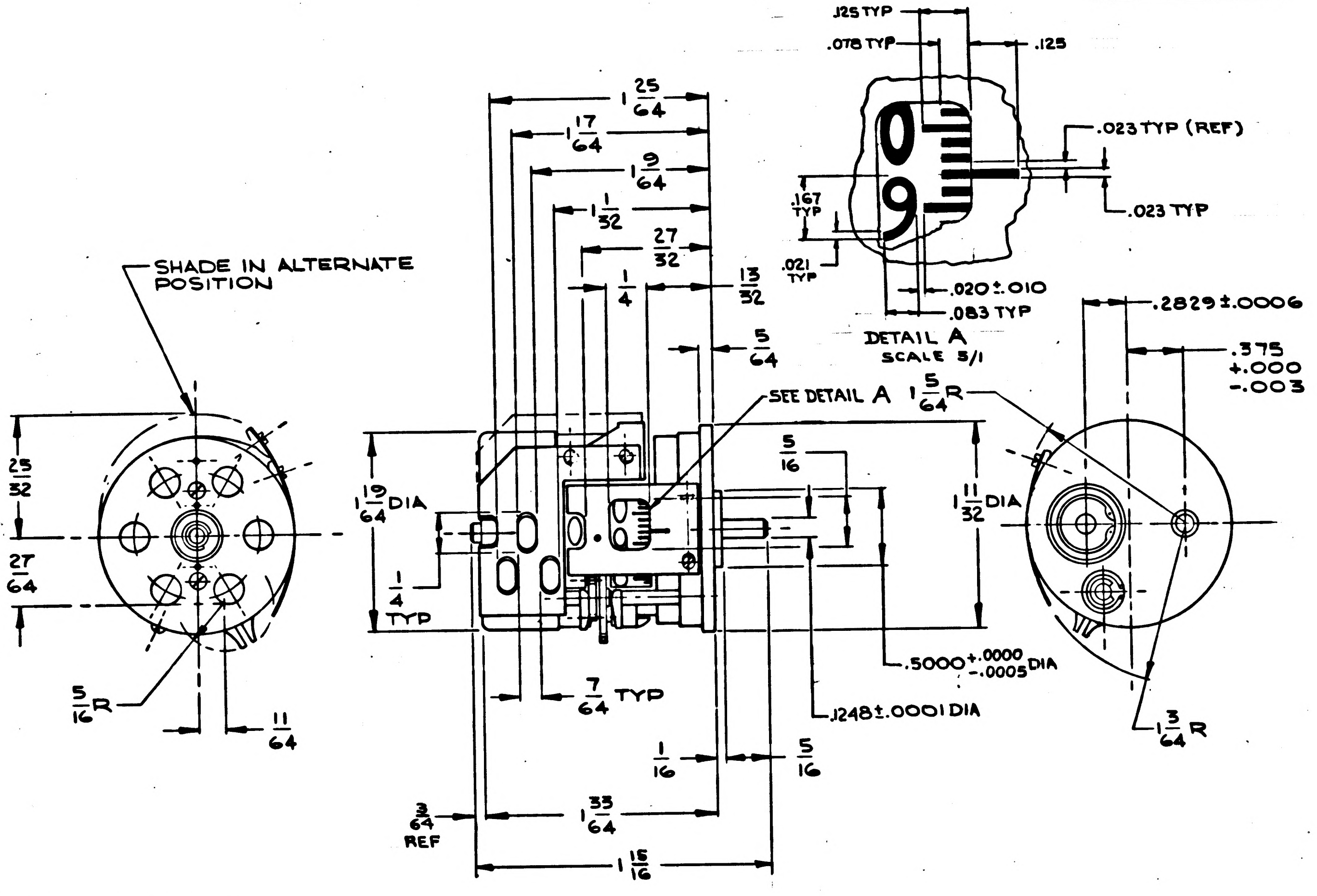
REVISIONS TDRR 03955

REQUIREMENTS:

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED IN MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III.
2. INSPECTION AND ACCEPTANCE:
   - A. UNIT SHALL BE MARKED WITH NASA DRAWING NUMBER REVISION LETTER AND MANUFACTURER'S IDENTIFICATION IN ACCORDANCE WITH:
     UNIT - PER MIL-STD-130 EXCEPT INK OR PAINT NOT ACCEPTABLE.
     PACKAGE AND SHIPPING CONTAINER - PER MIL-STD-129.
   - B. DIMENSIONS AS SHOWN.
   - C. INPUT SHAFT ROTATES COUNTER-CLOCKWISE FOR INCREASING ANGLE NUMBERS WHEN VIEWED FROM SHAFT END VIEW.
   - D. UNIT SHALL HAVE CONTINUOUS ROTATION IN BOTH DIRECTIONS.
   - E. DISTANCE BETWEEN CENTERLINES OF MARKINGS ON TENTHS DRUM SHALL BE 7.2° ± 1.8° (NON-CUMULATIVE) OF SHAFT ROTATION. TOTAL OF FOUR (4) LINES BETWEEN NUMERALS.
   - F. PRESENTATION ANGLE READINGS FROM 0° TO 359.98° THEN START AT 0° AGAIN. EACH REVOLUTION OF COUNTER INPUT SHAFT SHALL RESULT IN A PRESENTATION OF 1 DEGREE.
   - G. TORQUE
     1. 0.05 IN. OZ. MAXIMUM TORQUE REQUIRED TO START ALL THREE DRUMS FROM STANDSTILL.
     2. 0.25 IN. OZ. MAXIMUM TORQUE REQUIRED TO LIFT SHADE. (LOWER TORQUE VALUE REQUIRED TO FLIP SHADE AT ZERO DEGREE POSITION).
3. DESIGN REQUIREMENTS
   - A. FINISH:
     1. DRUMS AND EXTERNAL SHADES SHALL BE BLACK ANODIZED PER MIL-A-8625, TYPE II.
     2. COUNTER DRUMS SHALL HAVE WHITE SILK-SCREENED NUMERALS ON BLACK BACKGROUND
   - B. MATERIALS:
     1. BEARING RACES AND BALLS - CRES, FED. SPEC QQ-S-763, CLASS 440C, CONDITION A, R_C 56 MINIMUM HARDNESS AFTER HEAT TREATMENT.
     2. RETAINER - LINEN BASE PHENOLIC IN ACCORDANCE WITH MIL-P-79, TYPE FBE OR MIL-P-15035 TYPE FBE, (EXCLUDING WATER ABSORBTION AND SPECIFIC GRAVITY) 1-½% MINIMUM POROSITY.
     3. SHADES: CRES IN ACCORDANCE WITH FEDERAL SPECIFICATION QQ-S-766, CLASS 302, CONDITION A. PASSIVATE PER MIL-STD-171 PAR. 5.4.2.
     4. HOUSING: ALUMINUM ALLOY 356-T6. INVESTMENT CASTING IN ACCORDANCE WITH FEDERAL SPECIFICATION QQ-A-601 (ALTERNATE MATERIAL ALUMINUM ALLOY 356-T51). ANODIZED PER MIL-A-8625 TYPE II DYED BLACK.
     5. GEARS:
        - A. ALUMINUM ALLOY 7075-T6 IN ACCORDANCE WITH QQ-A-282 ANODIZED PER MIL-A-8625, TYPE II DYED BLACK.
        - B. CRES IN ACCORDANCE WITH QQ-S-763, CLASS 416. PASSIVATE IN ACCORDANCE WITH MIL-STD-171 PAR. 5.4.1.
     6. PINIONS: CRES 303 IN ACCORDANCE WITH FEDERAL SPECIFICATION QQ-S-763, CLASS 303. PASSIVATE IN ACCORDANCE WITH MIL-STD-171 PAR. 5.4.2.
     7. SHAFTS: CRES 303 IN ACCORDANCE WITH FEDERAL SPECIFICATION QQ-S-763, CLASS 303. PASSIVATE IN ACCORDANCE WITH MIL-STD-171 PAR. 5.4.2.
     8. GENEVA WHEEL: CRES 410 IN ACCORDANCE WITH FEDERAL SPECIFICATION QQ-S-763, CLASS 410, CONDITION A. PASSIVATE IN ACCORDANCE WITH MIL-STD-171 PAR 5.4.1.
   - C. GENERAL:
     1. BEARING TOLERANCES - SHALL BE IN ACCORDANCE WITH ABEC 7.
     2. BEARING LUBRICATION - IN ACCORDANCE WITH ND 1002077.
     3. BEARINGS MAY BE SHIELDED OR UNSHIELDED.
     4. ALL FERROUS PARTS SHALL BE DEMAGNETIZED.
     5. INPUT SPEED
        - A. MAXIMUM ALLOWABLE INPUT SPEED - 2160 RPM.
        - B. RECOMMENDED INPUT SPEED - 1440 RPM MAXIMUM.
4. SPECIAL CONDITIONING

   RUN IN FOR 10 HOURS AT 750 RPM ± 20 RPM AT 25°C ± 5°C, REVERSING DIRECTION EVERY 30 MINUTES. AFTER SPECIAL CONDITIONING EACH UNIT SHALL MEET ALL REQUIREMENTS IN SECTION 2, INSPECTION & ACCEPTANCE. SUPPLIER SHALL SUBMIT TEST DATA RELATING TO REQUIREMENTS 2.G.1, AND 2.G.2 PRIOR TO AND SUBSEQUENT TO SPECIAL CONDITIONING.
5. ENVIRONMENTAL REQUIREMENTS
   - A. LOW TEMPERATURE: 20°F ± 5°F FOR 48 HOURS MIN.
   - B. HIGH TEMPERATURE: 200°F ± 5°F FOR 48 HOURS MIN.
   - C. THERMAL SHOCK: MIL-STD-810 METHOD 503, TEMP. RANGE 20°F ± 5°F TO 180°F ± 5°F. TRANSFER TIME 5 MINUTES MAX.
   - D. THERMAL VACUUM: 200°F ± 5°F AT 1 × 10^{-4} MM Hg FOR 250 HOURS. 20°F ± 5°F AT 1 × 10^{-4} MM Hg FOR 250 HOURS.
   - E. HUMIDITY: IN ACCORDANCE WITH MIL-STD 810 METHOD 507. CONTINUOUS CYCLES SHALL BE 5 FOR A TOTAL TEST TIME OF NOT LESS THAN 120 HOURS.

5. ENVIRONMENTAL REQUIREMENTS (CONTD)
   - F. ACCELERATION: 20g ± 5% FOR 3 MINUTES ALONG EACH AXIS.
   - G. VIBRATION: 20g ± 5% (0 TO PEAK) 5 TO 2000 TO 5 CPS AT 1 MINUTE/OCTAVE LOGARITHMIC SWEEP ONCE ALONG EACH MAJOR AXIS.
   - H. SHOCK: IN ACCORDANCE WITH MIL-STD-810 METHOD 516-1, PROCEDURE V 50g ± 5% SHOCK PULSE.
   - I. ENDURANCE: MECHANICAL CYCLING 200 HOURS MIN AT 750 RPM ± 20 RPM AT 25°C. ± 5°C. REVERSING DIRECTION EVERY 24 HOURS.



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

KIC.
PN 75005005701

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/64 DECIMALS ±.005 ANGLES ± ½
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

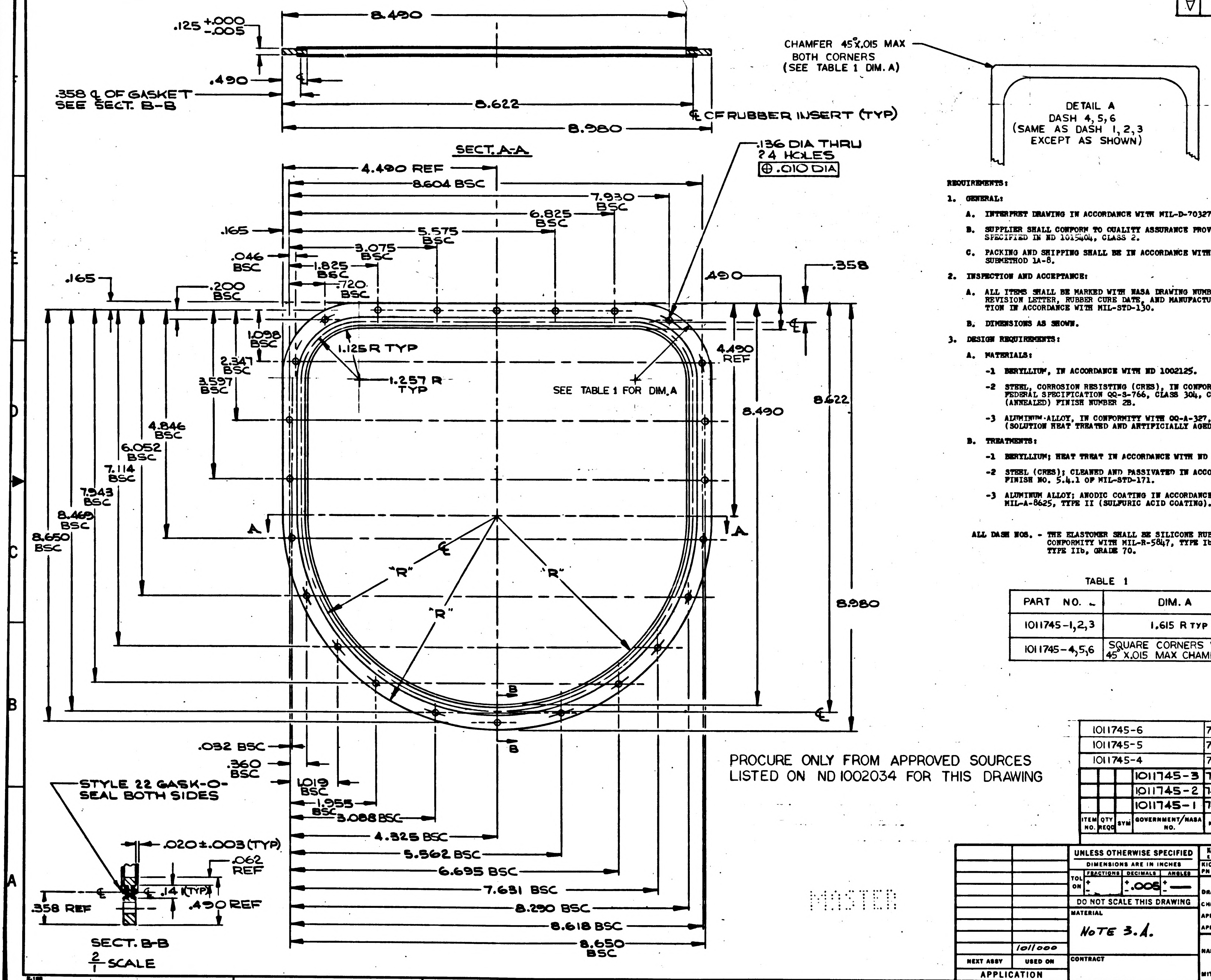
MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN E Pizzo DATE 7-30-63
CHECKED Bowman 7-31-63
APPROVAL G. Ruschmann
APPROVAL E. Thorp 9-23-63
NASA APPROVAL 1/17/63
MIT APPROVAL W Kupfer 17 Oct 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

COUNTER, ROTATING, FIXED MTG, ANGLE
(SPECIFICATION CONTROL DRAWING)

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1011744
SCALE ~ WT.
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY



.125 +.000 -.005
8.490
.490
.358 ℄ OF GASKET SEE SECT. B-B
8.622
℄ CF RUBBER INSERT (TYP)
8.980
SECT. A-A
CHAMFER 45° X.015 MAX BOTH CORNERS (SEE TABLE 1 DIM. A)
DETAIL A DASH 4,5,6 (SAME AS DASH 1,2,3 EXCEPT AS SHOWN)
.136 DIA THRU 24 HOLES
⊕ .010 DIA
4.490 REF
8.604 BSC
7.930 BSC
6.825 BSC
5.575 BSC
3.075 BSC
1.825 BSC
.720 BSC
.165
.046 BSC
.165
.200 BSC
.490
.358
1.098 BSC
2.347 BSC
3.597 BSC
4.846 BSC
6.052 BSC
7.114 BSC
7.943 BSC
8.468 BSC
8.650 BSC
1.125 R TYP
1.257 R TYP
SEE TABLE 1 FOR DIM. A
4.490 REF
8.490
8.622
8.980
A
A
"R"
"R"
"R"
℄
B
B
.032 BSC
.360 BSC
1.019 BSC
1.955 BSC
3.088 BSC
4.325 BSC
5.562 BSC
6.695 BSC
7.651 BSC
8.290 BSC
8.618 BSC
8.650 BSC
STYLE 22 GASK-O-SEAL BOTH SIDES
.020±.003 (TYP)
.062 REF
.14 (TYP)
.358 REF
.490 REF
SECT. B-B
2/1 SCALE

1011745 A

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR 10881		

REVISIONS 02560

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING SHALL BE IN ACCORDANCE WITH MIL-P-116, SUBMETHOD 1A-8.
2. INSPECTION AND ACCEPTANCE:
   - A. ALL ITEMS SHALL BE MARKED WITH NASA DRAWING NUMBER, DASH NUMBER. REVISION LETTER, RUBBER CURE DATE, AND MANUFACTURER'S IDENTIFICATION IN ACCORDANCE WITH MIL-STD-130.
   - B. DIMENSIONS AS SHOWN.
3. DESIGN REQUIREMENTS:
   - A. MATERIALS:
     - -1 BERYLLIUM, IN ACCORDANCE WITH ND 1002125.
     - -2 STEEL, CORROSION RESISTING (CRES), IN CONFORMITY WITH FEDERAL SPECIFICATION QQ-S-766, CLASS 304, CONDITION A (ANNEALED) FINISH NUMBER 2B.
     - -3 ALUMINUM ALLOY, IN CONFORMITY WITH QQ-A-327, TEMPER T6 (SOLUTION HEAT TREATED AND ARTIFICIALLY AGED).
   - B. TREATMENTS:
     - -1 BERYLLIUM; HEAT TREAT IN ACCORDANCE WITH ND 1002092.
     - -2 STEEL (CRES); CLEANED AND PASSIVATED IN ACCORDANCE WITH FINISH NO. 5.4.1 OF MIL-STD-171.
     - -3 ALUMINUM ALLOY; ANODIC COATING IN ACCORDANCE WITH MIL-A-8625, TYPE II (SULFURIC ACID COATING).

ALL DASH NOS. - THE ELASTOMER SHALL BE SILICONE RUBBER IN CONFORMITY WITH MIL-R-5847, TYPE Ib AND TYPE IIb, GRADE 70.

TABLE 1

PART NO. -	DIM. A
1011745-1,2,3	1.615 R TYP
1011745-4,5,6	SQUARE CORNERS WITH 45° X.015 MAX CHAMFER

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
			1011745-6	74426015006		GASKET	ALUM	NOTE 3A-3	
			1011745-5	74426015005		GASKET	CRES	NOTE 3A-2	
			1011745-4	74426015004		GASKET	BE	NOTE 3A-1	
			1011745-3	74426015003		GASKET	ALUM	NOTE 3.A-3	
			1011745-2	74426015002		GASKET	CRES	NOTE 3.A-2	
			1011745-1	74426015001		GASKET	BE.	NOTE 3.A-1	

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ; DECIMALS ±.005 ; ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL: NOTE 3.A.
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 7442601 5001 THRU 5003
DRAWN Pizzo DATE 4-10-63
CHECKED
APPROVAL 8-2-63
APPROVAL 8-12-63
NASA APPROVAL 8-14-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
GASKET
SOURCE CONTROL
DRAWING

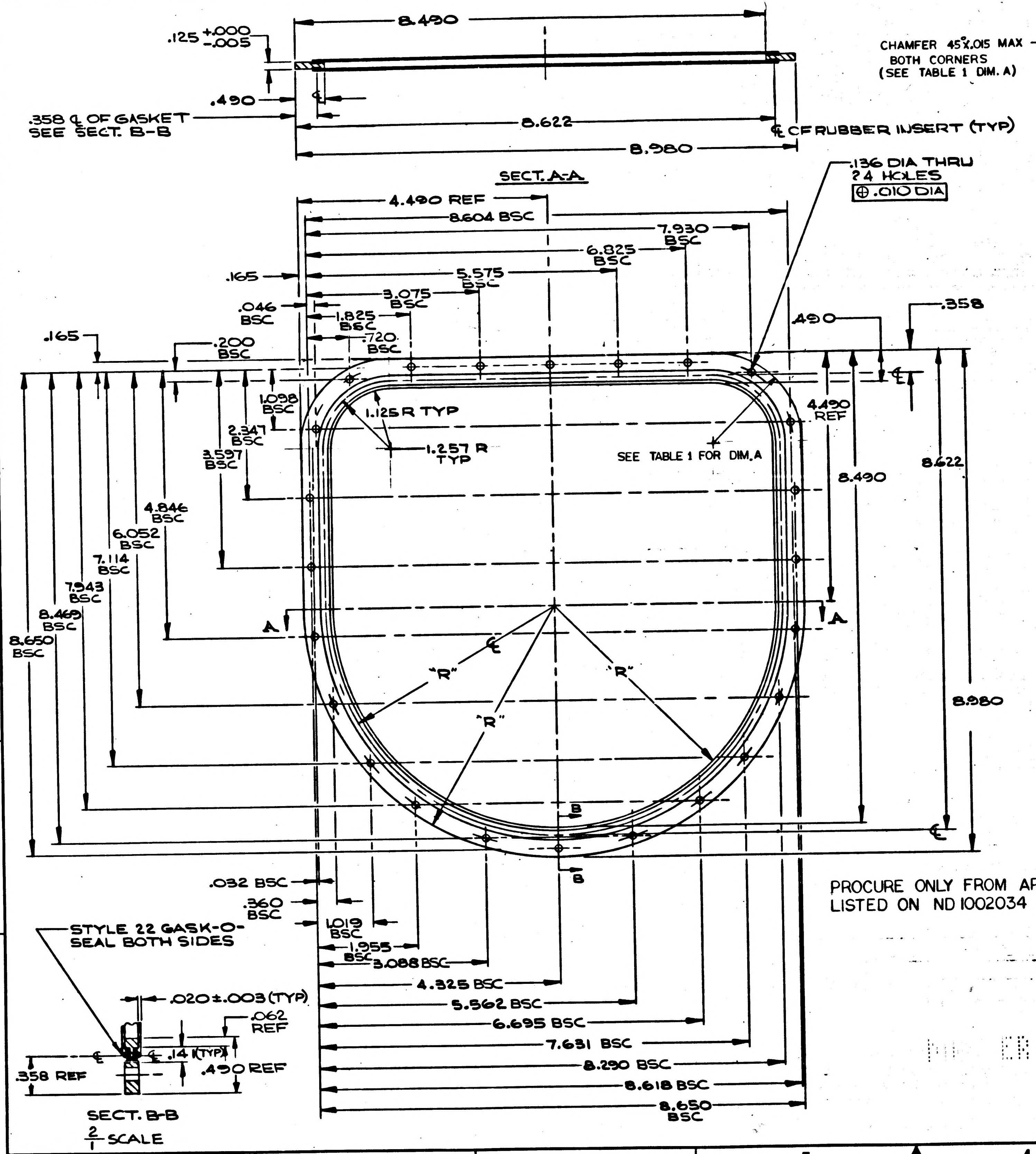
CODE IDENT NO.
SIZE D
NASA NUMBER 1011745 -
SCALE 1/1
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

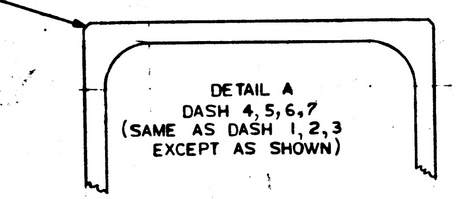
1011745

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

B 1011745

SYM	ZONE	REVISIONS 02560 DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR 10881		
B		REVISED PER TDRR 23467		


.125 +.000 -.005
8.490
.490
.358 ℄ OF GASKET SEE SECT. B-B
8.622
℄ OF RUBBER INSERT (TYP)
8.980
SECT. A-A
.136 DIA THRU 24 HOLES
⊕ .010 DIA
4.490 REF
8.604 BSC
7.930 BSC
6.825 BSC
5.575 BSC
3.075 BSC
1.825 BSC
.720 BSC
.165
.046 BSC
.200 BSC
.165
.490
.358
1.098 BSC
1.125 R TYP
2.347 BSC
1.257 R TYP
3.597 BSC
SEE TABLE 1 FOR DIM. A
4.490 REF
8.490
8.622
4.846 BSC
6.052 BSC
7.114 BSC
7.943 BSC
8.469 BSC
8.650 BSC
A
A
℄
"R"
"R"
"R"
8.980
B
B
.032 BSC
.360 BSC
STYLE 22 GASK-O-SEAL BOTH SIDES
1.019 BSC
1.955 BSC
3.088 BSC
4.325 BSC
5.562 BSC
6.695 BSC
7.631 BSC
8.290 BSC
8.618 BSC
8.650 BSC
.020±.003 (TYP)
.062 REF
.14 (TYP)
.490 REF
.358 REF
SECT. B-B
2/1 SCALE


CHAMFER 45°X.015 MAX BOTH CORNERS (SEE TABLE 1 DIM. A)

DETAIL A
DASH 4, 5, 6, 7
(SAME AS DASH 1, 2, 3
EXCEPT AS SHOWN)

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING SHALL BE IN ACCORDANCE WITH MIL-P-116, SUBMETHOD 1A-8.
2. INSPECTION AND ACCEPTANCE:
   - A. ALL ITEMS SHALL BE MARKED WITH NASA DRAWING NUMBER, DASH NUMBER, REVISION LETTER, RUBBER CURE DATE, AND MANUFACTURER'S IDENTIFICATION IN ACCORDANCE WITH MIL-STD-130.
   - B. DIMENSIONS AS SHOWN.
3. DESIGN REQUIREMENTS:
   - A. MATERIALS:
     - -1 BERYLLIUM, IN ACCORDANCE WITH ND 1002125.
     - -2 STEEL, CORROSION RESISTING (CRES), IN CONFORMITY WITH FEDERAL SPECIFICATION QQ-S-766, CLASS 304, CONDITION A (ANNEALED) FINISH NUMBER 2B.
     - -3 ALUMINUM ALLOY, IN CONFORMITY WITH QQ-A-327, TEMPER T6 (SOLUTION HEAT TREATED AND ARTIFICIALLY AGED).
     - -4 BERYLLIUM, IN ACCORDANCE WITH ND1002125. BLACK ANODIZE IN ACCORDANCE WITH ND1002127, TYPE 1
   - B. TREATMENTS
     - -1 BERYLLIUM; HEAT TREAT IN ACCORDANCE WITH ND 1002092.
     - -2 STEEL (CRES); CLEANED AND PASSIVATED IN ACCORDANCE WITH FINISH NO. 5.4.1 OF MIL-STD-171.
     - -3 ALUMINUM ALLOY; ANODIC COATING IN ACCORDANCE WITH MIL-A-8625, TYPE II (SULFURIC ACID COATING).

ALL DASH NOS. - THE ELASTOMER SHALL BE SILICONE RUBBER IN CONFORMITY WITH MIL-R-5847, TYPE Ib AND TYPE IIb, GRADE 70.

TABLE 1

PART NO.	DIM. A
1011745-1,2,3	1.615 R TYP
1011745-4,5,6,7	SQUARE CORNERS WITH 45° X.015 MAX CHAMFER

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
			1011745-7			GASKET	BE	NOTE 3A-4	
			1011745-6	74426015006		GASKET	ALUM	NOTE 3A-3	
			1011745-5	74426015005		GASKET	CRES	NOTE 3A-2	
			1011745-4	74426015004		GASKET	BE	NOTE 3A-1	
			1011745-3	74426015003		GASKET	ALUM	NOTE 3.A-3	
			1011745-2	74426015002		GASKET	CRES	NOTE 3.A-2	
			1011745-1	74426015001		GASKET	BE.	NOTE 3.A-1	

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ; DECIMALS ±.005 ; ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL NOTE 3.A.
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC 7442601 5001
PN THRU 5003
DRAWN Pizzo DATE 4-10-63
CHECKED
APPROVAL 8-2-63
APPROVAL 8-12-63
NASA APPROVAL W.J.
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
GASKET
SOURCE CONTROL
DRAWING

CODE IDENT NO.
SIZE D
NASA NUMBER 1011745 -
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

REVISIONS					
ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPROVED
	C	REPLACES REV B WITH CHANGE PER TDRR 30973		SEPT. 66	N.S.

REQUIREMENTS:

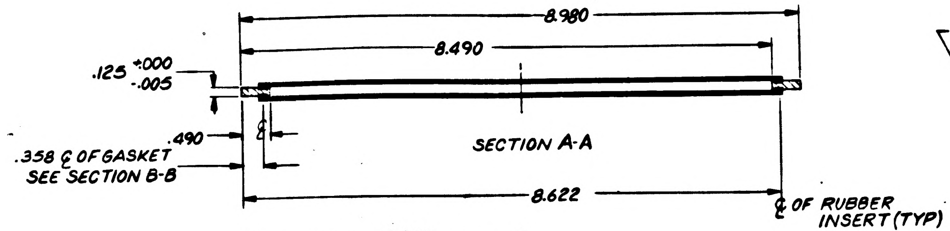
1. GENERAL:
   A. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND1015404, CLASS 2.
   C. PACKING AND SHIPPING SHALL BE IN ACCORDANCE WITH MIL-P-116, SUBMETHOD IA-8.

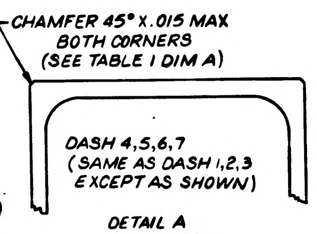
2. INSPECTION AND ACCEPTANCE
   A. ALL ITEMS SHALL BE MARKED WITH NASA DRAWING NUMBER, DASH NUMBER, REVISION LETTER, RUBBER CURE DATE, AND MANUFACTURER'S IDENTIFICATION IN ACCORDANCE WITH MIL-STD-130
   B. MAXIMUM ALLOWABLE LEAK RATE SHALL BE 3×10^{-7} C.C. ATM./SEC. AS MEASURED WITH HELIUM MASS SPECTROMETER. TEST SHALL BE PERFORMED PRIOR TO DIMENSIONAL CHECK AND UNDER THE FOLLOWING CONDITIONS:
      -1. FINISH OF METAL CLAMPING SURFACES SHALL BE 32√ WITH NO LUBRICANT USED BETWEEN SURFACES TO BE SEALED.
      -2. ONE ATMOSPHERE SHALL BE APPLIED TO O.D. OF GASKET.
      -3. GASKET SHALL BE CLAMPED WITH 24, #4-40 SCREWS, UTILIZING MOUNTING HOLES IN GASKET, WITH A TIGHTENING TORQUE OF 5.2 IN/LBS APPLIED TO SCREWS.
   C. DIMENSIONS AS SHOWN.

3. DESIGN REQUIREMENTS:
   A. MATERIALS:
      -1. BERYLLIUM, IN ACCORDANCE WITH ND 1002125
      -2. STEEL, CORROSION RESISTING (CRES), IN CONFORMITY WITH FEDERAL SPECIFICATION QQ-S-766, CLASS 304, CONDITION A (ANNEALED) FINISH NUMBER 2B.
      -3. ALUMINUM ALLOY, IN CONFORMITY WITH QQ-A-327, TEMPER T6 (SOLUTION HEAT TREATED AND ARTIFICIALLY AGED).
      -4. BERYLLIUM. IN ACCORDANCE WITH ND1002125. BLACK ANODIZE IN ACCORDANCE WITH ND 1002127
   B. TREATMENTS:
      -1. BERYLLIUM; HEAT TREAT IN ACCORDANCE WITH ND1002092
      -2. STEEL (CRES); CLEANED AND PASSIVATED IN ACCORDANCE WITH FINISH NO. 541 OF MIL-STD-171
      -3. ALUMINUM ALLOY; ANODIC COATING IN ACCORDANCE WITH MIL-A-8625, TYPE II (SULPHURIC ACID COATING)

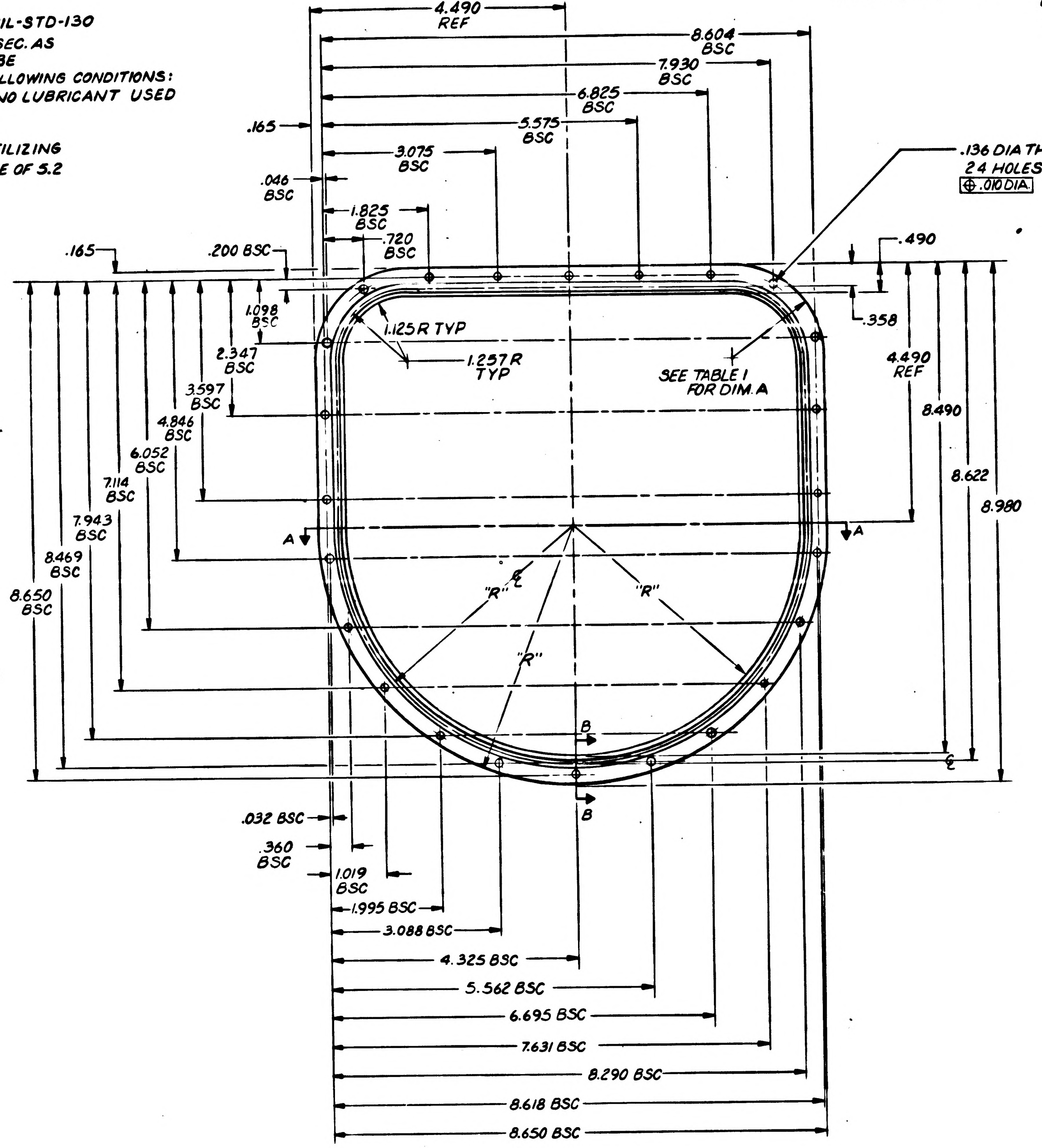
4. SPECIAL CONDITIONING:
   A. P/N 1011745-4 SHALL BE BAKED FOR 24 HOURS MIN. @ 300-325°F. IN AN ENVIRONMENT OF 1×10^{-6} TORR OR LESS. THIS SHALL BE DONE AFTER COMPLETION OF NORMAL FABRICATION PROCESSES AND PRIOR TO LEAK TEST AND FINAL DIMENSIONAL CHECK.

ALL DASH NOS. — THE ELASTOMER SHALL BE SILICONE RUBBER IN CONFORMITY WITH MIL-R-5847, TYPE Ib AND TYPE IIb, GRADE 70.


8.980
8.490
.125 +.000 -.005
.490
.358 ℄ OF GASKET SEE SECTION B-B
SECTION A-A
8.622
℄ OF RUBBER INSERT (TYP)


CHAMFER 45° X .015 MAX BOTH CORNERS (SEE TABLE I DIM A)
DASH 4,5,6,7 (SAME AS DASH 1,2,3 EXCEPT AS SHOWN)

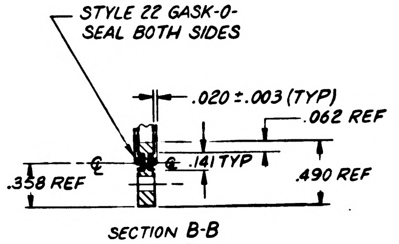
DETAIL A
SCALE 1/2


4.490 REF
8.604 BSC
7.930 BSC
6.825 BSC
5.575 BSC
3.075 BSC
.165
.046 BSC
1.825 BSC
.720 BSC
.136 DIA THRU 24 HOLES
⊕ .010 DIA.
.165
.200 BSC
.490
.358
1.098 BSC
1.125 R TYP
1.257 R TYP
2.347 BSC
3.597 BSC
4.846 BSC
6.052 BSC
7.114 BSC
7.943 BSC
8.469 BSC
8.650 BSC
SEE TABLE I FOR DIM A
4.490 REF
8.490
8.622
8.980
A
A
"R"
"R"
"R"
℄
B
B
℄
.032 BSC
.360 BSC
1.019 BSC
1.995 BSC
3.088 BSC
4.325 BSC
5.562 BSC
6.695 BSC
7.631 BSC
8.290 BSC
8.618 BSC
8.650 BSC

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

TABLE I

PART NO.	DIM A
1011745-1,2,3	1.615 R TYP
1011745-4,5,6,7	SQUARE CORNERS WITH 45° X .015 MAX CHAMFER


STYLE 22 GASK-O-SEAL BOTH SIDES
.020 ± .003 (TYP)
.062 REF
℄
.141 TYP
.358 REF
.490 REF

SECTION B-B
SCALE 2/1

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± — 3 PLACE DECIMALS ± .005 ANGLES ± —	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS		
DO NOT SCALE THIS DRAWING	DRAWN Pizzo DATE 6-0-63 CHECKED J. Ruggiero 8-2-63 APPROVAL S. Rubilman 8-12-63 CONTRACT	GASKET SOURCE CONTROL DRAWING		
MATERIAL SEE NOTE 3A	NASA APPROVAL W. J. Rhine 8-14-63	SIZE E	CODE IDENT NO. 80230	1011745
APPROVAL	MIT APPROVAL W. Kupfer	SCALE 1/1		SHEET 1 OF 1

PEQUIREMENTS:

1. GENERAL:
   A. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND1015404, CLASS 2.
   C. PACKING AND SHIPPING SHALL BE IN ACCORDANCE WITH MIL-P-116, SUBMETHOD IA-8.

2. INSPECTION AND ACCEPTANCE
   A. ALL ITEMS SHALL BE MARKED WITH NASA DRAWING NUMBER, DASH NUMBER, REVISION LETTER. RUBBER CURE DATE, AND MANUFACTURER'S IDENTIFICATION IN ACCORDANCE WITH MIL-STD-130
   B. MAXIMUM ALLOWABLE LEAK RATE SHALL BE 3 X 10^{-7} C.C. ATM./SEC. AS MEASURED WITH HELIUM MASS SPECTROMETER. TEST SHALL BE PERFORMED PRIOR TO DIMENSIONAL CHECK AND UNDER THE FOLLOWING CONDITIONS:
      -1. FINISH OF METAL CLAMPING SURFACES SHALL BE 32√ WITH NO LUBRICANT USED BETWEEN SURFACES TO BE SEALED.
      -2 ONE ATMOSPHERE SHALL BE APPLIED TO O.D. OF GASKET.
      -3. GASKET SHALL BE CLAMPED WITH 24 #4-40 SCREWS, UTILIZING MOUNTING HOLES IN GASKET, WITH A TIGHTENING TORQUE OF 5.2 IN/LBS APPLIED TO SCREWS.
   C. DIMENSIONS AS SHOWN.

3. DESIGN REQUIREMENTS:
   A. MATERIALS:
      -1. BERYLLIUM, IN ACCORDANCE WITH ND 1002125
      -2. STEEL, CORROSION RESISTING (CRES), IN CONFORMITY WITH FEDERAL SPECIFICATION QQ-S-766, CLASS 304, CONDITION A (ANNEALED) FINISH NUMBER 2B.
      -3. ALUMINUM ALLOY, IN CONFORMITY WITH QQ-A-327, TEMPER T6 (SOLUTION HEAT TREATED AND ARTIFICIALLY AGED).
      -4. BERYLLIUM. IN ACCORDANCE WITH ND1002125. BLACK ANODIZE IN ACCORDANCE WITH ND 1002127
   B. TREATMENTS:
      -1. BERYLLIUM; HEAT TREAT IN ACCORDANCE WITH ND1002092
      -2. STEEL (CRES); CLEANED AND PASSIVATED IN ACCORDANCE WITH FINISH NO. 541 OF MIL-STD-171
      -3. ALUMINUM ALLOY; ANODIC COATING IN ACCORDANCE WITH MIL-A-8625, TYPE II (SULPHURIC ACID COATING)

4. SPECIAL CONDITIONING:
   A. P/N 1011745-4 SHALL BE BAKED FOR 24 HOURS MIN. @ 300-325°F. IN AN ENVIRONMENT OF 1 X 10^{-6} TORR OR LESS. THIS SHALL BE DONE AFTER COMPLETION OF NORMAL FABRICATION PROCESSES AND PRIOR TO LEAK TEST AND FINAL DIMENSIONAL CHECK.

ALL DASH NOS. — THE ELASTOMER SHALL BE SILICONE RUBBER IN CONFORMITY WITH MIL-R-5847, TYPE Ib AND TYPE IIb, GRADE 70.

REVISIONS					
ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPROVED
	C	REPLACES REV B WITH CHANGE PER TDRR 30973		SEPT. 66	U.S.
	D	REPLACES REV C WITH CHANGE PER TDRR 33486		2 APR 6-	WK RWH

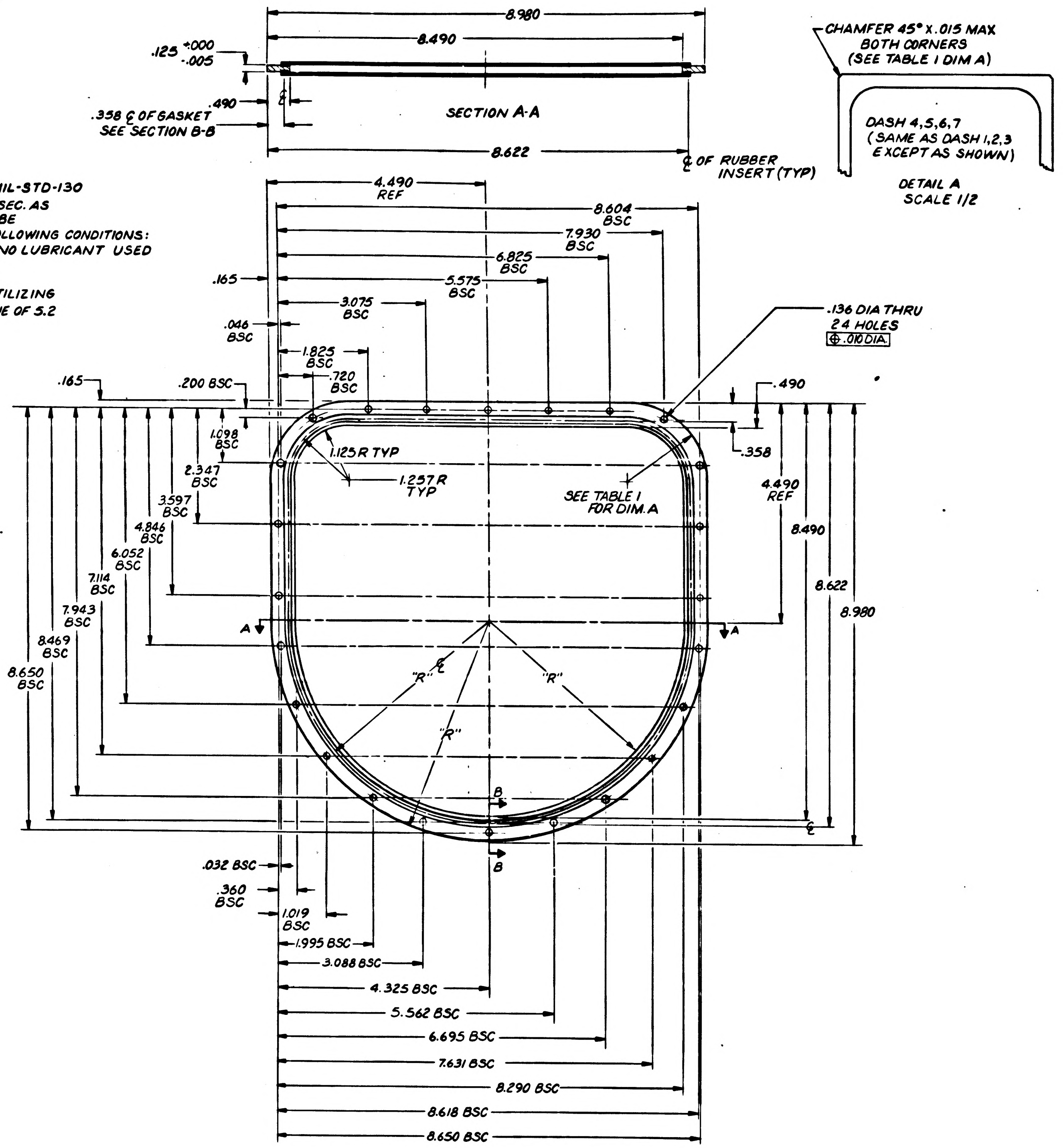
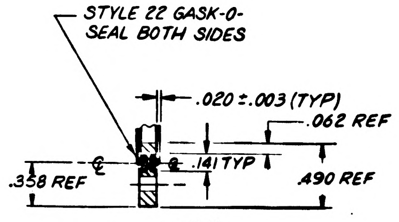

8.980
8.490
.125 +.000 -.005
.490
.358 ℄ OF GASKET SEE SECTION B-B
SECTION A-A
8.622
℄ OF RUBBER INSERT (TYP)
CHAMFER 45° X .015 MAX BOTH CORNERS (SEE TABLE I DIM A)
DASH 4,5,6,7 (SAME AS DASH 1,2,3 EXCEPT AS SHOWN)
DETAIL A SCALE 1/2
4.490 REF
8.604 BSC
7.930 BSC
6.825 BSC
5.575 BSC
3.075 BSC
.165
.046 BSC
1.825 BSC
.720 BSC
.165
.200 BSC
.136 DIA THRU 24 HOLES
⊕ .010 DIA
.490
.358
1.098 BSC
1.125 R TYP
1.257 R TYP
2.347 BSC
3.597 BSC
4.846 BSC
6.052 BSC
7.114 BSC
7.943 BSC
8.469 BSC
8.650 BSC
SEE TABLE I FOR DIM. A
4.490 REF
8.490
8.622
8.980
A
A
"R"
"R"
"R"
B
B
.032 BSC
.360 BSC
1.019 BSC
1.995 BSC
3.088 BSC
4.325 BSC
5.562 BSC
6.695 BSC
7.631 BSC
8.290 BSC
8.618 BSC
8.650 BSC

TABLE I

PAPT NO.	DIM A
1011745-1,2,3	1.615 R TYP
1011745-4,5,6,7	SQUARE CORNERS WITH 45°X .015 MAX CHAMFER

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING


STYLE 22 GASK-O-SEAL BOTH SIDES
.020 ±.003 (TYP)
.062 REF
.141 TYP
.358 REF
.490 REF
℄
℄

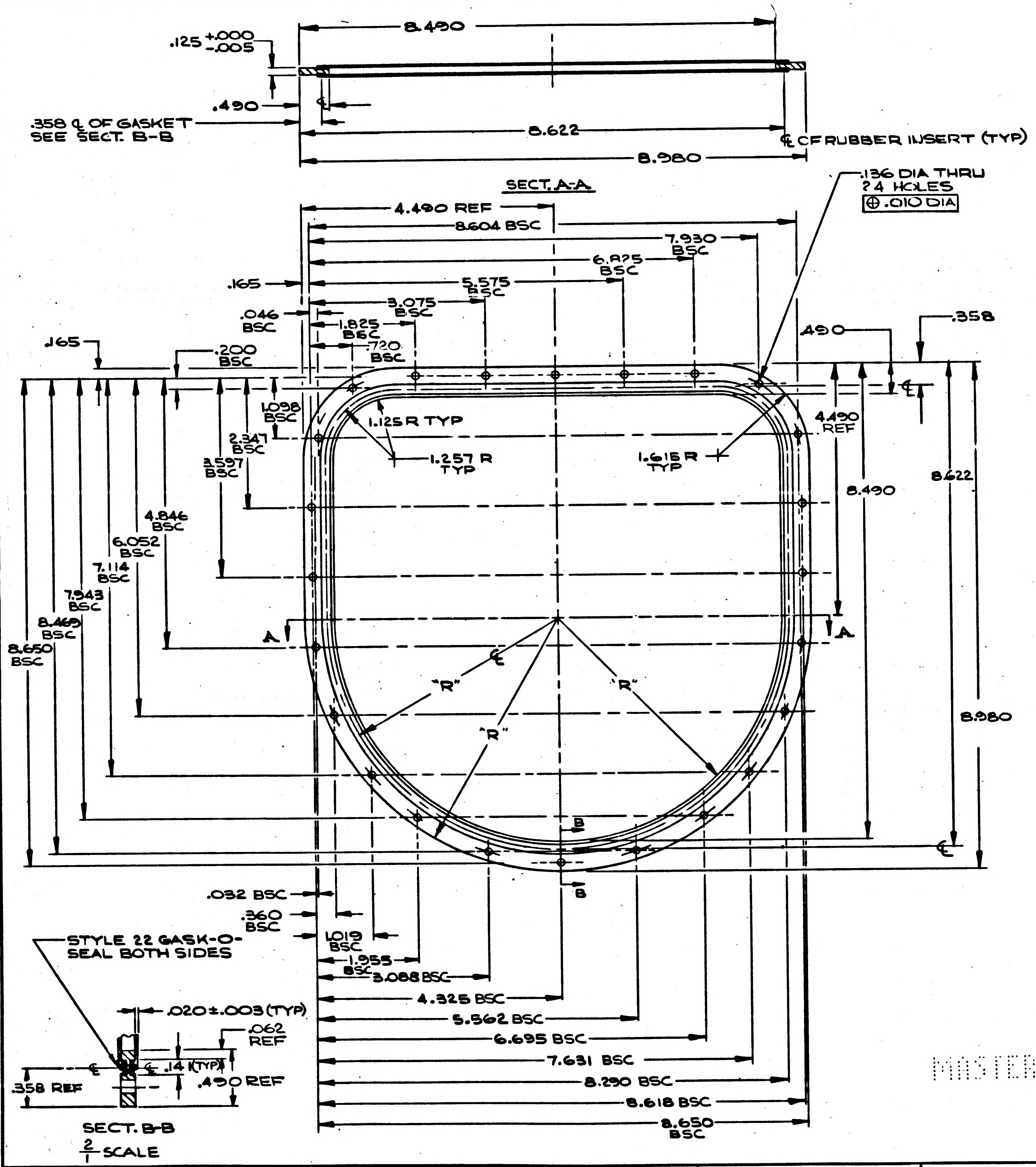
SECTION B-B
SCALE 2/1

SEE NOTE 3A-4				1	1	1011745-007	GASKET	
SEE NOTE 3A-3				1	1	1011745-006	GASKET	
SEE NOTE 3A-2				1	1	1011745-005	GASKET	
SEE NOTE 3A-1				1	1	1011745-004	GASKET	
SEE NOTE 3A-3				1	1	1011745-003	GASKET	
SEE NOTE 3A-2				1	1	1011745-002	GASKET	
SEE NOTE 3A-1				1	1	1011745-001	GASKET	
				011	ITEM NO.	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION	CODE IDENT
	QUANTITY REQUIRED				LIST OF PARTS AND MATERIALS			

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± — 3 PLACE DECIMALS ± .005 ANGLES ± —	MIT INSTRUMENTATION LAB CAMBRIDGE MASS DRAWN Pizzo DATE 6-0-3 CHECKED L. Ruggiero 8-2-3 APPROVAL S. Rubilman 8-12-63 CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS GASKET SOURCE CONTROL DRAWING
DO NOT SCALE THIS DRAWING MATERIAL SEE NOTE 3A APPROVAL	NASA APPROVAL W. J. Rhine 8-14-63 MIT APPROVAL W. Kupfer	SIZE E CODE IDENT NO. 80230 1011745 SCALE 1/1 SHEET 1 OF 1

1011745

SYM	ZONE	REVISIONS DESCRIPTION	DATE	APPROVAL



8.490
.125 +.000 -.005
.490
.358 ℄ OF GASKET SEE SECT. B-B
8.622
℄ CF RUBBER INSERT (TYP)
8.980
SECT. A-A
.136 DIA THRU 24 HOLES
⊕ .010 DIA
4.490 REF
8.604 BSC
7.930 BSC
6.825 BSC
5.575 BSC
3.075 BSC
1.825 BSC
.720 BSC
.165
.046 BSC
.165
.200 BSC
.490
.358
1.098 BSC
1.125 R TYP
2.347 BSC
3.597 BSC
1.257 R TYP
1.615 R TYP
4.490 REF
8.490
8.622
4.846 BSC
6.052 BSC
7.114 BSC
7.943 BSC
8.469 BSC
8.650 BSC
A
A
"R"
"R"
"R"
8.980
B
B
.032 BSC
.360 BSC
1.019 BSC
1.955 BSC
3.088 BSC
4.325 BSC
5.562 BSC
6.695 BSC
7.631 BSC
8.290 BSC
8.618 BSC
8.650 BSC
STYLE 22 GASK-O-SEAL BOTH SIDES
.020±.003 (TYP)
.062 REF
.14 (TYP)
.490 REF
.358 REF
SECT. B-B
2/1 SCALE

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING SHALL BE IN ACCORDANCE WITH MIL-P-116, SUBMETHOD 1A-8.
2. INSPECTION AND ACCEPTANCE:
   - A. ALL ITEMS SHALL BE MARKED WITH NASA DRAWING NUMBER, DASH NUMBER. REVISION LETTER, RUBBER CURE DATE, AND MANUFACTURER'S IDENTIFICATION IN ACCORDANCE WITH MIL-STD-130.
   - B. DIMENSIONS AS SHOWN.
3. DESIGN REQUIREMENTS:
   - A. MATERIALS:
     - -1 BERYLLIUM, IN ACCORDANCE WITH ND 1002125.
     - -2 STEEL, CORROSION RESISTING (CRES), IN CONFORMITY WITH FEDERAL SPECIFICATION QQ-S-766, CLASS 304, CONDITION A (ANNEALED) FINISH NUMBER 2B.
     - -3 ALUMINUM ALLOY, IN CONFORMITY WITH QQ-A-327, TEMPER T6 (SOLUTION HEAT TREATED AND ARTIFICIALLY AGED).
   - B. TREATMENTS:
     - -1 BERYLLIUM; HEAT TREAT IN ACCORDANCE WITH ND 1002092.
     - -2 STEEL (CRES); CLEANED AND PASSIVATED IN ACCORDANCE WITH FINISH NO. 5.4.1 OF MIL-STD-171.
     - -3 ALUMINUM ALLOY; ANODIC COATING IN ACCORDANCE WITH MIL-A-8625, TYPE II (SULFURIC ACID COATING).

ALL DASH NOS. - THE ELASTOMER SHALL BE SILICONE RUBBER IN CONFORMITY WITH MIL-R-5847, TYPE Ib AND TYPE IIb, GRADE 70.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
			1011745-3	74426015003		GASKET	ALUM	NOTE 3.A-3	
			1011745-2	74426015002		GASKET	CRES	NOTE 3.A-2	
			1011745-1	74426015001		GASKET	BE.	NOTE 3.A-1	

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ; DECIMALS ±.005; ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL: NOTE 3.A.
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC 74426015001 THRU 5003 PN
DRAWN Pizzo DATE 4-10-63
CHECKED
APPROVAL 8-2-63
APPROVAL 8-12-63
NASA APPROVAL W.J. [illegible] 8-14-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
GASKET
SOURCE CONTROL
DRAWING

CODE IDENT NO.
SIZE D
NASA NUMBER 1011745 -
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

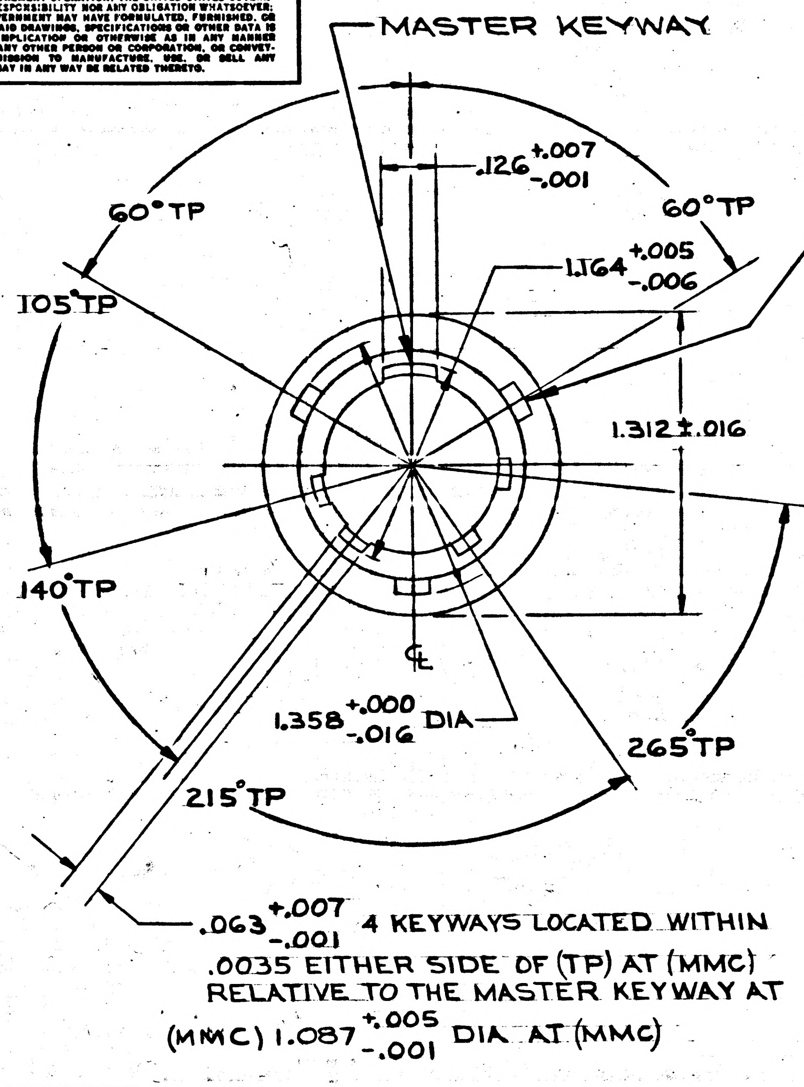
08525

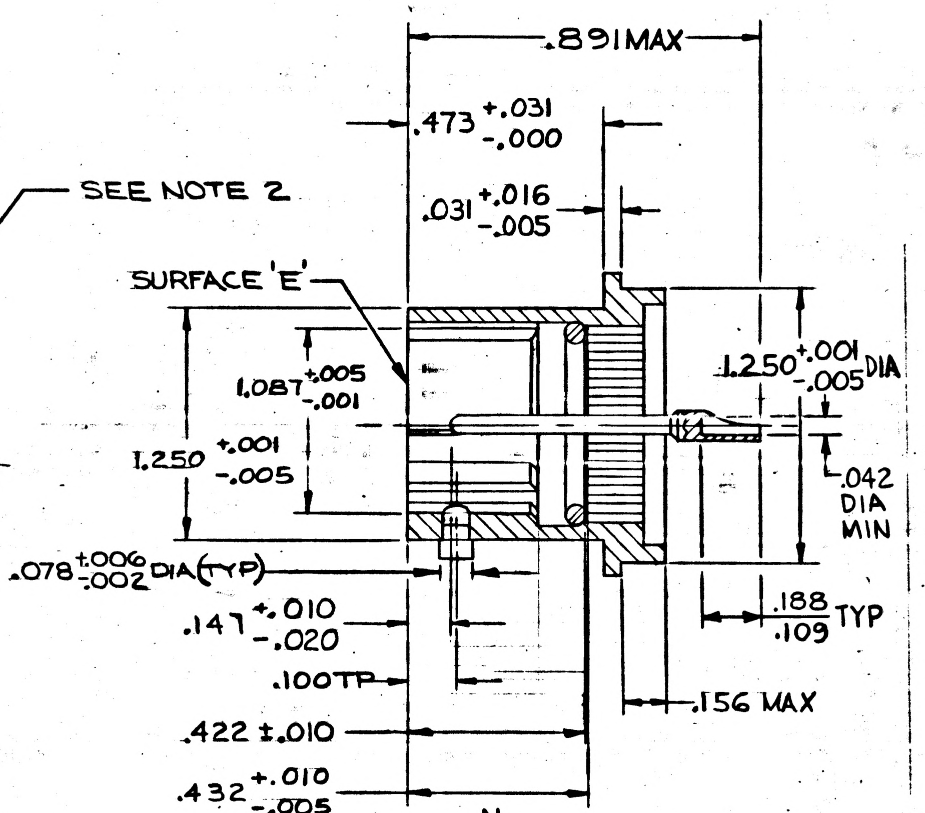
1011746

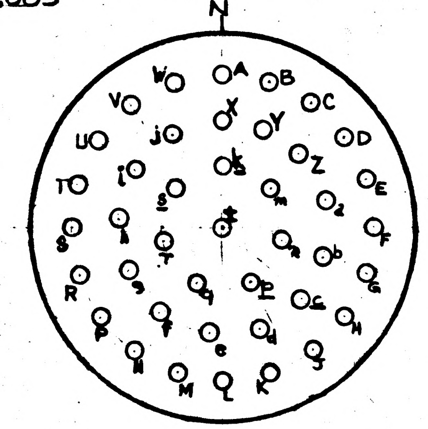
SYM	DESCRIPTION	DATE	APPROVAL

REVISIONS

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.


MASTER KEYWAY
$.126^{+.007}_{-.001}$
60° TP
60° TP
SEE NOTE 2
$1.164^{+.005}_{-.006}$
105° TP
1.312 ± .016
140° TP
℄
$1.358^{+.000}_{-.016}$ DIA
265° TP
215° TP
$.063^{+.007}_{-.001}$ 4 KEYWAYS LOCATED WITHIN .0035 EITHER SIDE OF (TP) AT (MMC) RELATIVE TO THE MASTER KEYWAY AT (MMC) $1.087^{+.005}_{-.001}$ DIA AT (MMC)


.891 MAX
$.473^{+.031}_{-.000}$
$.031^{+.016}_{-.005}$
SURFACE 'E'
$1.087^{+.005}_{-.001}$
$1.250^{+.001}_{-.005}$
$1.250^{+.001}_{-.005}$ DIA
.042 DIA MIN
$.078^{+.006}_{-.002}$ DIA (TYP)
$.147^{+.010}_{-.020}$
.100 TP
$\frac{.188}{.109}$ TYP
.156 MAX
.422 ± .010
$.432^{+.010}_{-.005}$


N
A
B
C
D
E
F
G
H
J
K
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M
N
P
R
S
T
U
V
W
X
Y
Z

FRONT FACE OF PIN INSERT

NOTES:

1- THESE DIM. FOR REF ONLY. SEE NOTE 1 E GENERAL REQUIREMENTS SHEET 2.

2- TRUE POSITION (TP) TOLERANCES SPECIFIED ARE FOR MAXIMUM MATERIAL CONDITIONS (MMC)

3- $.078^{+.006}_{-.002}$ DIA LOCATED WITHIN .005 R OF (TP) AT (MMC) RELATIVE TO $1.250^{+.001}_{-.005}$ DIA AT (MMC) SURFACE 'E' AND RELATIVE TO THE MASTER KEYWAY WITHIN .010 ~~EITHER~~ SIDE OF (TP) ~~AT~~ (MMC)

MASTER

K.I.C. NO. 68013062501

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING

MATERIAL

HEAT TREATMENT

FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN M. NEILL DATE 9-17-63
CHECKED R. Williams 10-21-63
APPROVAL E. Macdonald 3-13-64
APPROVAL E. Mong 4-8-64
NASA APPROVAL
MIT APPROVAL 5/26/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CONNECTOR, ELECTRICAL
41 PINS, SIZE 20
SPECIFICATION CONTROL DWG.

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011746
SCALE ~
WT
SHEET 1 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

4 3 2 1 08825

1011746

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.
   - D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052.
   - E. PARTS SHALL MEET ALL THE REQUIREMENTS OF MIL-C-26482 AND MS3113H20-41PN EXCEPT FOR THE SHELL AND CONTACT FINISH AS NOTED IN 3C.4 AND 3D.2.
2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS
     1. ITEMS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, AND MANUFACTURER'S IDENTIFICATION PER ND 1002019.
     2. MECHANICAL DIMENSIONS AS SHOWN.
     3. CONTACTS: 41 PINS SIZE 20 .040 ± .001 DIA.
     4. ALL PIN LOCATIONS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.
     5. ENGAGEMENT: 3 POINT BAYONET LOCK, 5 KEY POLARIZATION (NORMAL)
     6. THIS DRAWING SHALL MATE WITH NASA DRAWING PART NO. 1010348-1
   - B. ELECTRICAL REQUIREMENTS
     1. INSULATION RESISTANCE: 5000 MEGOHMS PER MIL-STD-202, METHOD 302, TEST B.
     2. DIELECTRIC WITHSTANDING VOLTAGE:

        SEA LEVEL: 1500 V RMS, 60 CPS, PER MIL-STD-202, METHOD 301, MAX 1 MA LEAKAGE
3. DESIGN REQUIREMENTS
   - A. MOUNTING: PANEL, ROUND FLANGE (HERMETIC SEAL)
   - B. DIELECTRIC WITHSTANDING VOLTAGE:

     70,000 FEET: 375 V RMS, 60 CPS
   - C. CONTACTS
     1. TYPE: SOLDER CUP TO ACCOMMODATE SIZE 20 STRANDED WIRE.
     2. RATING: 5 AMPERES
     3. MATERIAL: NICKEL IRON ALLOY (51% NICKEL, BALANCE IRON)
     4. FINISH: GOLD PLATE PER MIL-G-45204, TYPE II, .000100/.000160 THICK OVER NICKEL PLATE PER QQ-N-290, CLASS 2.
   - D. SHELL:
     1. MATERIAL: NICKEL IRON ALLOY (51% NICKEL, BALANCE IRON).
     2. FINISH: GOLD PLATE PER MIL-G-45204, TYPE II, .000100/.000160 THICK OVER NICKEL PLATE PER QQ-N-290, CLASS 2.
   - E. INSULATION: VITREOUS MATERIAL SHALL BE SO FUSED TO PINS AND SHELL SO AS TO PREVENT A LEAK RATE IN EXCESS OF 0.1 MICRON CUBIC FOOT PER HOUR WHEN SUBJECTED TO A PRESSURE DIFFERENTIAL OF 1 ATMOSPHERE ACROSS THE CONNECTOR IN ACCORDANCE WITH AIR LEAKAGE (CLASS H) REQUIREMENT PER APPLICABLE PARAGRAPH OF MIL-C-26482.

PROCURE ONLY FROM APPROVED SOURCE LISTED ON ND 1002034 FOR THIS DRAWING

MASTER

K.I.C. NO. 68013062501

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING

MATERIAL

HEAT TREATMENT

FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN M. Menzorio DATE 3-9-64
CHECKED S. Rakahi 3-9-64
APPROVAL E. MacDonald 3-13-64
APPROVAL E. Mary 4-8-64
NASA APPROVAL J Bernard
MIT APPROVAL D Hoyl 3/26/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CONNECTOR, ELECTRICAL
41 PINS, SIZE 20
SPEC CONTROL DWG

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	C	1011746

SCALE ~ WT SHEET 2 OF 2

4 3 2 1

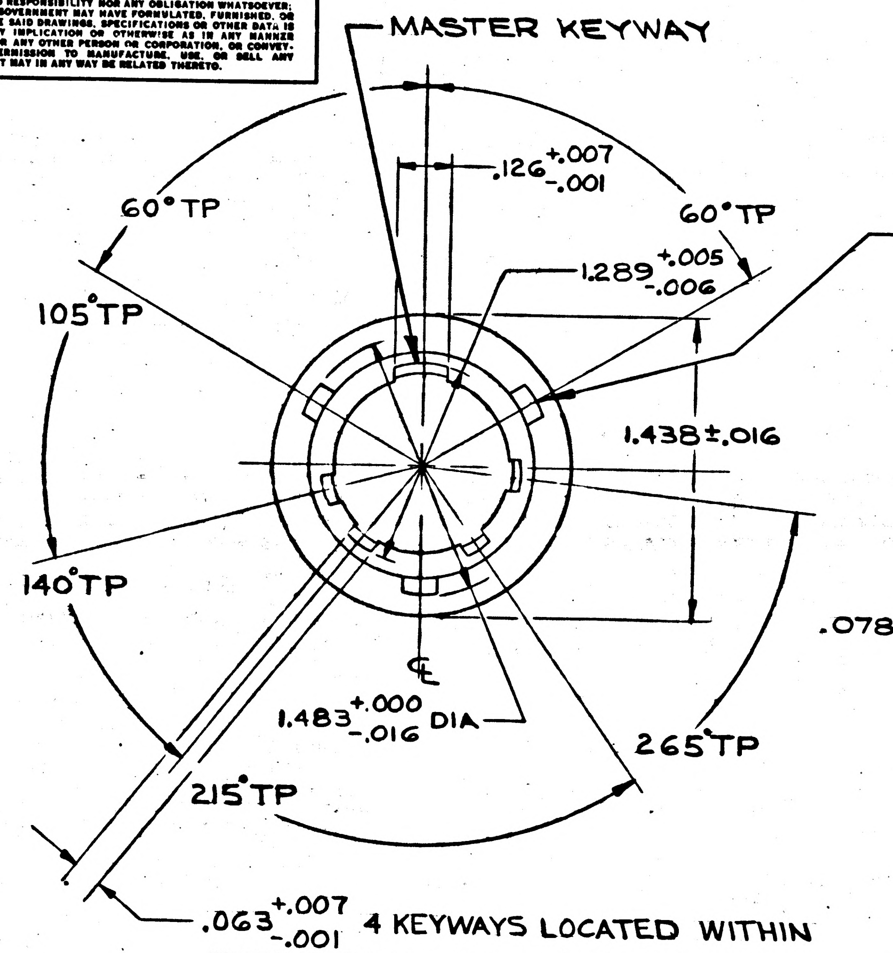
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

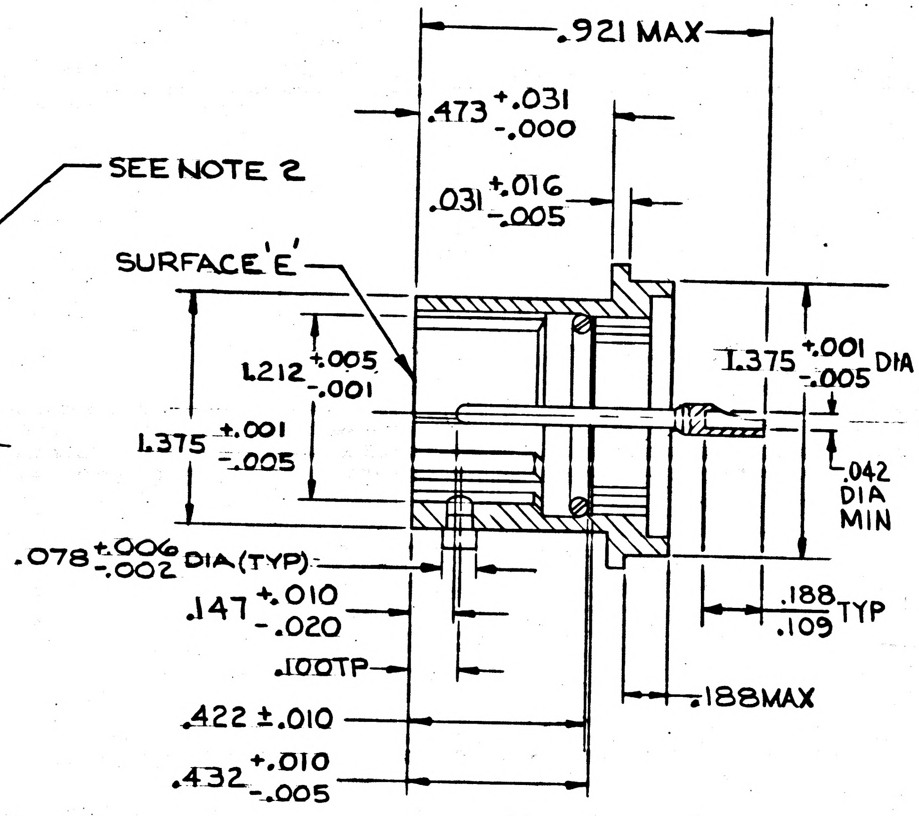
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1011747

08925

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL


MASTER KEYWAY
.126 +.007 -.001
60° TP
60° TP
SEE NOTE 2
1.289 +.005 -.006
105° TP
1.438 ±.016
140° TP
℄
1.483 +.000 -.016 DIA
265° TP
215° TP
.063 +.007 -.001 4 KEYWAYS LOCATED WITHIN .0035 EITHER SIDE OF (TP) AT (MMC) RELATIVE TO THE MASTER KEYWAY AT (MMC) & 1.212 +.005 -.001 DIA AT (MMC)

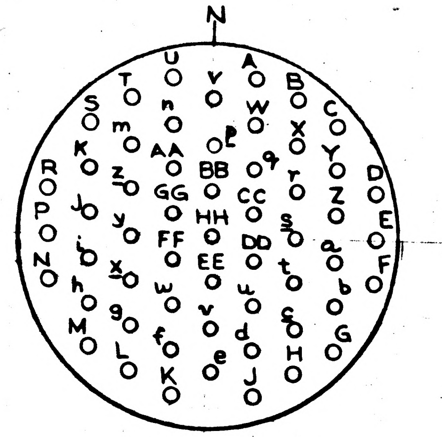

.921 MAX
.473 +.031 -.000
.031 +.016 -.005
SURFACE 'E'
1.212 +.005 -.001
1.375 +.001 -.005
1.375 +.001 -.005 DIA
.042 DIA MIN
.078 +.006 -.002 DIA (TYP)
.147 +.010 -.020
.188 .109 TYP
.100 TP
.188 MAX
.422 ±.010
.432 +.010 -.005

NOTES:

1- THESE DIM. FOR REF ONLY. SEE NOTE 1E GENERAL REQUIREMENTS SHEET 2

2- TRUE POSITION (TP) TOLERANCES SPECIFIED ARE FOR MAXIMUM MATERIAL CONDITIONS (MMC).

3- .078 $^{+.006}_{-.002}$ DIA LOCATED WITHIN .005 R OF (TP) AT (MMC) RELATIVE TO 1.375 $^{+.001}_{-.005}$ DIA AT (MMC) SURFACE 'E' AND RELATIVE TO THE MASTER KEYWAY WITHIN .010 EITHER SIDE OF (TP) AT (MMC)


N
U V A B
T n W C
S m p X
K AA q Y
R z BB r D
GG CC Z
P j y HH s E
FF DD a
N i x EE t F
h w u b
M g v c G
L f d H
K e J

FRONT FACE OF PIN INSERT

K.I.C. NO. 68013062601	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
		LIST OF MATERIALS		

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

NEXT ASSY | USED ON
APPLICATION

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN M. NEILL DATE 9-17-63
CHECKED H. J. Athens 10-21-63
APPROVAL E. D. MacDonald 3-13-64
APPROVAL E. Mory 4-7-64
NASA APPROVAL
MIT APPROVAL D. Hoag 5/24/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CONNECTOR, ELECTRICAL
55 PINS, SIZE 20
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. | SIZE C | NASA DRAWING NO. 1011747
SCALE ~ | WT | SHEET 1 OF 2

MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011747

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REQUIREMENTS

1. GENERAL
    - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
    - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
    - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.
    - D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052.
    - E. PARTS SHALL MEET ALL THE REQUIREMENTS OF MIL-C-26482 AND MS3113H22-55PN EXCEPT FOR THE SHELL AND CONTACT FINISH AS NOTED IN 3C.4 AND 3D.2.
2. INSPECTION AND ACCEPTANCE
    - A. MECHANICAL REQUIREMENTS
        1. ITEMS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION PER ND 1002019.
        2. MECHANICAL DIMENSIONS AS SHOWN.
        3. CONTACTS: 55 PINS SIZE 20 .040 ± .001 DIA.
        4. ALL PIN LOCATIONS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.
        5. ENGAGEMENT: 3 POINT BAYONET LOCK, 5 KEY POLARIZATION (NORMAL)
        6. THIS DRAWING SHALL MATE WITH NASA DRAWING PART NO. 1010348-2.
    - B. ELECTRICAL REQUIREMENTS
        1. INSULATION RESISTANCE: 5000 MEGOHMS PER MIL-STD-202, METHOD 302, TEST B.
        2. DIELECTRIC WITHSTANDING VOLTAGE: SEA LEVEL - 1500 V RMS, 60 CPS, PER MIL-STD 202, METHOD 301, MAX 1 MA LEAKAGE.
3. DESIGN REQUIREMENTS
    - A. MOUNTING: PANEL, ROUND FLANGE (HERMETIC SEAL)
    - B. DIELECTRIC WITHSTANDING VOLTAGE:

      70,000 FEET: 375 V RMS, 60 CPS
    - C. CONTACTS:
        1. TYPE: SOLDER CUP TO ACCOMMODATE SIZE 20 STRANDED WIRE
        2. RATING: 5 AMPERES
        3. MATERIAL: NICKEL IRON ALLOY (51% NICKEL, BALANCE IRON)
        4. FINISH: GOLD PLATE PER MIL-G-45204, TYPE II, .000100/.000160 THICK OVER NICKEL PLATE PER QQ-N-290, CLASS 2
    - D. SHELL:
        1. MATERIAL: NICKEL IRON ALLOY (51% NICKEL, BALANCE IRON)
        2. FINISH: GOLD PLATE PER MIL-G-45204, TYPE II, .000100/.000160 THICK OVER NICKEL PLATE PER QQ-N-290, CLASS 2
    - E. INSULATION: VITREOUS MATERIAL SHALL BE SO FUSED TO PINS AND SHELL SO AS TO PREVENT A LEAK RATE IN EXCESS OF 0.1 MICRON CUBIC FOOT PER HOUR WHEN SUBJECTED TO A PRESSURE DIFFERENTIAL OF 1 ATMOSPHERE ACROSS THE CONNECTOR IN ACCORDANCE WITH AIR LEAKAGE (CLASS [illegible]) REQUIREMENT PER APPLICABLE PARAGRAPH OF MIL-C-26482.

PROCURE ONLY FROM APPROVED SOURCE LISTED ON ND 1002034 FOR THIS DRAWING

MASTER

K.I.C. NO. 68013062601

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN M.MENZOEIO DATE 3-9-64
CHECKED S. Zakaluk 3-9-64
APPROVAL B.H. MacDonald 3-13-64
APPROVAL E. Thomp 4-7-64
NASA APPROVAL
MIT APPROVAL A. Kosfeld 1/26/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CONNECTOR, ELECTRICAL
55 PINS, SIZE 20
SPEC CONTROL DWG

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	C	1011747

SCALE ~ WT SHEET 2 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1011748 A

REVISIONS 02560

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 14532	12-1-64	WK

REQUIREMENTS:

1. GENERAL:

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

C. PACKING AND SHIPPING IN ACCORDANCE WITH ND 1002215 CLASS I

D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052

E. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-C-8384.

2. INSPECTION AND ACCEPTANCE:

A. MECHANICAL REQUIREMENTS:

1. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION PER MIL-STD-129.

2. PARTS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER PER ND 1002019 EXCEPT INK OR PAINT NOT ACCEPTABLE.

3. MECHANICAL DIMENSIONS AS SHOWN.

4. CONTACTS: 1 #20 PIN, .040 ± .001 IN. DIA.
1 #20 SOCKET TO ACCOMMODATE PIN .040 ± .001 IN. DIA.

5. ALL CONTACTS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.

6. ENGAGEMENT: FRICTION (POLARIZED)

7. PART 1011748-1 SHALL MATE WITH PART 101178-2.

8. WIRE TERMINATION: SOLDER CUP TO ACCOMMODATE #22 AWG STRANDED WIRE.

9. INSERTION AND WITHDRAWAL FORCE 2 TO 11 OZ/PIN WITH MATING CONNECTOR.

B. ELECTRICAL REQUIREMENTS:

1. INSULATION RESISTANCE: 1000 MEGOHMS MIN. AT 1000 VDC

2. SERVICE RATING: SEA LEVEL 530 V RMS

3. DIELECTRIC STRENGTH: SEA LEVEL 1600 V RMS

3. DESIGN REQUIREMENTS:

A. MOUNTING: SURFACE MOUNT, AS INDICATED ON DRAWING

B. SERVICE RATING: 70,000 FEET 140 V RMS

C. DIELECTRIC STRENGTH: 70,000 FEET 425 V RMS

D. INSULATION (BODY): GLASS FILLED DIALLYL PHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN)

E. CONTACTS: PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204
SOCKETS TYPE I, CLASS 2
PINS TYPE II, CLASS 2

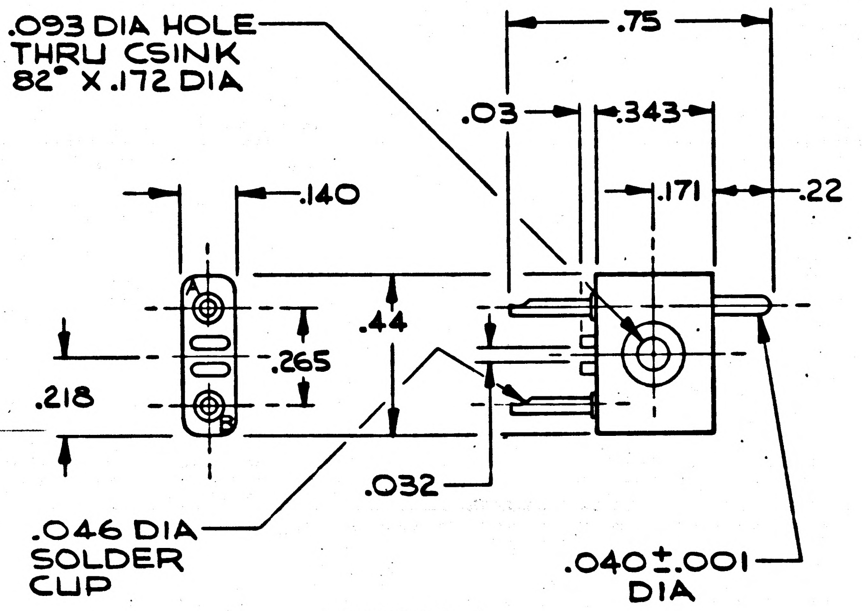
F. CONTACT RATING: 3 AMPS

G. SURFACE-CREEPAGE DISTANCE: 3/32 MIN. TO GROUND

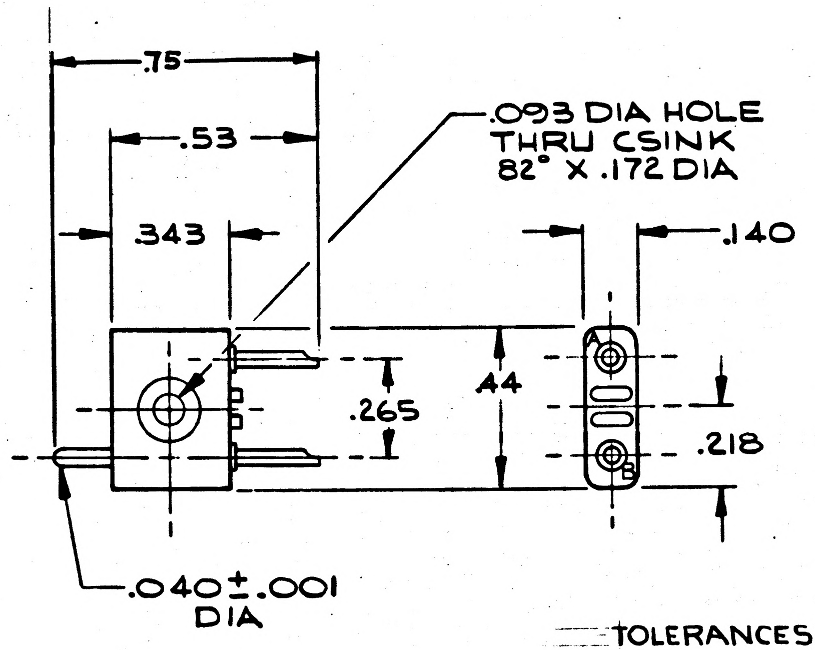
H. AIR SPACE: 3/32 MIN. TO GROUND

I. CONTACT RESISTANCE: 20 MV MAX AT 3 AMPS

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



1011748-1



1011748-2

TOLERANCES:
TWO PLACES DECIMAL ±.010
THREE PLACES DECIMAL ±.005

KIC.
PN 68502016401
THRU 6402

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN F. PIZZO DATE 6-25-63
CHECKED E Costa
APPROVAL E Costa 8/9/63
APPROVAL E Thomp 8-12-63
NASA APPROVAL W J Rhine 8-14-63
MIT APPROVAL W Kupfer 14 Aug 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CONNECTOR, ELECTRICAL
1 PIN AND 1 SOCKET #20 CONTACTS
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. SIZE C NASA DRAWING NO. 1011748-
SCALE ~ WT SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

B	1011748

REVISIONS	02560		
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 14532	12-1-64	WK
B	REVISED PER TDRR 16995	11 Mar 65	WK

REQUIREMENTS:

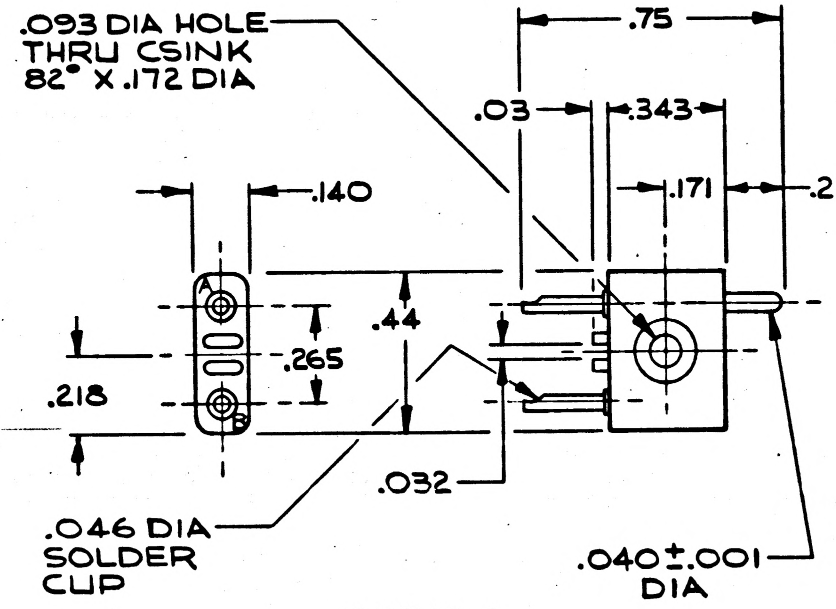
1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH ND 1002215 CLASS I
   - D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052
   - E. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-C-8384.
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     1. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION PER MIL-STD-129.
     2. PARTS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER PER ND 1002019 PAINT NOT ACCEPTABLE.
     3. MECHANICAL DIMENSIONS AS SHOWN.
     4. CONTACTS: 1 #20 PIN, .040 ± .001 IN. DIA.
1 #20 SOCKET TO ACCOMMODATE PIN .040 ± .001 IN. DIA.
     5. ALL CONTACTS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.
     6. ENGAGEMENT: FRICTION (POLARIZED)
     7. PART 1011748-1 SHALL MATE WITH PART 101178-2.
     8. WIRE TERMINATION: SOLDER CUP TO ACCOMMODATE #22 AWG STRANDED WIRE.
     9. INSERTION AND WITHDRAWAL FORCE 2 TO 11 OZ/PIN WITH MATING CONNECTOR.
   - B. ELECTRICAL REQUIREMENTS:

1.	INSULATION RESISTANCE:	1000 MEGOHMS MIN. AT 1000 VDC
2.	SERVICE RATING:	SEA LEVEL 530 V RMS
3.	DIELECTRIC STRENGTH:	SEA LEVEL 1600 V RMS

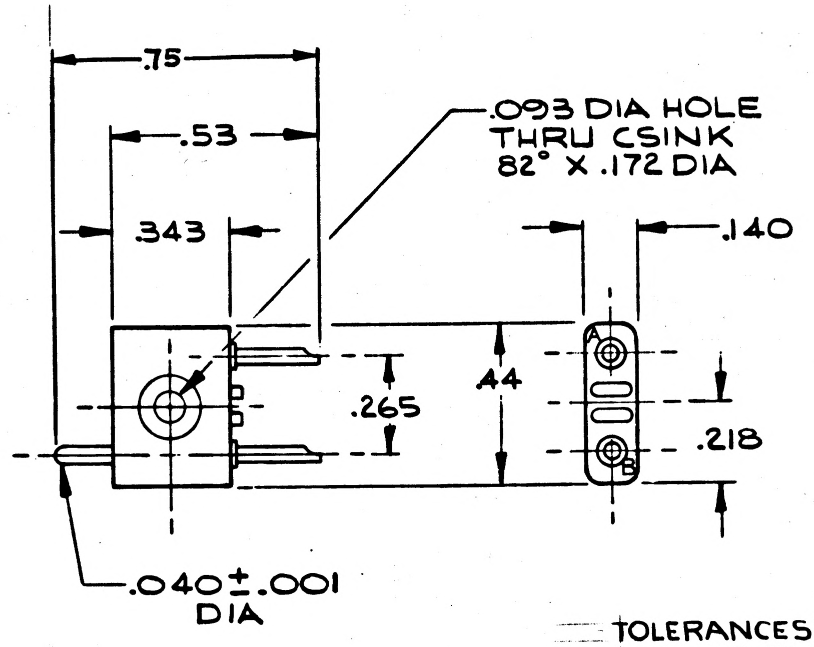
3. DESIGN REQUIREMENTS:

A.	MOUNTING:	SURFACE MOUNT, AS INDICATED ON DRAWING
B.	SERVICE RATING:	70,000 FEET 140 V RMS
C.	DIELECTRIC STRENGTH:	70,000 FEET 425 V RMS
D.	INSULATION (BODY):	GLASS FILLED DIALLYL PHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN)
E.	CONTACTS:	PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204 SOCKETS TYPE I, CLASS 2 PINS TYPE II, CLASS 2
F.	CONTACT RATING:	3 AMPS
G.	SURFACE-CREEPAGE DISTANCE:	3/32 MIN. TO GROUND
H.	AIR SPACE:	3/32 MIN. TO GROUND
I.	CONTACT RESISTANCE:	20 MV MAX AT 3 AMPS

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



1011748-1



1011748-2

TOLERANCES:
TWO PLACES DECIMAL ±.010
THREE PLACES DECIMAL ±.005

NEXT ASSY	USED ON
APPLICATION	

KIC. PN 68502016401 THRU 6402	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DWG. NO. CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS		
MATERIAL	DRAWN F. PIZZO DATE 6-25-63 CHECKED F Costa APPROVAL F Costa 8/9/63 APPROVAL E Thomp 8-12-63	CONNECTOR, ELECTRICAL 1 PIN AND 1 SOCKET #20 CONTACTS SPECIFICATION CONTROL DRAWING		
HEAT TREATMENT	NASA APPROVAL W J Rhine 5-14-63	CODE IDENT NO.	SIZE C	NASA DRAWING NO. 1011748-
FINAL FINISH	MIT APPROVAL W Kupfer 14 Aug 63	SCALE ~	WT	SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1011748-

SYM	DESCRIPTION	DATE	APPROVAL
	REVISIONS 02560		

REQUIREMENTS:

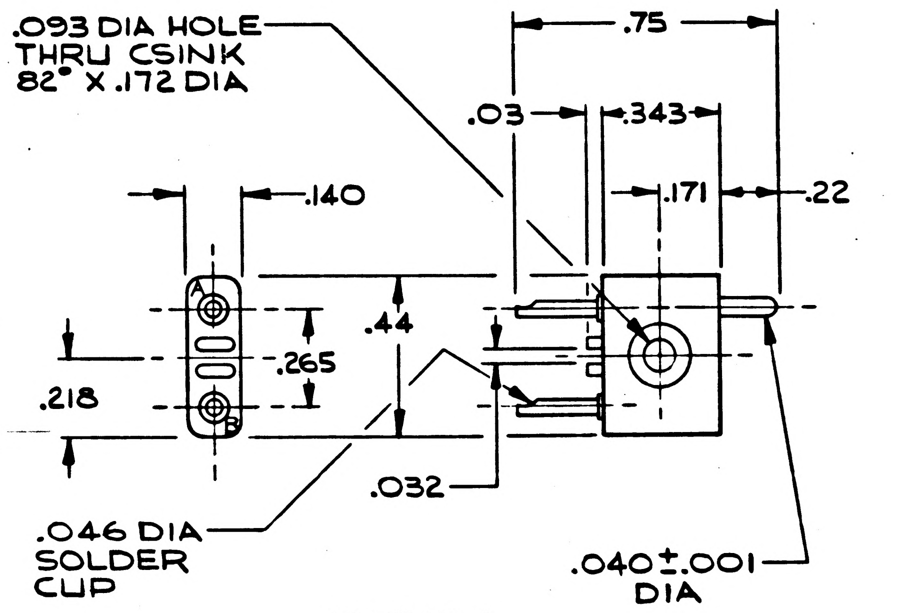
1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.
   - D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052
   - E. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-C-8384.
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     1. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION PER MIL-STD-129.
     2. PARTS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER PER MIL-STD-130, EXCEPT INK OR PAINT NOT ACCEPTABLE.
     3. MECHANICAL DIMENSIONS AS SHOWN.
     4. CONTACTS: 1 #20 PIN, .040 ± .001 IN. DIA.
1 #20 SOCKET TO ACCOMMODATE PIN .040 ± .001 IN. DIA.
     5. ALL CONTACTS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.
     6. ENGAGEMENT: FRICTION (POLARIZED)
     7. PART 1011748-1 SHALL MATE WITH PART 101178-2.
     8. WIRE TERMINATION: SOLDER CUP TO ACCOMMODATE #22 AWG STRANDED WIRE.
     9. INSERTION AND WITHDRAWAL FORCE 2 TO 11 OZ/PIN WITH MATING CONNECTOR.
   - B. ELECTRICAL REQUIREMENTS:

1. INSULATION RESISTANCE:	1000 MEGOHMS MIN. AT 1000 VDC
2. SERVICE RATING:	SEA LEVEL 530 V RMS
3. DIELECTRIC STRENGTH:	SEA LEVEL 1600 V RMS

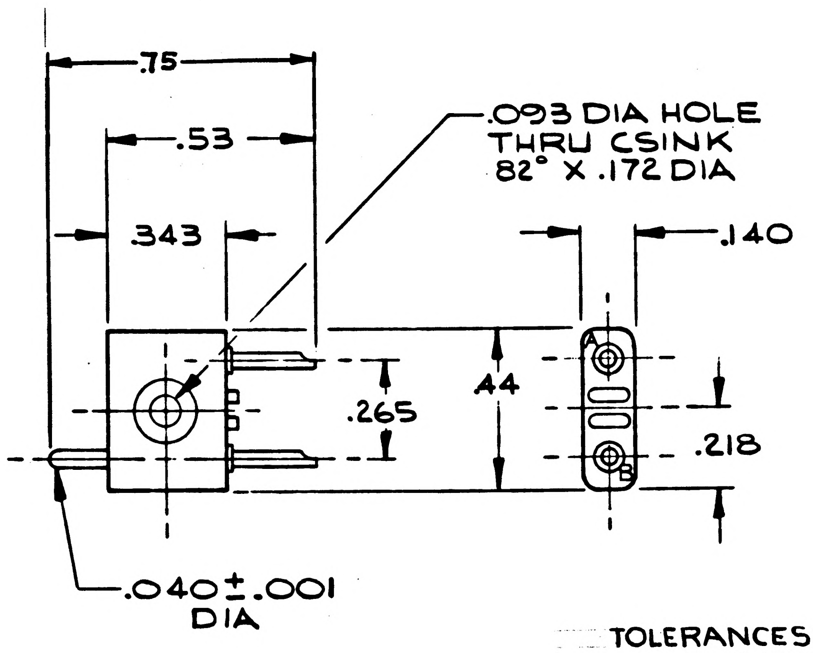
3. DESIGN REQUIREMENTS:

A. MOUNTING:	SURFACE MOUNT, AS INDICATED ON DRAWING
B. SERVICE RATING:	70,000 FEET 140 V RMS
C. DIELECTRIC STRENGTH:	70,000 FEET 425 V RMS
D. INSULATION (BODY):	GLASS FILLED DIALLYL PHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN)
E. CONTACTS:	PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204 SOCKETS TYPE I, CLASS 2 PINS TYPE II, CLASS 2
F. CONTACT RATING:	3 AMPS
G. SURFACE-CREEPAGE DISTANCE:	3/32 MIN. TO GROUND
H. AIR SPACE:	3/32 MIN. TO GROUND
I. CONTACT RESISTANCE:	20 MV MAX AT 3 AMPS

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



1011748-1



1011748-2

TOLERANCES:
TWO PLACES DECIMAL ±.010
THREE PLACES DECIMAL ±.005

KIC.
PN 68502016401
THRU 6402

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN F.PIZZO DATE 6-25-63
CHECKED E Costa
APPROVAL E Costa 8/9/63
APPROVAL E Thomp 8-12-63
NASA APPROVAL W J Rhine 5-14-67
MIT APPROVAL W Kupfer 14 Aug 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CONNECTOR, ELECTRICAL
1 PIN AND 1 SOCKET #20 CONTACTS
SPECIFICATION CONTROL DRAWING

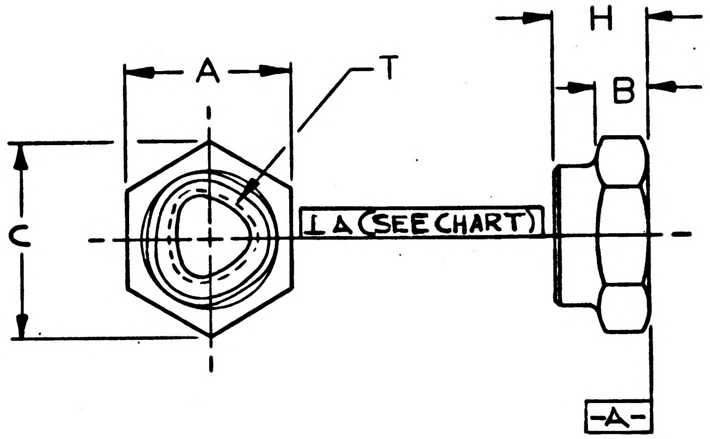
CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011748-
SCALE ~
WT
SHEET 1 OF 1

1011748-

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011750

REVISIONS 02560				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL



REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III.
2. INSPECTION AND ACCEPTANCE:
   - A. PACKAGE AND SHIPPING CONTAINER SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND MANUFACTURER'S PART NUMBER PER MIL-STD-129.
   - B. DIMENSIONS AS SHOWN.
   - C. THREADS SHALL CONFORM TO MIL-S-7742
3. DESIGN REQUIREMENTS:
   - A. MATERIAL: CRES FED SPEC QQ-S-763 CLASS 303 COND B
   - B. FINISH: PASSIVATED PER MIL-STD-171
   - C. LOCKING FEATURE PER MIL-N-25027 (ASG)

							REF			
DASH NO.	T THREAD SIZE	A MAX. MIN.	B REF.	C MIN.	H MAX. MIN.	MAX SQUARENESS	BEARING AREA MIN.SQ.IN.	TENSILE STRENGTH LBS.MIN.	WEIGHT PER 1000 APPROX.	STARTING TORQUE INCH-OZ. MAX.
-1	#0-80 NF-3B	.110 .106	.046	.121	.077 .072	.003	.004	220	.126 lb.	14.0
-2	#1-64 NC-3B	.126 .122	.056	.139	.092 .087	.003	.005	330	.219 lb.	24.0
-3	#1-72 NF-3B	.126 .122	.056	.139	.092 .087	.003	.005	350	.219 lb.	24.0
-4	#2-56 NC-3B	.157 .150	.067	.171	.107 .102	.004	.009	460	.409 lb.	40.0
-5	#2-64 NF-3B	.157 .150	.067	.171	.107 .102	.004	.009	490	.409 lb.	40.0
-6	#3-48 NC-3B	.189 .181	.071	.207	.122 .117	.004	.014	600	.604 lb.	50.0
-7	#3-56 NF-3B	.189 .181	.071	.207	.122 .117	.004	.014	650	.604 lb.	50.0
-8	#4-40 NC-3B	.189 .181	.071	.207	.122 .117	.004	.012	750	.586 lb.	60.0
-9	#4-48 NF-3B	.189 .181	.071	.207	.122 .117	.004	.012	820	.586 lb.	60.0

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

1011750

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ——	± ——	± ——

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 3

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC 74443128001
PN 8009

DRAWN Pizzo DATE 5-3-63
CHECKED BOHMAN 5-8-63
APPROVAL M. Werner
APPROVAL E. Thomp 8-12-63
NASA APPROVAL W J Rhine 5-14-63
MIT APPROVAL W [illegible] for H [illegible]

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
NUT, SELF-LOCKING, HEXAGON
SPECIFICATION CONTROL
DRAWING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011750
SCALE ~
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

SYM	ZONE	REVISIONS DESCRIPTION	DATE	APPROVAL

1011752

DASH NO.	
1	STATOR
-2	ROTOR

REQUIREMENTS:

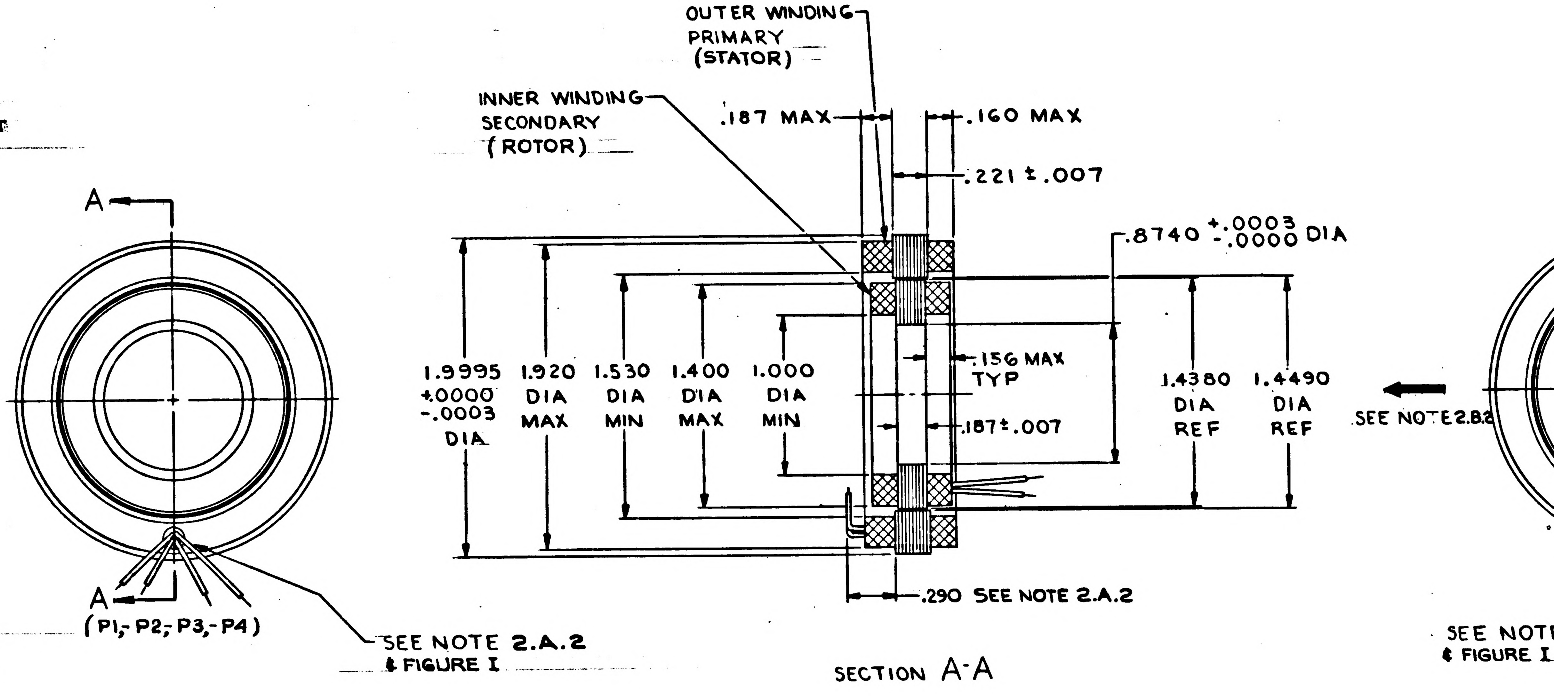
1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404 CLASS 1.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL REQUIREMENTS SPECIFIED IN PROCUREMENT SPECIFICATION PS 1011294
   - D. PACKING AND SHIPPING SHALL BE CAPABLE OF MEETING THE REQUIREMENTS OF PROCUREMENT SPECIFICATION PS 1011294, PARAGRAPH 5.1.
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     1. LEADS TO BE 25" MINIMUM LENGTH PER MIL-W-16878 TYPE E, 28 AWG COLOR CODED IN ACCORDANCE WITH FIGURE I.
     2. LEADS TO EXIT AXIALLY AS SHOWN ON DRAWING; LEADS MUST BE CAPABLE OF BENDING 90° WITHIN .290 OF FACE OF LAMINATION.
     3. DIMENSIONS AS SHOWN.
     4. ROTOR AND STATOR SHALL BE IDENTIFIED AS MATCHED PAIRS. IF PROCESS REQUIRES MARKING, MARK PER MIL-STD-130 EXCEPT THAT INK OR PAINT ARE NOT ACCEPTABLE.
     5. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER, DASH NUMBER, MANUFACTURER'S NAME AND PART NUMBER AND SERIAL NUMBER PER MIL-STD-129.
   - B. ELECTRICAL REQUIREMENTS:
     1. RESOLVERS SHALL BE AT ELECTRICAL ZERO WITHIN ±5° WHEN LEADS ARE POSITIONED AS SHOWN ON DRAWING.
     2. A POSITIVE RESOLVER ANGLE "A" RESULTS WHEN THE INNER RESOLVER WINDING IS ROTATED COUNTERCLOCKWISE FROM ELECTRICAL ZERO, VIEWED IN THE DIRECTION INDICATED BY THE ORIENTATION ARROW. POLARITY IS SUCH THAT THE FOLLOWING CONDITIONS ARE SATISFIED:

$$E_{S1-S3} = K(E_{P1-P3} \cos A + E_{P2-P4} \sin A)$$

$$E_{S2-S4} = K(E_{P2-P4} \cos A - E_{P1-P3} \sin A)$$

WHERE "K" IS THE TRANSFORMATION RATIO. AT ELECTRICAL ZERO (A=0)

$$E_{S1-S3} = K E_{P1-P3} \quad \text{AND} \quad E_{S2-S4} = K E_{P2-P4}$$


A
A
(P1, P2, P3, P4)
SEE NOTE 2.A.2
& FIGURE I
OUTER WINDING PRIMARY (STATOR)
INNER WINDING SECONDARY (ROTOR)
.187 MAX
.160 MAX
.221 ± .007
.8740 +.0003 -.0000 DIA
1.9995 +.0000 -.0003 DIA
1.920 DIA MAX
1.530 DIA MIN
1.400 DIA MAX
1.000 DIA MIN
.156 MAX TYP
.187 ± .007
1.4380 DIA REF
1.4490 DIA REF
.290 SEE NOTE 2.A.2
SEE NOTE 2.B.2
SEE NOTE 2.A.2 (S1, S2, S3, S4)
& FIGURE I

SECTION A-A

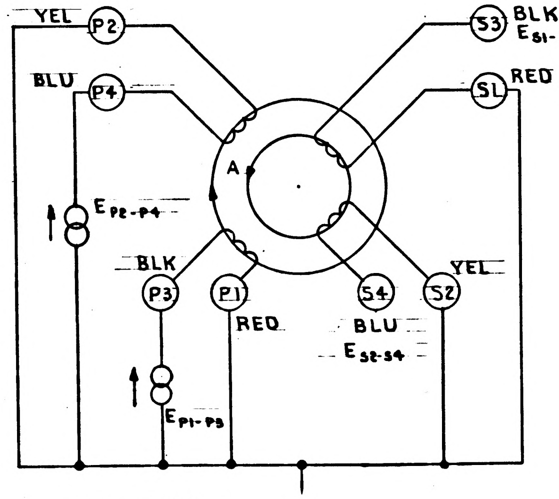

YEL
P2
BLU
P4
E_{P2-P4}
A
BLK
P3
P1
RED
E_{P1-P3}
S3
BLK
E_{S1-S3}
S1
RED
S4
BLU
E_{S2-S4}
S2
YEL

FIGURE I

PROCURE ONLY FROM APPROVED SOURCES OF SUPPLY LISTED ON ND 1012034 FOR THIS DRAWING.

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011294	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± —

DO NOT SCALE THIS DRAWING

MATERIAL —

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 75002009701-9702

DRAWN S. McGee DATE 5-3-63
CHECKED
APPROVAL Costa 9/9/63
APPROVAL 9-13-63
NASA APPROVAL
MIT APPROVAL 9/17/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RESOLVER
ONE SPEED
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. SIZE D NASA NUMBER 1011752

SCALE 2:1 WEIGHT CALC ACTUAL SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011755

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS				

REQUIREMENTS:

1. GENERAL:

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 1.

   C. UNITS SHALL BE CAPABLE OF MEETING ALL REQUIREMENTS SPECIFIED IN PROCUREMENT SPECIFICATION PS 1011294

   D. PACKING AND SHIPPING SHALL BE CAPABLE OF MEETING THE REQUIREMENTS OF PROCUREMENT SPECIFICATION PS 1011294, PARAGRAPH 5.1

2. INSPECTION AND ACCEPTANCE:

   A. MECHANICAL REQUIREMENTS

      1. LEADS TO BE 25" MINIMUM LENGTH PER MIL-W-16878, TYPE E, 28 AWG COLOR CODED IN ACCORDANCE WITH FIG.I.

      2.a INNER MEMBER LEADS TO EXIT RADIALLY FROM I.D. OF WINDING AS SHOWN.

      b. OUTER MEMBER LEADS TO EXIT AXIALLY WITHIN 3.875 DIA

      3. DIMENSIONS AS SHOWN.

      4. ROTOR AND STATOR SHALL BE IDENTIFIED AS MATCHED PAIRS. IF PROCESS REQUIRES MARKING, MARK PER MIL-STD-130 EXCEPT THAT INK OR PAINT ARE NOT ACCEPTABLE.

      5. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER, DASH NUMBER, MANUFACTURER'S NAME AND PART NUMBER AND SERIAL NUMBER PER MIL-STD-129.

   B. ELECTRICAL REQUIREMENTS

      1. RESOLVERS SHALL BE AT ELECTRICAL ZERO WITHIN ±3° WHEN LEADS ARE POSITIONED AS SHOWN ON DRAWING.

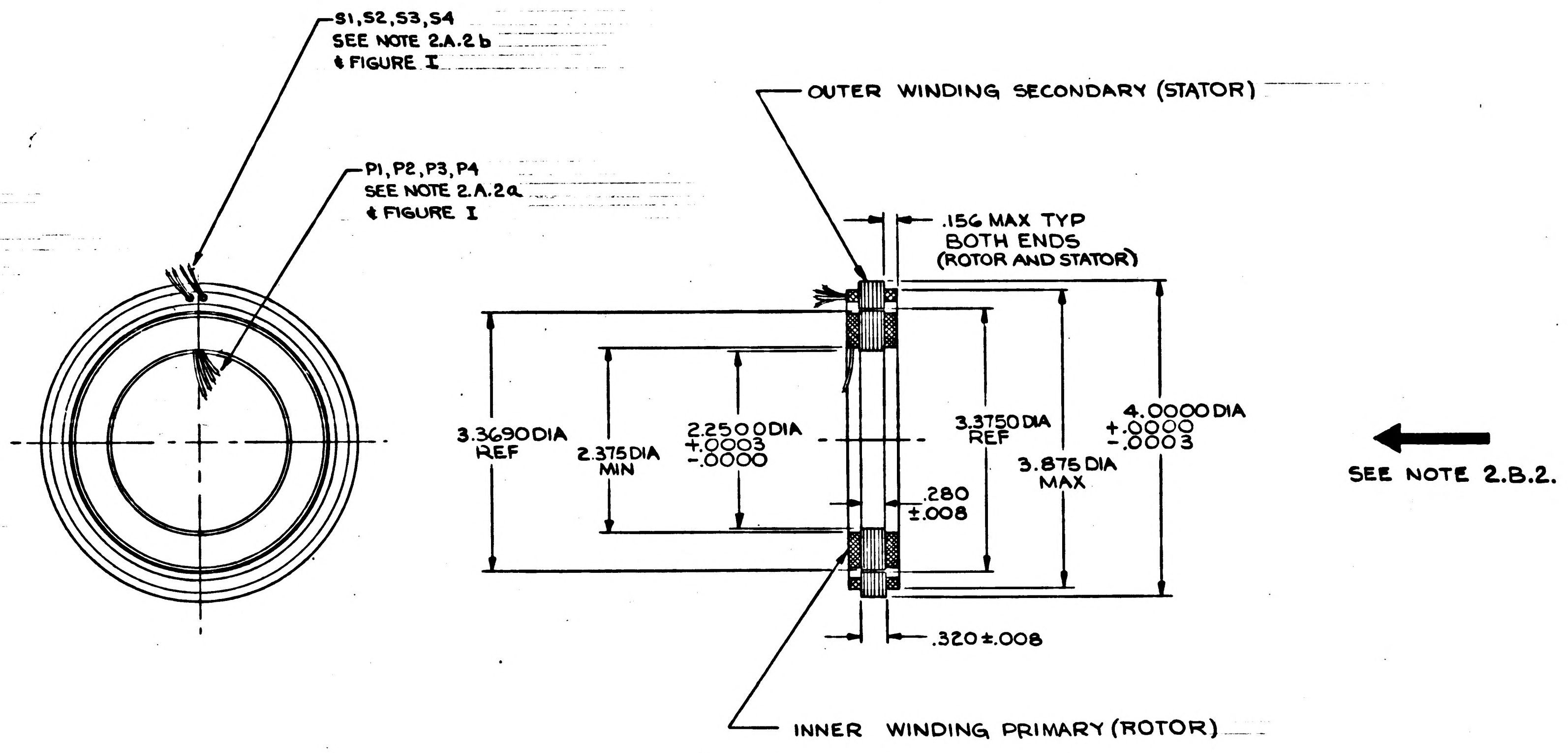
      2. A POSITIVE RESOLVER ANGLE "A" RESULTS WHEN THE INNER RESOLVER WINDING IS ROTATED CCW FROM ELECTRICAL ZERO AS VIEWED IN THE DIRECTION INDICATED BY THE ORIENTATION ARROW. POLARITY IS SUCH THAT THE FOLLOWING CONDITIONS ARE SATISFIED:

$$E_{S1-S3} = K(E_{P1-P3} \cos 64A - E_{P2-P4} \sin 64A)$$

$$E_{S2-S4} = K(E_{P2-P4} \cos 64A + E_{P1-P3} \sin 64A)$$

WHERE "K" IS THE TRANSFORMATION RATIO AT ELECTRICAL ZERO (A=0)

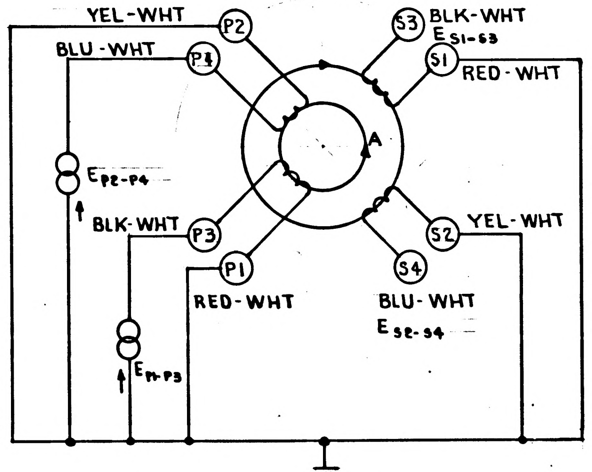
$$E_{S1-S3} = K E_{P1-P3}$$



S1,S2,S3,S4
SEE NOTE 2.A.2.b
& FIGURE I
P1,P2,P3,P4
SEE NOTE 2.A.2.a
& FIGURE I
OUTER WINDING SECONDARY (STATOR)
.156 MAX TYP
BOTH ENDS
(ROTOR AND STATOR)
3.3690 DIA
REF
2.375 DIA
MIN
2.2500 DIA
+.0003
-.0000
3.3750 DIA
REF
3.875 DIA
MAX
4.0000 DIA
+.0000
-.0003
.280
±.008
.320±.008
INNER WINDING PRIMARY (ROTOR)
SEE NOTE 2.B.2.

DASH NO.
-1 STATOR
-2 ROTOR

PROCURE ONLY FROM APPROVED SOURCES OF SUPPLY LISTED ON ND 1012034 FOR THIS DRAWING.



YEL-WHT
P2
BLU-WHT
P4
E_{P2-P4}
BLK-WHT
P3
P1
RED-WHT
E_{P1-P3}
A
S3
BLK-WHT
E_{S1-S3}
S1
RED-WHT
S2
YEL-WHT
S4
BLU-WHT
E_{S2-S4}

FIG. I

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011294	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 75 00200 9901-9902
DRAWN V.LOZZIO DATE 5-2-63
CHECKED W. Dupuis
APPROVAL
APPROVAL E. Ohanya 9-13-63
NASA APPROVAL Jack Barnes
MIT APPROVAL 9/7/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RESOLVER
SIXTY-FOUR SPEED
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE D
NASA NUMBER 1011755
SCALE 1:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011755

A 1011756

REVISIONS 02560				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR 14843	1-24-64	WR

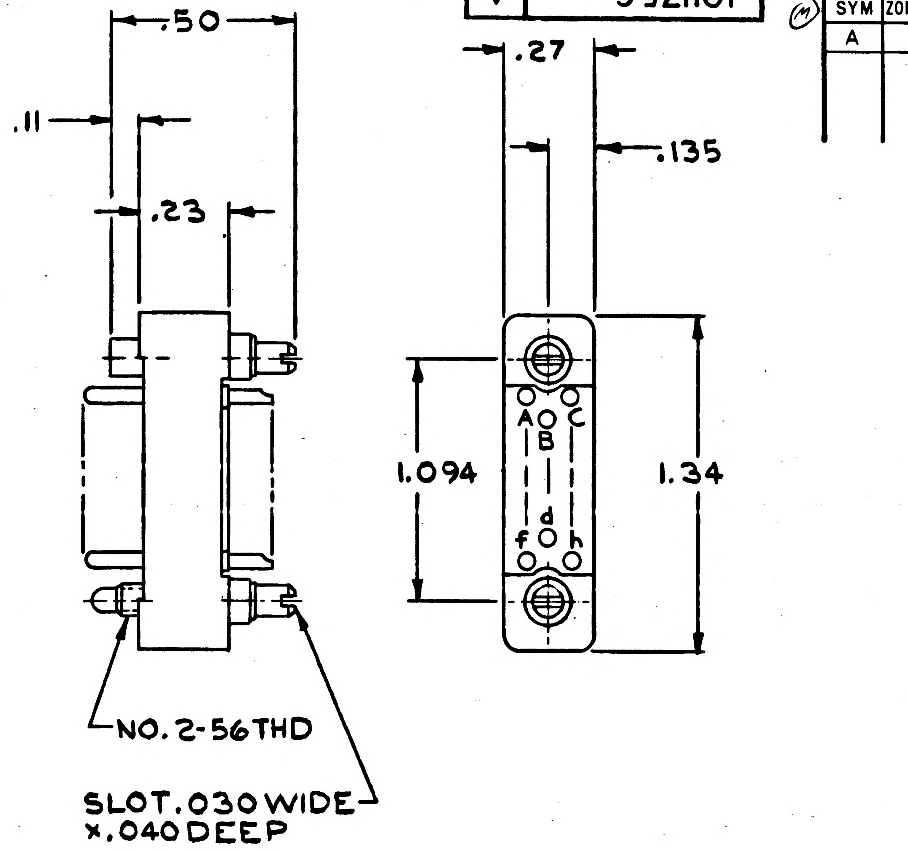
REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.
   - D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052
   - E. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-C-8384
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS
     1. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION PER MIL-STD-129.
     2. PARTS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER PER MIL-STD-130, EXCEPT INK OR PAINT NOT ACCEPTABLE.
     3. MECHANICAL DIMENSIONS AS SHOWN.
     4. CONTACTS 29 #22 PINS .030 ± .001 IN. DIAMETER.
     5. ALL PINS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.
     6. ENGAGEMENT: SCREWLOCKS, POLARIZED.
     7. THIS DRAWING SHALL MATE WITH A MATCHING PART NASA DRAWING 1011645 (REF).
     8. WIRE TERMINATION: SOLDER CUP TO ACCOMMODATE #22 AWG STRANDED WIRE.
     9. INSERTION AND WITHDRAWAL FORCE 2 TO 11 OZ/PIN WITH MATING CONNECTOR.
   - B. ELECTRICAL REQUIREMENTS:
     1. INSULATION RESISTANCE: 1000 MEGOHMS MIN AT 1000 VDC
     2. SERVICE RATING: SEA LEVEL 530 V RMS
     3. DIELECTRIC STRENGTH SEA LEVEL 1600 V RMS
   - C. MATING TORQUE: UNIT SHALL WITHSTAND A MATING TORQUE OF 2 1/4 TO 2 1/2 IN.-LBS. MAXIMUM WITHOUT DEGRADATION OF PERFORMANCE
3. DESIGN REQUIREMENTS:

A. MOUNTING:	PENDANT (CABLE)
B. SERVICE RATING:	70,000 FEET 140 V RMS
C. DIELECTRIC STRENGTH:	70,000 FEET 425 V RMS
D. INSULATION (BODY):	GLASS FILLED DIALLYL PHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN)
E. CONTACTS:	PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204, TYPE II, CLASS 2 OVER COPPER FLASH
F. SCREWLOCKS:	STAINLESS STEEL, PASSIVATED
G. CONTACT RATING:	3 AMPS
H. CONTACT CENTER TO CENTER:	3/32 ± .002
I. SURFACE-CREEPAGE DISTANCE:	1/16 MIN.
J. AIR SPACE:	.040 MIN.

K. CONTACT RESISTANCE:
1. 20 MV MAX AT 3 AMPS
2. 25 MICROVOLTS MAXIMUM AT 250 MICROAMPS D.C. AFTER 500 INSERTIONS AND WITHDRAWALS

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



TOLERANCES:
TWO PLACE DECIMALS— ±.010
THREE PLACE DECIMALS ±.005

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

	FRACTIONS	DECIMALS	ANGLES
TOL ON	+ –	+ –	+ –

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 68502018401
DRAWN G. KRUK DATE 5-15-63
CHECKED V. Tomasaca 5-17-63
APPROVAL F. Costay 8/9/63
APPROVAL 8-12-63
NASA APPROVAL W. J. Rhine 8-14-63
MIT APPROVAL 14 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE CONNECTOR, ELECTRICAL
RECTANGULAR, 29 NO. 22 PIN
CONTACTS
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011756
SCALE ~
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

REVISIONS 02560				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

1011756

REQUIREMENTS:

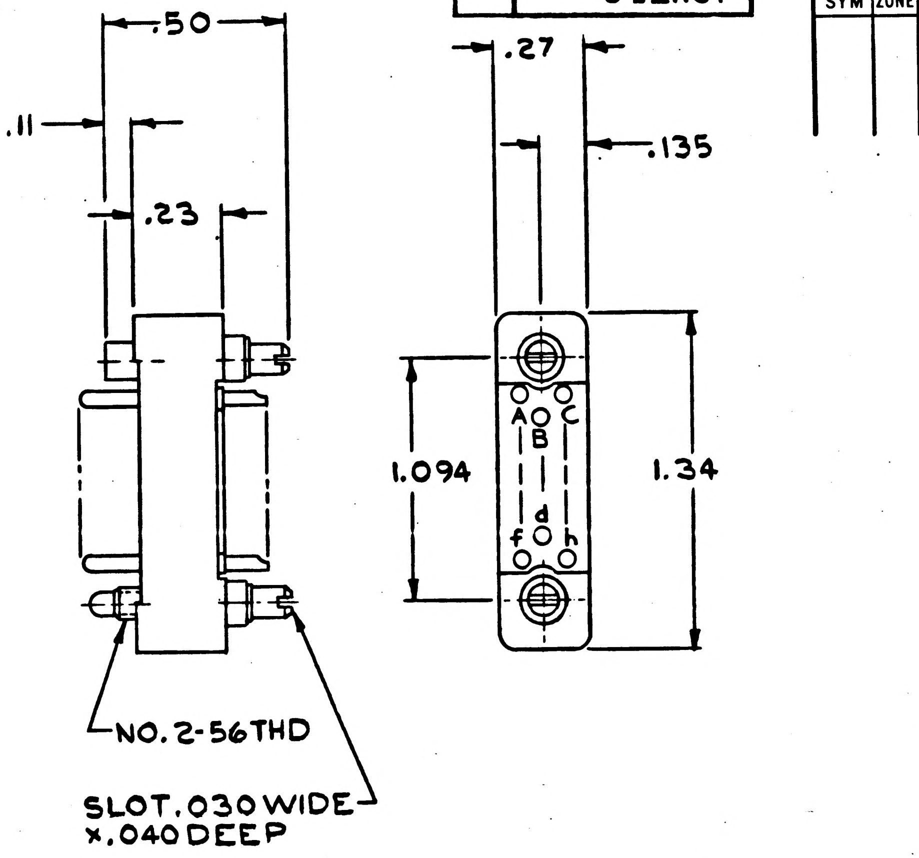
1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.
   - D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052
   - E. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-C-8384
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS
     1. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION PER MIL-STD-129.
     2. PARTS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER PER MIL-STD-130, EXCEPT INK OR PAINT NOT ACCEPTABLE.
     3. MECHANICAL DIMENSIONS AS SHOWN.
     4. CONTACTS 29 #22 PINS .030 ± .001 IN. DIAMETER.
     5. ALL PINS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.
     6. ENGAGEMENT: SCREWLOCKS, POLARIZED.
     7. THIS DRAWING SHALL MATE WITH A MATCHING PART NASA DRAWING 1011645 (REF).
     8. WIRE TERMINATION: SOLDER CUP TO ACCOMMODATE #22 AWG STRANDED WIRE.
     9. INSERTION AND WITHDRAWAL FORCE 2 TO 11 OZ/PIN WITH MATING CONNECTOR.
   - B. ELECTRICAL REQUIREMENTS:

1. INSULATION RESISTANCE:	1000 MEGOHMS MIN AT 1000 VDC
2. SERVICE RATING:	SEA LEVEL 530 V RMS
3. DIELECTRIC STRENGTH:	SEA LEVEL 1600 V RMS

3. DESIGN REQUIREMENTS:

A. MOUNTING:	PENDANT (CABLE)
B. SERVICE RATING:	70,000 FEET 140 V RMS
C. DIELECTRIC STRENGTH:	70,000 FEET 425 V RMS
D. INSULATION (BODY):	GLASS FILLED DIALLYL PHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN)
E. CONTACTS:	PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204, TYPE II, CLASS 2
F. SCREWLOCKS:	STAINLESS STEEL, PASSIVATED
G. CONTACT RATING:	3 AMPS
H. CONTACT CENTER TO CENTER:	3/32 ± .002
I. SURFACE-CREEPAGE DISTANCE:	1/16 MIN.
J. AIR SPACE:	.040 MIN.
K. CONTACT RESISTANCE:	20 MV MAX AT 3 AMPS.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



TOLERANCES:
TWO PLACE DECIMALS— ±.010
THREE PLACE DECIMALS ±.005

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

	FRACTIONS	DECIMALS	ANGLES
TOL ON	+ −	+ −	+ −

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 68502C18401
DRAWN G. KRUK DATE 5-15-63
CHECKED V. Tomaca 5-17-63
APPROVAL F. Costay 8/9/63
APPROVAL 8-12-63
NASA APPROVAL W J Rhine 8-14-63
MIT APPROVAL 14 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE CONNECTOR, ELECTRICAL
RECTANGULAR, 29 NO. 22 PIN
CONTACTS
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011756
SCALE ~
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

1011756

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011757

REVISIONS 02560				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REQUIREMENTS:

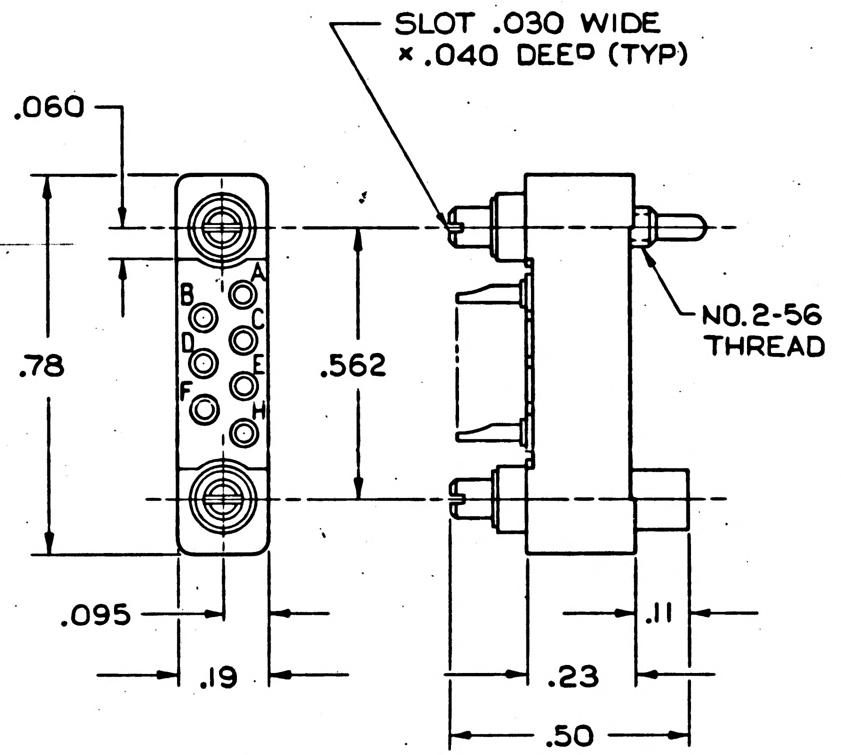
1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.
   - D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052
   - E. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-C-8384.
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - 1. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION PER MIL-STD-129.
     - 2. PARTS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER PER MIL-STD-130, EXCEPT INK OR PAINT NOT ACCEPTABLE.
     - 3. MECHANICAL DIMENSIONS AS SHOWN.
     - 4. CONTACTS 7 #22 SOCKETS TO ACCOMMODATE .030 ± .001 IN. PIN DIAMETER.
     - 5. ALL SOCKETS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.
     - 6. ENGAGEMENT: SCREWLOCKS, POLARIZED.
     - 7. THIS DRAWING SHALL MATE WITH A MATCHING PART NASA DRAWING 1011741 (REF).
     - 8. WIRE TERMINATION: SOLDER CUP TO ACCOMMODATE #22 AWG STRANDED WIRE.
     - 9. INSERTION AND WITHDRAWAL FORCE 2 TO 11 OZ/PIN WITH MATING CONNECTOR.
   - B. ELECTRICAL REQUIREMENTS:

1.	INSULATION RESISTANCE:	1000 MEGOHMS MIN AT 1000 VDC
2.	SERVICE RATING:	SEA LEVEL 530 V RMS
3.	DIELECTRIC STRENGTH:	SEA LEVEL 1600 V RMS

3. DESIGN REQUIREMENTS:

A.	MOUNTING:	PENDANT (CABLE)
B.	SERVICE RATING:	70,000 FEET 140 V RMS
C.	DIELECTRIC STRENGTH:	70,000 FEET 425 V RMS
D.	INSULATION (BODY):	GLASS FILLED DIALLYL PHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN)
E.	CONTACTS:	PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204, TYPE I, CLASS 2
F.	SCREWLOCKS:	STAINLESS STEEL, PASSIVATED
G.	CONTACT RATING:	3 AMPS
H.	CONTACT CENTER TO CENTER:	3/32 ± .002
I.	SURFACE-CREEPAGE DISTANCE:	1/16 MIN.
J.	AIR SPACE:	.040 MIN.
K.	CONTACT RESISTANCE:	20 MV MAX AT 3 AMPS

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



TOLERANCES:
TWO PLACE DECIMALS ± .010
THREE PLACE DECIMALS ± .005

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± NOTED	± —

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 68502018301
DRAWN V. Stalinowsky DATE 5-16-63
CHECKED V. Tomala 5-17-63
APPROVAL C. F. Cotsay 8/9/63
APPROVAL E. Thomas 8-12-63
NASA APPROVAL W J Rhine 5-14-63
MIT APPROVAL W Kupfer 14 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
CONNECTOR, ELECTRICAL
RECTANGULAR, 7 #22 SOCKET CONTACTS
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011757
SCALE
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011757

A	1011758

REVISIONS 02560				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR 10687	6/29/64	

REQUIREMENTS:

1. GENERAL:

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

   C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.

   D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052

   E. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-C-8384.

2. INSPECTION AND ACCEPTANCE:

   A. MECHANICAL REQUIREMENTS:

      1. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION PER MIL-STD-129.

      2. PARTS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER PER MIL-STD-130, EXCEPT INK OR PAINT NOT ACCEPTABLE.

      3. MECHANICAL DIMENSIONS AS SHOWN.

      4. CONTACTS 20 #22 SOCKETS TO ACCOMMODATE .030 ± .001 IN. PIN DIAMETER.

      5. ALL SOCKETS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.

      6. ENGAGEMENT: SCREWLOCKS, POLARIZED

      7. THIS DRAWING SHALL MATE WITH A MATCHING PART NASA DRAWING 1011740 (REF).

      8. WIRE TERMINATION: SOLDER CUP TO ACCOMMODATE #22 AWG STRANDED WIRE.

      9. INSERTION AND WITHDRAWAL FORCE 2 TO 11 OZ/PIN WITH MATING CONNECTOR.

   B. ELECTRICAL REQUIREMENTS:

1.	INSULATION RESISTANCE:	1000 MEGOHMS MIN. AT 1000 VDC
2.	SERVICE RATING:	SEA LEVEL 530 V RMS
3.	DIELECTRIC STRENGTH:	SEA LEVEL 1600 V RMS

3. DESIGN REQUIREMENTS:

A.	MOUNTING:	PER TABLE I
B.	SERVICE RATING:	70,000 FEET 140 V RMS
C.	DIELECTRIC STRENGTH:	70,000 FEET 425 V RMS
D.	INSULATION (BODY):	GLASS FILLED DIALLYL PHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN)
E.	CONTACTS:	PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204, TYPE I, CLASS 2
F.	SCREWLOCKS AND STUDS	STAINLESS STEEL, PASSIVATED
G.	CONTACT RATING:	3 AMPS
H.	CONTACT CENTER TO CENTER:	3/32 ± .002
I.	SURFACE-CREEPAGE DISTANCE:	1/16 MIN.
J.	AIR SPACE:	.040 MIN.
K.	CONTACT RESISTANCE:	20 MV MAX AT 3 AMPS

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

FIGURE I

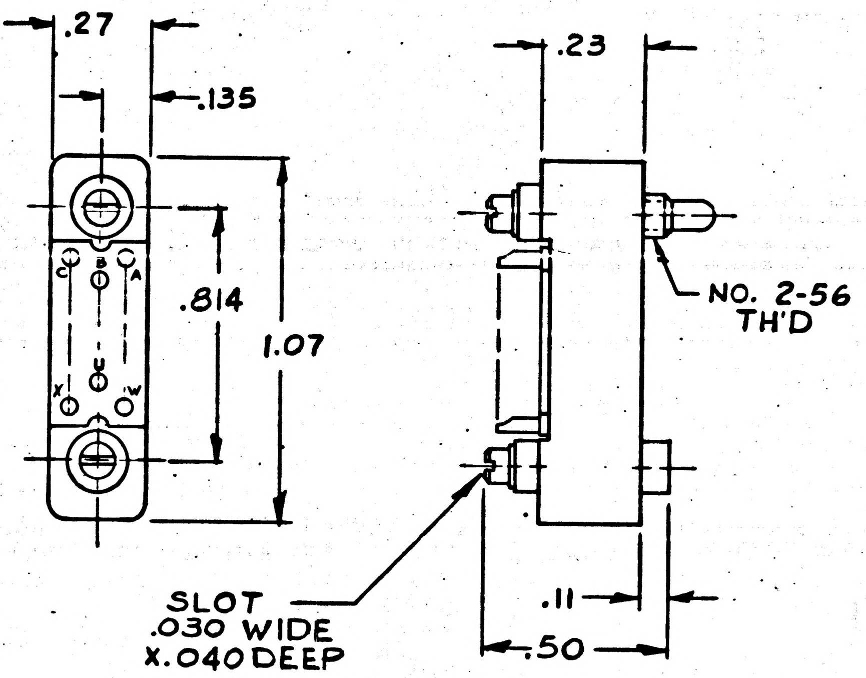


TABLE I

DASH NO.	MOUNTING HARDWARE
1011758-1	SCREWLOCKS PER FIG. I
1011758-2	CHASSIS MOUNTS PER FIGURE II

MASTER

TOLERANCES:
TWO PLACE DECIMALS ----- ±.010
THREE PLACE DECIMALS ---- ±.005

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± -	± NOTED	± -

DO NOT SCALE THIS DRAWING

MATERIAL

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 68502018201

DRAWN	C. SCRICCO	DATE 5-16-63
CHECKED	Tomala 5-17-63	
APPROVAL	8/9/63	
APPROVAL	8-12-63	
NASA APPROVAL	W J Kline 5-14-63	
MIT APPROVAL	14 Aug 63	

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
CONNECTOR ELECTRICAL
RECTANGULAR 20 #22 SOCKET CONTACTS
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011758

SCALE	WEIGHT	CALC ACTUAL	SHEET 1 OF 2

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

4 3 2 1

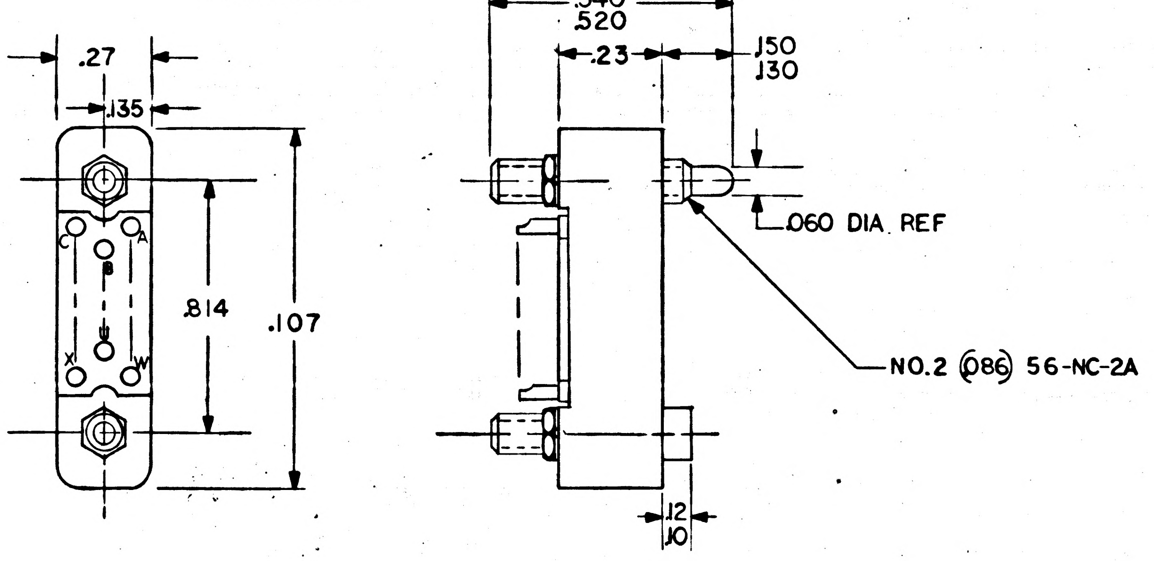
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1011758 A

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	THIS SHEET ADDED PER TDRR 10687	6/29/64	L.E.L.

FIGURE II



NOTES:

1. TOLERANCES: TWO PLACE DECIMALS ----- ±.010
THREE PLACE DECIMALS ---- ±.005

MASTER

Ⓐ THIS SHEET ADDED

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
SEE NOTE 1.
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN R. Addario Jr. DATE 26 June 64
CHECKED A. Mato 6-29-64
APPROVAL E. Thorup (wpm) 6-29-64
APPROVAL
NASA APPROVAL
MIT APPROVAL L. E. Larson 6/29/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CONNECTOR ELECTRICAL RECTANGULAR 20 #22 SOCKET CONTACTS
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011758
SCALE NONE
WT
SHEET 2 OF 2

4 3 2 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

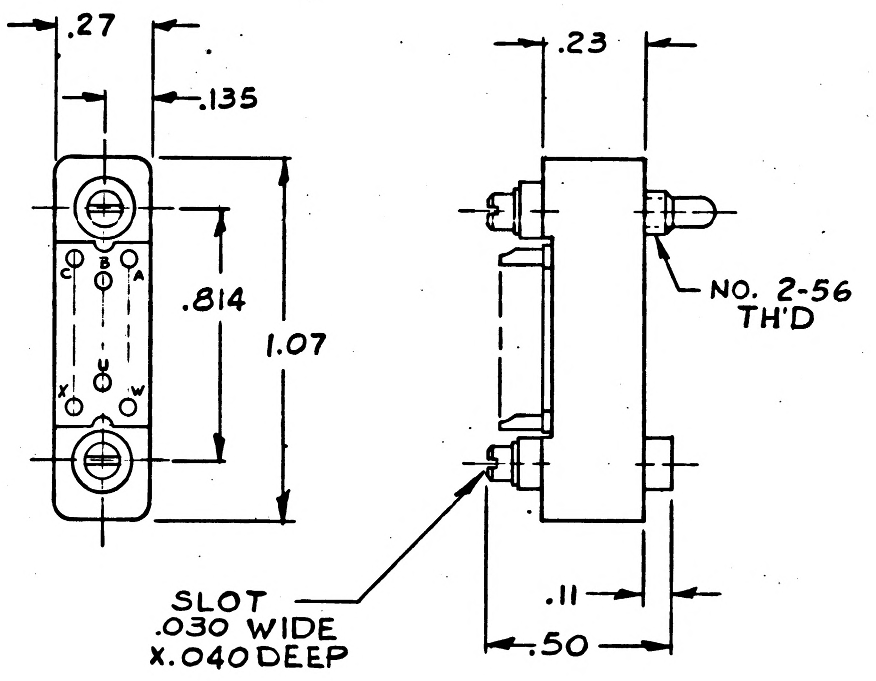
1011758

REVISIONS 02560				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD 1A.
   - D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052
   - E. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-C-8384.
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     1. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION PER MIL-STD-129.
     2. PARTS SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER PER MIL-STD-130, EXCEPT INK OR PAINT NOT ACCEPTABLE.
     3. MECHANICAL DIMENSIONS AS SHOWN.
     4. CONTACTS 20 #22 SOCKETS TO ACCOMMODATE .030 ± .001 IN. PIN DIAMETER.
     5. ALL SOCKETS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.
     6. ENGAGEMENT: SCREWLOCKS, POLARIZED.
     7. THIS DRAWING SHALL MATE WITH A MATCHING PART NASA DRAWING 1011740 (REF).
     8. WIRE TERMINATION: SOLDER CUP TO ACCOMMODATE #22 AWG STRANDED WIRE.
     9. INSERTION AND WITHDRAWAL FORCE 2 TO 11 OZ/PIN WITH MATING CONNECTOR.
   - B. ELECTRICAL REQUIREMENTS:
     1. INSULATION RESISTANCE: 1000 MEGOHMS MIN. AT 1000 VDC
     2. SERVICE RATING: SEA LEVEL 530 V RMS
     3. DIELECTRIC STRENGTH: SEA LEVEL 1600 V RMS
3. DESIGN REQUIREMENTS:
   - A. MOUNTING: PENDANT (CABLE)
   - B. SERVICE RATING: 70,000 FEET 140 V RMS
   - C. DIELECTRIC STRENGTH: 70,000 FEET 425 V RMS
   - D. INSULATION (BODY): GLASS FILLED DIALLYL PHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN)
   - E. CONTACTS: PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204, TYPE I, CLASS 2
   - F. SCREWLOCKS: STAINLESS STEEL, PASSIVATED
   - G. CONTACT RATING: 3 AMPS
   - H. CONTACT CENTER TO CENTER: 3/32 ± .002
   - I. SURFACE-CREEPAGE DISTANCE: 1/16 MIN.
   - J. AIR SPACE: .040 MIN.
   - K. CONTACT RESISTANCE: 20 MV MAX AT 3 AMPS

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



MASTER

TOLERANCES:
TWO PLACE DECIMALS ----- ±.010
THREE PLACE DECIMALS ---- ±.005

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± -	± NOTED	± -

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 68502018201
DRAWN C. SCRICCO DATE 5-16-63
CHECKED V. Tomala 5-12-63
APPROVAL 8/9/63
APPROVAL 8-12-63
NASA APPROVAL W. J. Rhine 5-14-63
MIT APPROVAL 14 Aug 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
CONNECTOR ELECTRICAL
RECTANGULAR 20 #22 SOCKET CONTACTS
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011758

SCALE	WEIGHT	CALC ACTUAL	SHEET 1 OF 1

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

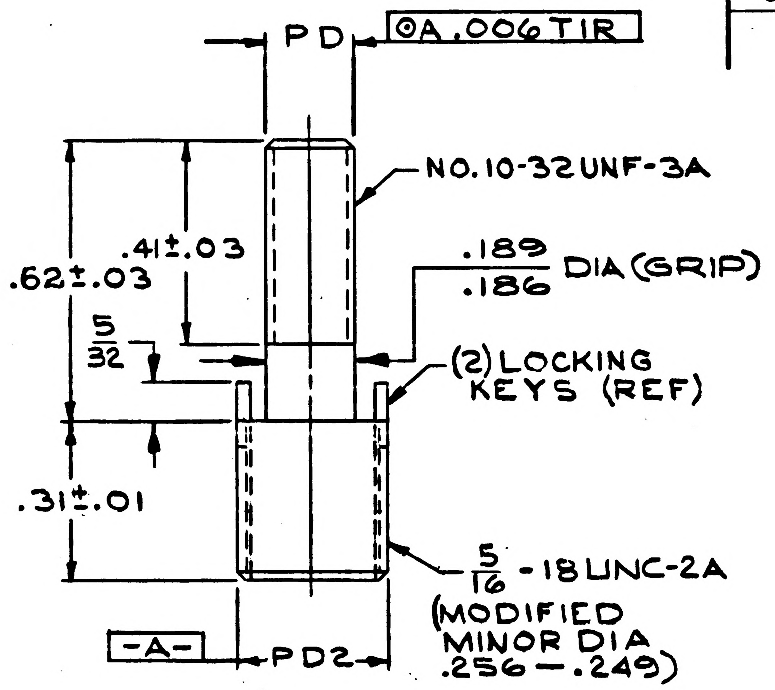
1011758

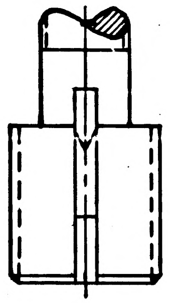
1011765 A

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
		REVISIONS 02280		
A3		REVISED PER TDRR NO. 03154.	9/16/63	9/17

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED IN MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISION SPECIFIED IN ND 1015404, CLASS 3.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III.
2. INSPECTION AND ACCEPTANCE:
   - A. PACKAGE AND SHIPPING CONTAINER SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND MANUFACTURER'S PART NUMBER PER MIL-STD-129.
   - B. DIMENSIONS AS SHOWN.
   - C. AXIAL MISALIGNMENT BETWEEN STUD END AND NUT END THREADS - 1/2° MAX.
3. DESIGN REQUIREMENTS:
   - A. STUDS ARE DESIGNED TO BE LOCKED IN PLACE BY MEANS OF HARDENED KEYS UPON INSTALLATION.
   - B. MATERIAL: STUD-CRES 303, MIL-S-7720 COND. B
   - C. FINISH: PASSIVATED PER MIL-STD-171 TABLE V-A FINISH NO. 5.4.2.
   - D. MATERIAL: KEYS-CRES 17-7 PH. MIL-S-25043
   - E. FINISH: PASSIVATED PER MIL-STD-171 TABLE V-A FINISH NO. 5.4.2.





INSTALLATION HOLE DATA (REF)

TAP DRILL DIA	$.272^{+.004}_{-.001}$
COUNTERSUNK DIA	$.323^{+.010}_{-.000}$
TAP (UNC-2B)	5/16-18
MINIMUM DEPTH FULL THD .37	

NOTE: STUD END SHALL BE INSTALLED .01 TO .03 BELOW SURFACE.

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DWG

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	±.016	± ~	± ~

DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 3

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 74464020001

DRAWN G. KRUK DATE 5-7-63
CHECKED
APPROVAL 6-24-63
APPROVAL 7-16-63
NASA APPROVAL 7/24/63
MIT APPROVAL 24 July 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE STUD, LOCKED IN (KEY LOCK) (SPECIFICATION CONTROL DRAWING)

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011765
SCALE ~	WEIGHT CALC ACTUAL	SHEET OF 1

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

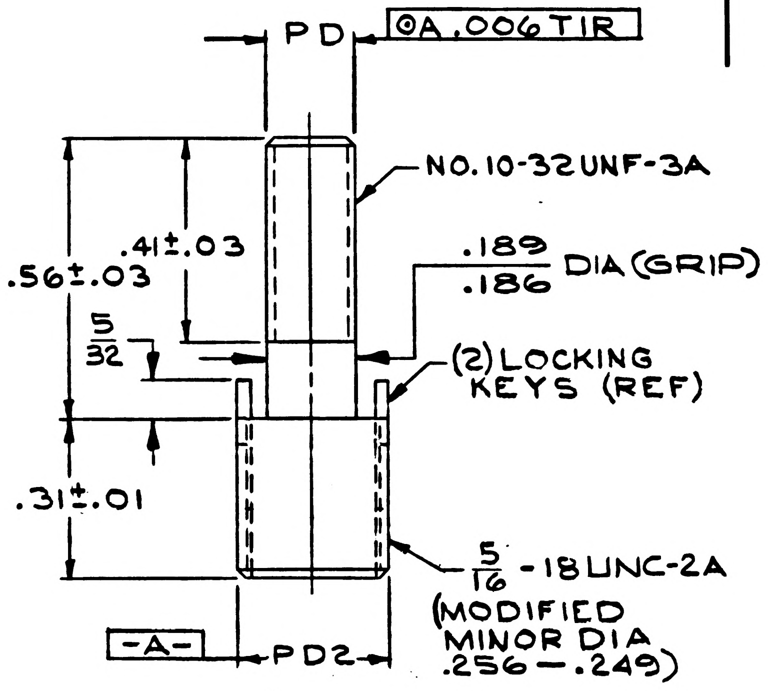
1011765

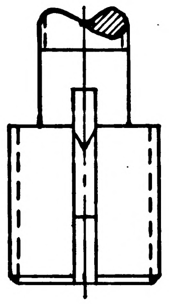
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REVISIONS 02280

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED IN MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISION SPECIFIED IN ND 1015404, CLASS 3.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III.
2. INSPECTION AND ACCEPTANCE:
   - A. PACKAGE AND SHIPPING CONTAINER SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND MANUFACTURER'S PART NUMBER PER MIL-STD-129.
   - B. DIMENSIONS AS SHOWN.
   - C. AXIAL MISALIGNMENT BETWEEN STUD END AND NUT END THREADS - 1/2° MAX.
3. DESIGN REQUIREMENTS:
   - A. STUDS ARE DESIGNED TO BE LOCKED IN PLACE BY MEANS OF HARDENED KEYS UPON INSTALLATION.
   - B. MATERIAL: CRES 303, MIL-S-7720, CONDITION B
   - C. FINISH: PASSIVATED PER MIL-STD-171





INSTALLATION HOLE DATA (REF)

TAP DRILL DIA	.272 $^{+.004}_{-.001}$
COUNTERSUNK DIA	.323 $^{+.010}_{-.000}$
TAP (UNC-2B)	5/16-18
MINIMUM DEPTH FULL THD	.37

NOTE: STUD END SHALL BE INSTALLED .01 TO .03 BELOW SURFACE.

PROCURE ONLY FROM APROVED SOURCES LISTED ON ND 1002034 FOR THIS DWG

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ±.016; DECIMALS ± ~; ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 3
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 74464020001
DRAWN G. KRUK DATE 5-7-63
CHECKED
APPROVAL 6-24-63
APPROVAL 7-16-63
NASA APPROVAL 7/24/63
MIT APPROVAL 24 July 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
STUD, LOCKED IN
(KEY LOCK)
(SPECIFICATION CONTROL DRAWING)

CODE IDENT NO.
SIZE C
NASA NUMBER 1011765
SCALE ~
WEIGHT CALC ACTUAL
SHEET OF 1

E-184

INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

1011766

REVISIONS TDRR 05237			
SYM	DESCRIPTION	DATE	APPROVAL

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REQUIREMENTS:

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED IN MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III.
2. INSPECTION AND ACCEPTANCE
   - A. PACKAGE AND SHIPPING CONTAINER SHALL BE MARKED WITH NASA DRAWING NUMBER, DASH NUMBER, REVISION LETTER AND MANUFACTURER'S PART NUMBER PER MIL-STD-129.
   - B. DIMENSIONS AS SHOWN.
3. DESIGN REQUIREMENTS
   - A. MATERIAL- CORROSION RESISTANT STEEL 302, 303 OR 304 IN ACCORDANCE WITH QQ-S-763: PASSIVATED IN ACCORDANCE WITH MIL-STD-171, FINISH NUMBER 5.4.
   - B. LOCKING FEATURE- SHALL BE IN ACCORDANCE WITH MIL-N-25027.

PROCURE ONLY FROM APPROVED SOURCES
LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

K.I.C. NO. 74443145001 THRU 5018

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN M.NEILL DATE 10-9-63
CHECKED 12/6/63
APPROVAL 12/9/63
APPROVAL E. Thorup 12/12/63
NASA APPROVAL 12/17/63
MIT APPROVAL A. Hazel 12/17/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

NUT, SELF-LOCKING,
CLINCH
SPECIFICATION CONTROL DRAWING

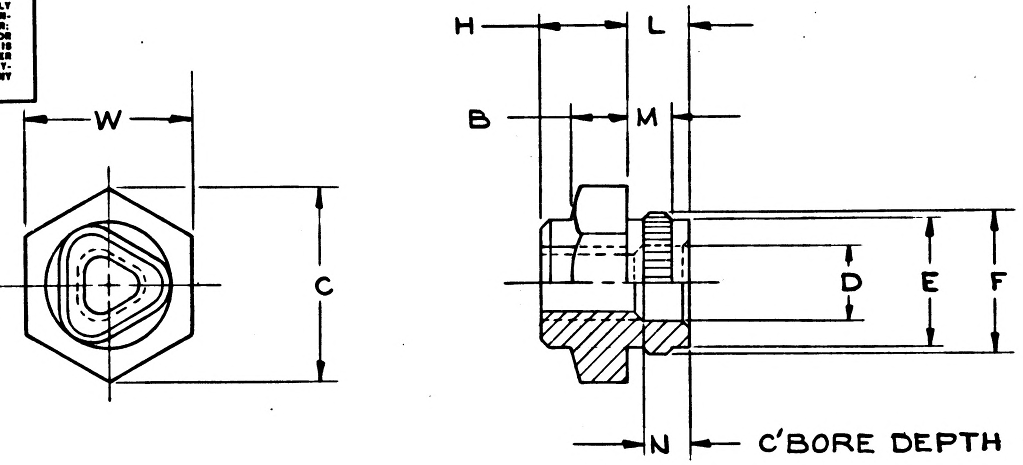
CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011766
SCALE
WT
SHEET 1 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1011766

REVISIONS TDRR 05237			
SYM	DESCRIPTION	DATE	APPROVAL



NASA DASH NO.	THREAD T	B REF	C MIN	D +.003 -.000	E +.000 -.003	F +.000 -.003	H +.000 -.005	W MAX	W MIN	SHANK L ±.003	SHANK M +.000 -.010	SHANK N ±.005	WEIGHT LBS PER 1000	REFERENCE MAT'L THICK. RANGE MAX	REFERENCE MAT'L THICK. RANGE MIN	REFERENCE REC. MTG. HOLE SIZE MAX	REFERENCE REC. MTG. HOLE SIZE MIN	STARTING TORQUE, IN.-OZ. (AS REC'D) FIRST INSTALLATION MAX.	FIRST REMOVAL MIN.	FIFTH REMOVAL MIN.
-1	0-80UNF-3B	.046	.121	.067	.091	.097	.077	.110	.106	.057	.038	.047	.175	.032	.020	.094	.092	14.0	2.0	1.0
-2	1-64UNC-3B	.056	.139	.081	.107	.113	.092	.126	.122				.280			.110	.108	24.0	3.0	1.5
-3	1-72UNF-3B	.056	.139	.081	.107	.113	.092	.126	.122				.280			.110	.108	24.0	3.0	1.5
-4	2-56UNC-3B	.067	.171	.108	.132	.138	.107	.157	.150				.480			.135	.133	40.0	5.0	2.0
-5	2-64UNF-3B	.067	.171	.108	.132	.138	.107	.157	.150				.480			.135	.133	40.0	5.0	2.0
-6	3-48UNC-3B	.071	.207	.133	.164	.171	.122	.189	.181				.720			.167	.165	50.0	6.5	3.0
-7	3-56UNF-3B	↕	↕	↕	↕	↕	↕	↕	↕				.720			.167	.165	50.0	6.5	3.0
-8	4-40UNC-3B	↕	↕	↕	↕	↕	↕	↕	↕				.705			.167	.165	60.0	10.0	5.0
-9	4-48UNF-3B	.071	.207	.133	.164	.171	.122	.189	.181				.705			.167	.165	60.0	10.0	5.0
-10	0-80UNF-3B	.046	.121	.067	.091	.097	.077	.110	.106	.087	.060	.077	.200	.063	.033	.094	.092	14.0	2.0	1.0
-11	1-64UNC-3B	.056	.139	.081	.107	.113	.092	.126	.122				.315			.110	.108	24.0	3.0	1.5
-12	1-72UNF-3B	.056	.139	.081	.107	.113	.092	.126	.122				.315			.110	.108	24.0	3.0	1.5
-13	2-56UNC-3B	.067	.171	.108	.132	.138	.107	.157	.150				.520			.135	.133	40.0	5.0	2.0
-14	2-64UNF-3B	.067	.171	.108	.132	.138	.107	.157	.150				.520			.135	.133	40.0	5.0	2.0
-15	3-48UNC-3B	.071	.207	.133	.164	.171	.122	.189	.181				.780			.167	.165	50.0	6.5	3.0
-16	3-56UNF-3B	↕	↕	↕	↕	↕	↕	↕	↕				.780			.167	.165	50.0	6.5	3.0
-17	4-40UNC-3B	↕	↕	↕	↕	↕	↕	↕	↕				.765			.167	.165	60.0	10.0	5.0
-18	4-48UNF-3B	.071	.207	.133	.164	.171	.122	.189	.181				.765			.167	.165	60.0	10.0	5.0

REFERENCE ONLY			
NASA DASH NO.	KIC DASH NO.	NASA DASH NO.	KIC DASH NO.
-1	5001	-10	5010
-2	5002	-11	5011
-3	5003	-12	5012
-4	5004	-13	5013
-5	5005	-14	5014
-6	5006	-15	5015
-7	5007	-16	5016
-8	5008	-17	5017
-9	5009	-18	5018

MASTER

NEXT ASSY	USED ON
APPLICATION	

K.I.C. NO. 74443145001 THRU 5018

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 3A

HEAT TREATMENT

FINAL FINISH
SEE NOTE 3A

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN M.NEILL DATE 10-8-63
CHECKED 11-6-63
APPROVAL 12-8-63
APPROVAL 12/12/63
NASA APPROVAL 12/17/63
MIT APPROVAL 12/17/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

NUT, SELF-LOCKING, CLINCH

SPECIFICATION CONTROL DRAWING

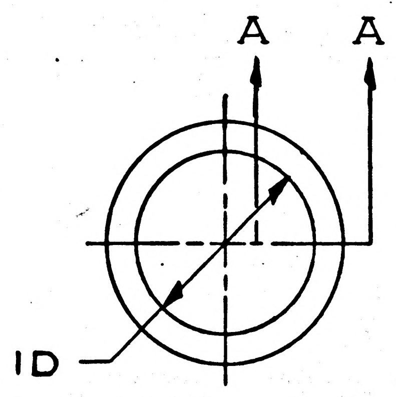
CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011766
SCALE ~
WT
SHEET 2 OF 2

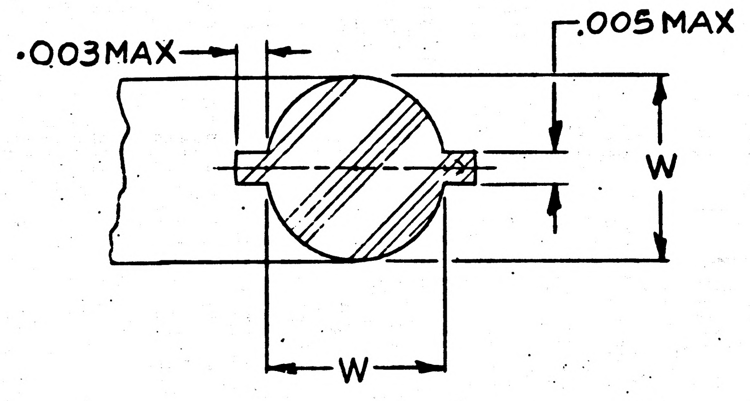
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011768 A

REVISIONS 02560				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	C 5&6	REVISED PER TDRR 13138	9-30-64	WH

NASA DASH NO.	I.D.		W		VOL. CU IN. (REF)
	MIN.	MAX.	MIN.	MAX.	
- 1	.025	.033	.037	.043	.0003
- 2	.038	.046	.047	.053	.0006
- 3	.052	.060	.057	.063	.0010
- 4	.065	.075	.067	.073	.0017
- 5	.096	.106			.0021
- 6	.109	.119			.0022
- 7	.140	.150			.0026
- 8	.171	.181			.0030
- 9	.203	.213			.0034
-10	.234	.244			.0037
-11	.296	.306			.0045
-12	.359	.369			.0052
-13	.421	.431			.0060
-14	.484	.494			.0068
-15	.546	.556			.0075
-16	.609	.619			.0083
-17	.671	.681			.0090
-18	.734	.744			.0098
-19	.795	.807			.0105
-20	.858	.870			.0113
-21	.920	.932			.0120
-22	.983	.995			.0128
-23	1.045	1.057			.0136
-24	1.108	1.120			.0143
-25	1.170	1.182			.0151
-26	1.233	1.245			.0158
-27	1.295	1.307			.0166
-28	1.358	1.370			.0173
-29	1.479	1.499			.0188
-30	1.604	1.624			.0204
-31	1.729	1.749			.0219
-32	1.854	1.874	.067	.073	.0234
-33	1.879	1.899	.067	.073	.0249
-34	2.104	2.124	.067	.073	.0264
-35	2.354	2.374	.067	.073	.0294
-36	4.859	4.874	.135	.143	.2383





SECTION A-A (ENLARGED)

CROSS SECTION
DIA EQUALS W

REQUIREMENTS:

1. GENERAL:

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.

C. ITEMS SHALL BE PREPARED FOR DELIVERY IN ACCORDANCE WITH MIL-0-4861 AND MIL-P-116.

PRESERVATION: METHOD 1C-1
UNIT PACKAGING: LEVEL A

D. ITEMS SHALL CONFORM TO THE REQUIREMENTS OF MIL-G-22050.

2. INSPECTION AND ACCEPTANCE:

A. INDIVIDUAL PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA DRAWING NUMBER, DASH NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION (SIZE AND COMPOUND NO.), THE CURE DATE, AND MIL-G-22050, IN ACCORDANCE WITH MIL-STD-129.

B. DIMENSIONS AS SHOWN.

C. ITEMS SHALL BE VISUALLY INSPECTED FOR DEFECTS IN ACCORDANCE WITH MIL-STD-413.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES: FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE 1D
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 74453043001 THRU 3032
DRAWN C. SCRICCO DATE 5-27-63
CHECKED
APPROVAL 6-24-63
APPROVAL 8-12-63
NASA APPROVAL W. J. 8-14-63
MIT APPROVAL 14 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PACKING, PREFORMED
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011768
SCALE ~
WEIGHT CALC ACTUAL
SHEET 1 OF 1

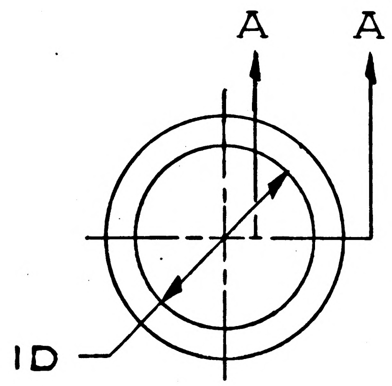
E-184

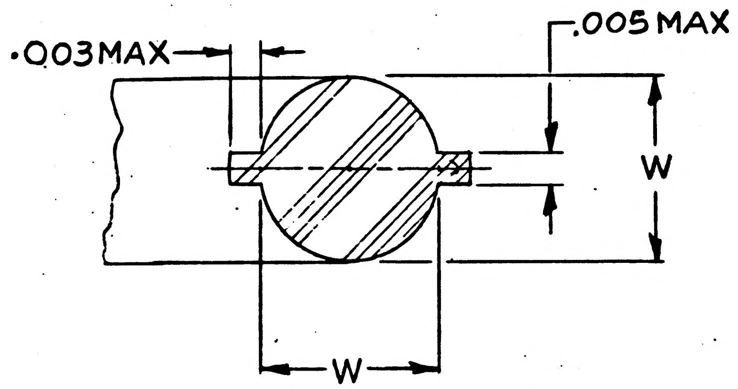
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

B	1011768

REVISIONS 02560				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	C 5&6	REVISED PER TDRR 13138	9-30-64	WH
B		REVISED PER TDRR 14038	11-12-64	WIC

NASA DASH NO.	I.D.		W		VOL. CU IN. (REF)
	MIN.	MAX.	MIN.	MAX.	
- 1	.025	.033	.037	.043	.0003
- 2	.038	.046	.047	.053	.0006
- 3	.052	.060	.057	.063	.0010
- 4	.065	.075	.067	.073	.0017
- 5	.096	.106			.0021
- 6	.109	.119			.0022
- 7	.140	.150			.0026
- 8	.171	.181			.0030
- 9	.203	.213			.0034
-10	.234	.244			.0037
-11	.296	.306			.0045
-12	.359	.369			.0052
-13	.421	.431			.0060
-14	.484	.494			.0068
-15	.546	.556			.0075
-16	.609	.619			.0083
-17	.671	.681			.0090
-18	.734	.744			.0098
-19	.795	.807			.0105
-20	.858	.870			.0113
-21	.920	.932			.0120
-22	.983	.995			.0128
-23	1.045	1.057			.0136
-24	1.108	1.120			.0143
-25	1.170	1.182			.0151
-26	1.233	1.245			.0158
-27	1.295	1.307			.0166
-28	1.358	1.370			.0173
-29	1.479	1.499			.0188
-30	1.604	1.624			.0204
-31	1.729	1.749			.0219
-32	1.854	1.874	.067	.073	.0234
-33	1.979	1.999	.067	.073	.0249
-34	2.104	2.124	.067	.073	.0264
-35	2.354	2.374	.067	.073	.0294
-36	4.844	4.874	.135	.143	.2383





SECTION A-A (ENLARGED)

CROSS SECTION DIA EQUALS W

REQUIREMENTS:

1. GENERAL:

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.

   C. ITEMS SHALL BE PREPARED FOR DELIVERY IN ACCORDANCE WITH MIL-O-4861 AND MIL-P-116.

      PRESERVATION: METHOD 1C-1
      UNIT PACKAGING: LEVEL A

   D. ITEMS SHALL CONFORM TO THE REQUIREMENTS OF MIL-G-22050.

2. INSPECTION AND ACCEPTANCE:

   A. INDIVIDUAL PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA DRAWING NUMBER, DASH NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION (SIZE AND COMPOUND NO.), THE CURE DATE, AND MIL-G-22050, IN ACCORDANCE WITH MIL-STD-129.

   B. DIMENSIONS AS SHOWN.

   C. ITEMS SHALL BE VISUALLY INSPECTED FOR DEFECTS IN ACCORDANCE WITH MIL-STD-413.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL: SEE NOTE 1D
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 74453043001 THRU 3032

DRAWN C. SCRICCO DATE 5-27-63
CHECKED
APPROVAL 6-24-63
APPROVAL E. Phomp 8-12-63
NASA APPROVAL W. J. Rhine 8-14-63
MIT APPROVAL 14 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PACKING, PREFORMED
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011768
SCALE ~
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

C	1011768

REVISIONS 02560				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	C 5&6	REVISED PER TDRR 13138	9-30-64	WH
B		REVISED PER TDRR 14038	11-12-64	WIC
C		REVISED PER TDRR 22288	9/14	

NASA DASH NO.	I.D.		W		VOL. CU IN. (REF)
	MIN.	MAX.	MIN.	MAX.	
- 1	.025	.033	.037	.043	.0003
- 2	.038	.046	.047	.053	.0006
- 3	.052	.060	.057	.063	.0010
- 4	.065	.075	.067	.073	.0017
- 5	.096	.106			.0021
- 6	.109	.119			.0022
- 7	.140	.150			.0026
- 8	.171	.181			.0030
- 9	.203	.213			.0034
-10	.234	.244			.0037
-11	.296	.306			.0045
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-14	.484	.494			.0068
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-17	.671	.681			.0090
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-19	.795	.807			.0105
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-21	.920	.932			.0120
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-33	1.979	1.999	.067	.073	.0249
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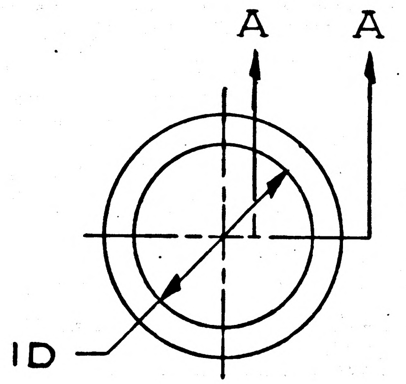
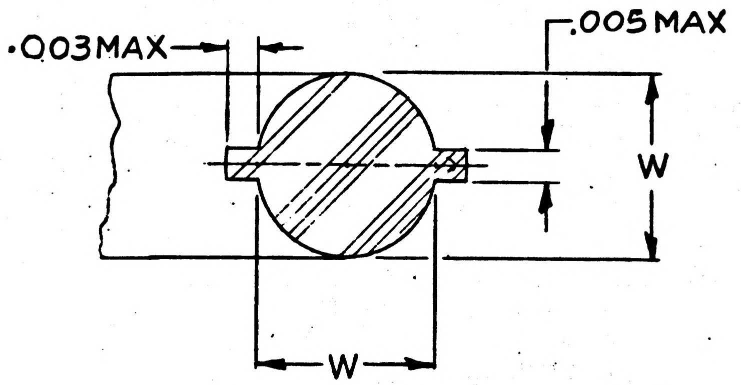
-35	2.354	2.374	.067	.073	.0294
-36	4.844	4.874	.135	.143	.2383





SECTION A-A (ENLARGED)

CROSS SECTION
DIA EQUALS W

REQUIREMENTS:

1. GENERAL:

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.

C. ITEMS SHALL BE PREPARED FOR DELIVERY IN ACCORDANCE WITH MIL-0-4861 AND MIL-P-116.

PRESERVATION: METHOD 1C-1
UNIT PACKAGING: LEVEL A

D. ITEMS SHALL CONFORM TO THE REQUIREMENTS OF MIL-G-22050.

2. INSPECTION AND ACCEPTANCE:

A. INDIVIDUAL PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA DRAWING NUMBER, DASH NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION (SIZE AND COMPOUND NO.), THE CURE DATE, AND MIL-G-22050, IN ACCORDANCE WITH MIL-STD-129.

B. DIMENSIONS AS SHOWN.

C. ITEMS SHALL BE VISUALLY INSPECTED FOR DEFECTS IN ACCORDANCE WITH MIL-STD-413.

3. DESIGN:

A. SHELF LIFE: FIVE YEARS MINIMUM FROM CURE DATE, AT ROOM AMBIENT CONDITIONS, WHEN PACKAGED AS IN PARAGRAPH I.C.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS + — - ; DECIMALS + — - ; ANGLES + — -
DO NOT SCALE THIS DRAWING
MATERIAL: SEE NOTE ID
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 74453043001 THRU 3032
DRAWN C. SCRICCO DATE 5-27-63
CHECKED
APPROVAL 6-24-63
APPROVAL E. Phouy 8-12-63
NASA APPROVAL W. J. 8-14-63
MIT APPROVAL 14 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PACKING, PREFORMED
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA NUMBER 1011768
SCALE ~
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

E-154

1011768 D

NASA DASH NO.	I.D. MIN.	I.D. MAX.	W MIN.	W MAX.	VOL. CU IN. (REF)
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- 2	.038	.046	.047	.053	.0006
- 3	.052	.060	.057	.063	.0010
- 4	.065	.075	.067	.073	.0017
- 5	.096	.106			.0021
- 6	.109	.119			.0022
- 7	.140	.150			.0026
- 8	.171	.181			.0030
- 9	.203	.213			.0034
-10	.234	.244			.0037
-11	.296	.306			.0045
-12	.359	.369			.0052
-13	.421	.431			.0060
-14	.484	.494			.0068
-15	.546	.556			.0075
-16	.609	.619			.0083
-17	.671	.681			.0090
-18	.734	.744			.0098
-19	.795	.807			.0105
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-27	1.295	1.307			.0166
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-29	1.479	1.499			.0188
-30	1.604	1.624			.0204
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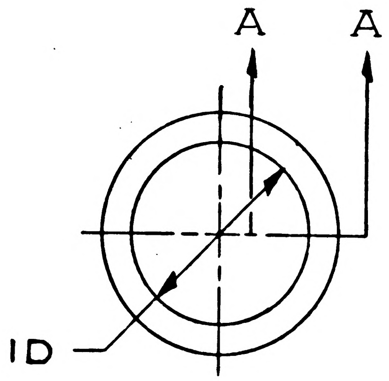
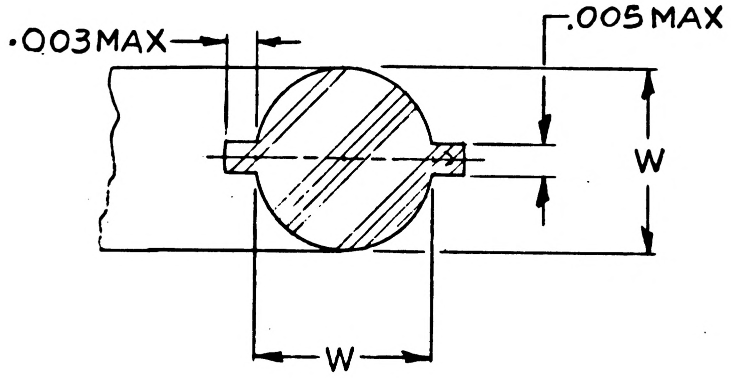
-36	4.844	4.874	.135	.143	.2383

REVISIONS 02560				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	5&6	REVISED PER TDRR 13138	9-30-64	WH
B		REVISED PER TDRR 14038	11-12-64	wic
C		REVISED PER TDRR 22288	9/14	TJ GM
D		REVISED PER TDRR 31918	12 NOV 66	ME E.B.





SECTION A-A (ENLARGED)

CROSS SECTION
DIA EQUALS W

REQUIREMENTS:

1. GENERAL:

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.

   C. ITEMS SHALL BE PREPARED FOR DELIVERY IN ACCORDANCE WITH MIL-O-4861 AND MIL-P-116.

      PRESERVATION: METHOD 1C-1
      UNIT PACKAGING: LEVEL A

   D. ITEMS SHALL CONFORM TO THE REQUIREMENTS OF MIL-G-22050.

2. INSPECTION AND ACCEPTANCE:

   A. INDIVIDUAL PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA DRAWING NUMBER, DASH NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION (SIZE AND COMPOUND NO.), THE CURE DATE, AND MIL-G-22050, IN ACCORDANCE WITH MIL-STD-129.

   B. DIMENSIONS AS SHOWN.

   C. ITEMS SHALL BE VISUALLY INSPECTED FOR DEFECTS IN ACCORDANCE WITH MIL-STD-413.

3. DESIGN:

   A. SHELF LIFE: FIVE YEARS MINIMUM FROM CURE DATE AT ROOM AMBIENT CONDITIONS, WHEN PACKAGED AS IN PARAGRAPH 1. C.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

4. SPECIAL CONDITIONING:
   PARTS SHALL BE BAKED FOR 24 HOURS MINIMUM @ 300-325°F IN AN ENVIRONMENT OF $1X10^{-6}$ TORR OR LESS. THIS SHALL BE DONE PRIOR TO FINAL DIMENSIONAL CHECK.

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE ID
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 74453043001 THRU 3032
DRAWN C. SCRICCO DATE 5-27-63
CHECKED
APPROVAL 6-24-63
APPROVAL E. Phoup 8-12-63
NASA APPROVAL W. J. 8-14-63
MIT APPROVAL 14 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PACKING, PREFORMED
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA NUMBER 1011768
SCALE ~
WEIGHT CALC ACTUAL
SHEET 1 OF 1

D 1011768

E-154

1011768

REVISIONS 02560				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NASA DASH NO.	I.D.		W		VOL. CU IN. (REF)
	MIN.	MAX.	MIN.	MAX.	
- 1	.025	.033	.037	.043	.0003
- 2	.038	.046	.047	.053	.0006
- 3	.052	.060	.057	.063	.0010
- 4	.065	.075	.067	.073	.0017
- 5	.096	.106			.0021
- 6	.109	.119			.0022
- 7	.140	.150			.0026
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- 9	.203	.213			.0034
-10	.234	.244			.0037
-11	.296	.306			.0045
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-15	.546	.556			.0075
-16	.609	.619			.0083
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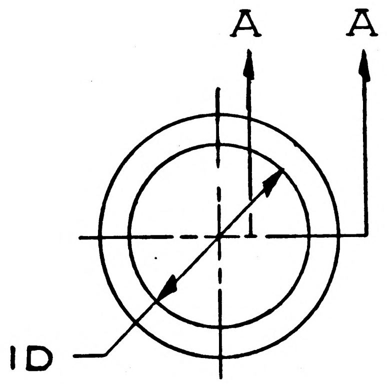
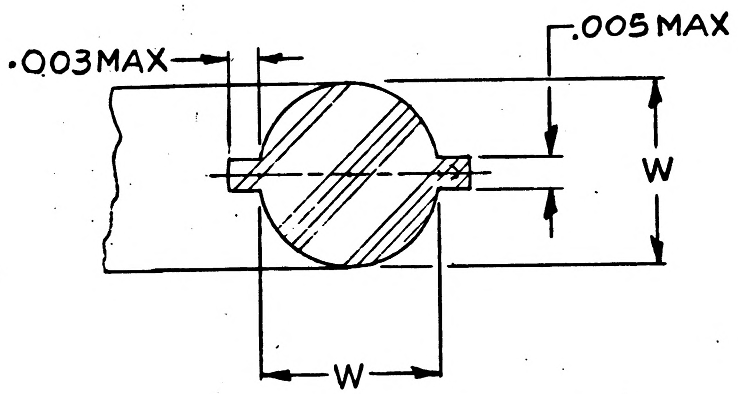
-29	1.479	1.499			.0188
-30	1.604	1.624			.0204
-31	1.729	1.749			.0219
-32	1.854	1.874	.067	.073	.0234





SECTION A-A (ENLARGED)

CROSS SECTION
DIA EQUALS W

MASTER

REQUIREMENTS:

1. GENERAL:

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.

   C. ITEMS SHALL BE PREPARED FOR DELIVERY IN ACCORDANCE WITH MIL-O-4861 AND MIL-P-116.

      PRESERVATION: METHOD 1C-1
      UNIT PACKAGING: LEVEL A

   D. ITEMS SHALL CONFORM TO THE REQUIREMENTS OF MIL-G-22050.

2. INSPECTION AND ACCEPTANCE:

   A. INDIVIDUAL PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA DRAWING NUMBER, DASH NUMBER, REVISION LETTER, MANUFACTURER'S IDENTIFICATION (SIZE AND COMPOUND NO.), THE CURE DATE, AND MIL-G-22050, IN ACCORDANCE WITH MIL-STD-129.

   B. DIMENSIONS AS SHOWN.

   C. ITEMS SHALL BE VISUALLY INSPECTED FOR DEFECTS IN ACCORDANCE WITH MIL-STD-413.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± —	± —

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 1D

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 74453043001 THRU 3032

DRAWN C. SCRICCO DATE 5-27-63
CHECKED
APPROVAL 6-24-63
APPROVAL E. Phoump 8-12-63
NASA APPROVAL 8-14-63 W. J. Rhea
MIT APPROVAL 14 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PACKING, PREFORMED
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011768
SCALE ∼
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

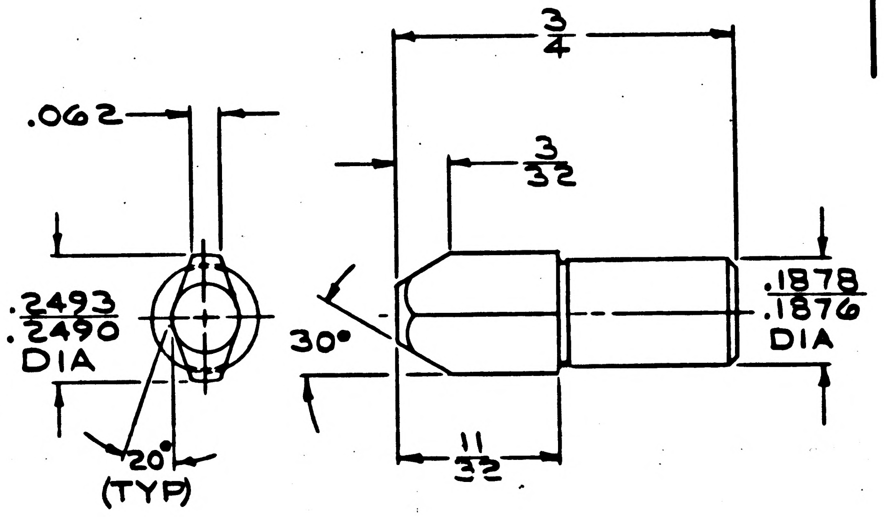
1011769

REVISIONS 02560

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REQUIREMENTS:

1. **GENERAL:**
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED IN MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III.
2. **INSPECTION AND ACCEPTANCE:**
   - A. PACKAGE AND SHIPPING CONTAINER SHALL BE MARKED WITH NASA DRAWING NUMBER REVISION LETTER AND MANUFACTURERS PART NUMBER PER MIL-STD-129.
   - B. DIMENSIONS AS SHOWN.
3. **DESIGN REQUIREMENTS:**
   - A. MATERIAL - CRES PER FED SPEC QQ-S-763 CLASS 440 COND C. HARDENED TO Rc 55-60 PER ND 1002087 PASSIVATE PER MIL-STD-171



1011769

MASTER

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DRAWING.

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/32	± .010	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 3A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 74444028001

DRAWN G. KRUK DATE 5-28-63
CHECKED S. J. Fumola 5-29-63
APPROVAL E. Kurzban 8-20-63
APPROVAL E. Thomp 8-12-63
NASA APPROVAL W. J. Rhine 8-14-63
MIT APPROVAL W. Kupfer 14 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PIN, DIAMOND
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. | SIZE C | NASA NUMBER 1011769
SCALE ~ | WEIGHT | CALC ACTUAL | SHEET | OF

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A2	-	REVISED PER TDRR NO. 03799	10/4/63	

REVISIONS 02560

A 1011771

REQUIREMENTS:

1. GENERAL:

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.

   C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III.

2. INSPECTION AND ACCEPTANCE:

   A. PACKAGE AND SHIPPING CONTAINER SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND MANUFACTURER'S PART NUMBER PER MIL-STD-129.

   B. DIMENSIONS AS SHOWN.

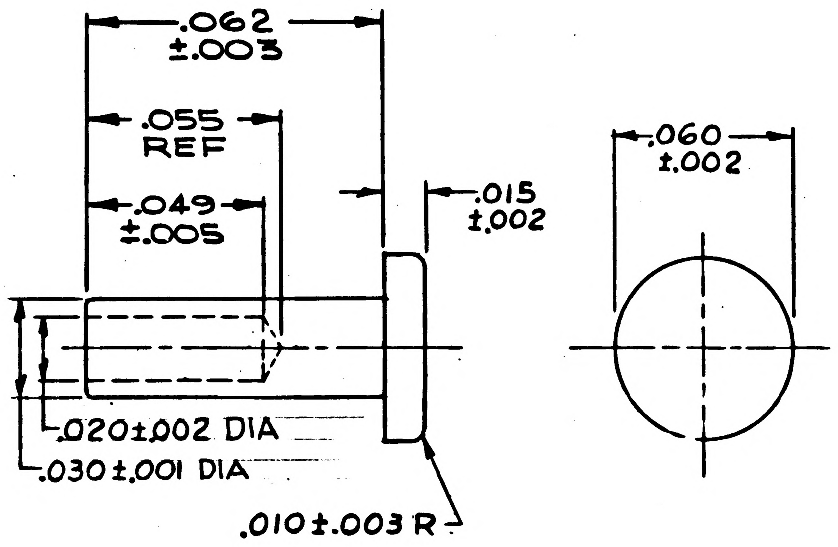
3. DESIGN REQUIREMENTS:

   A. MATERIAL - BRASS, FED. SPEC. QQ-B-626, COMPOSITION 22, 24 KARAT GOLD PLATED, MIL-G-45204, TYPE I, OR EQUIVALENT.

   B. RECOMMENDED DRILL HOLE SIZE - .033 ± .001.

   C. RECOMMENDED CLINCH ALLOWANCE - .032 NOM.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ — −	+ — −	+ — −

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 3A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 74454018001

DRAWN C. SCRICCA DATE 5-28-63
CHECKED V. Ruggello
APPROVAL 8-26-63
APPROVAL E. Dhouys 8-12-63
NASA APPROVAL W J Rhine 8-14-63
MIT APPROVAL 14 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RIVET, UNIVERSAL HEAD
MINIATURE
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011771
SCALE ~
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

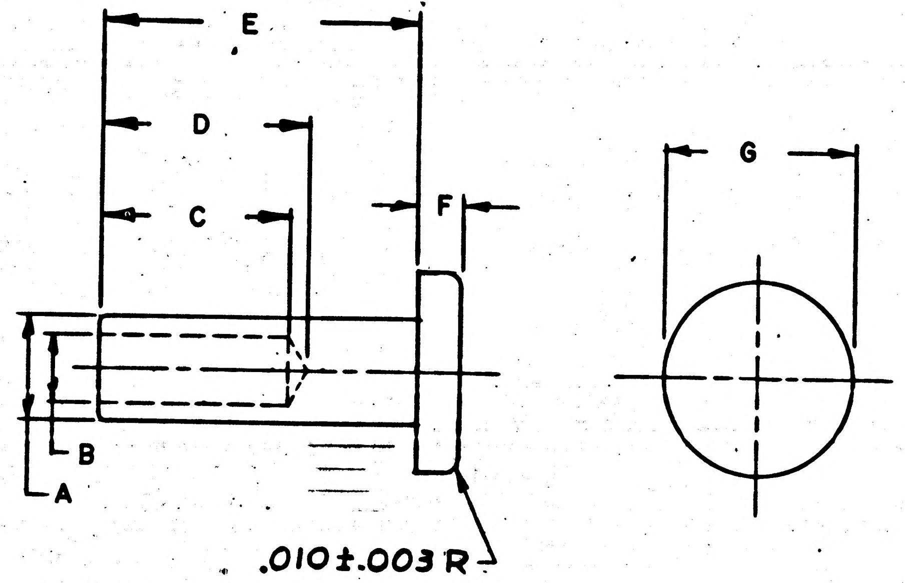
1011771 A

B 1011771

REVISIONS 02560				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A2	—	REVISED PER TDRR NO. 03799	10/1/63	
B		REVISED PER TDRR 10882		

REQUIREMENTS:

1. **GENERAL:**
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III.
2. **INSPECTION AND ACCEPTANCE:**
   - A. PACKAGE AND SHIPPING CONTAINER SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND MANUFACTURER'S PART NUMBER PER MIL-STD-129.
   - B. DIMENSIONS AS SHOWN.
3. **DESIGN REQUIREMENTS:**
   - A. MATERIAL - BRASS, FED. SPEC. QQ-B-626, COMPOSITION 22, 24 KARAT GOLD PLATED, MIL-G-45204, TYPE I, OR EQUIVALENT.



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

DASH NO.	"A" DIA ±.001	"B" DIA ±.002	C ±.005	D REF	E ±.003	F ±.003	"G" DIA ±.003	CLINCH ALLOWENCE (NOM)	DRILL HOLE SIZE +.003 -.000
-1	.030	.020	.049	.055	.062	.015	.062	.032	.032
-2	.045	.025	.049	.055	.062	.015	.080	.032	.047

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ — −	+ — −	+ — −

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 3A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 74454018001

DRAWN C. SCRICCA DATE 5-28-63
CHECKED V. Ruggiero
APPROVAL 8-26-63
APPROVAL E. Thomas 8-12-63
NASA APPROVAL W J Klein 8-14-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RIVET, UNIVERSAL HEAD MINIATURE SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011771

SCALE ~ | WEIGHT CALC ACTUAL | SHEET 1 OF 1

E-184

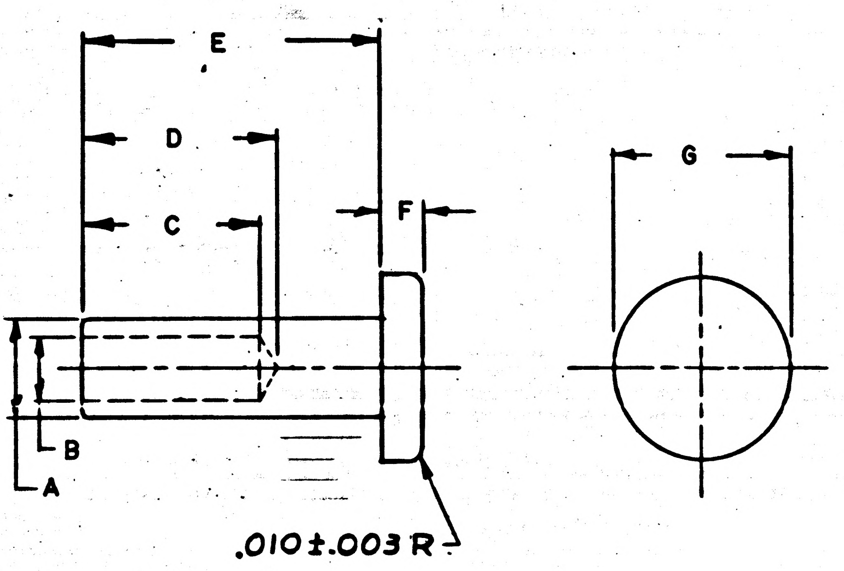
INCHES

C 1011771

REVISIONS 02560				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A2		REVISED PER TDRR NO. 03799	7/19/63	EK
B		REVISED PER TDRR 10882	6/16/64	wk
C		REVISED PER TDRR 12814	9/29/64	wk

REQUIREMENTS:

1. **GENERAL:**
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III.
2. **INSPECTION AND ACCEPTANCE:**
   - A. PACKAGE AND SHIPPING CONTAINER SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND MANUFACTURER'S PART NUMBER PER MIL-STD-129.
   - B. DIMENSIONS AS SHOWN.
3. **DESIGN REQUIREMENTS:**
   - A. MATERIAL - BRASS, FED. SPEC. QQ-B-626, COMPOSITION 2, 24 KARAT GOLD PLATED, MIL-G-45204, TYPE I, OR EQUIVALENT.



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

DASH NO.	"A" DIA ±.001	"B" DIA ±.002	C ±.005	D REF	E ±.003	F ±.003	"G" DIA ±.003	CLINCH ALLOWENCE (NOM)	DRILL HOLE SIZE +.003 -.000
-1	.030	.020	.049	.055	.062	.015	.062	.032	.032
-2	.045	.025	.049	.055	.062	.015	.080	.032	.047

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ — -	+ — -	+ — -

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 3A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 74454018001

DRAWN E. SCRICCA DATE 5-28-63
CHECKED V. Ruggiero
APPROVAL 8-26-63
APPROVAL E. Thomas 8-12-63
NASA APPROVAL W J Rhine 8-14-63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RIVET, UNIVERSAL HEAD
MINIATURE
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. | SIZE C | NASA NUMBER 1011771
SCALE ~ | WEIGHT CALC ACTUAL | SHEET 1 OF 1

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011771 C

1011771

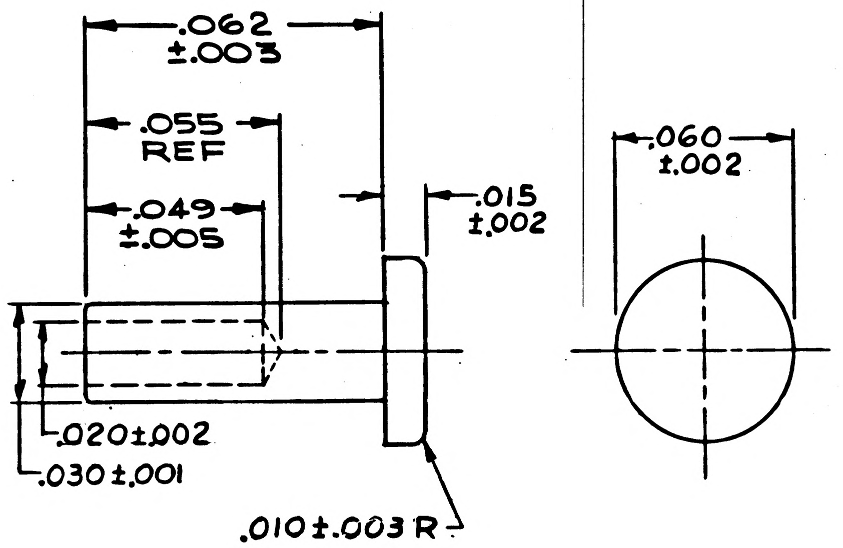
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REVISIONS 02560

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III.
2. INSPECTION AND ACCEPTANCE:
   - A. PACKAGE AND SHIPPING CONTAINER SHALL BE MARKED WITH NASA DRAWING NUMBER, REVISION LETTER AND MANUFACTURER'S PART NUMBER PER MIL-STD-129.
   - B. DIMENSIONS AS SHOWN.
3. DESIGN REQUIREMENTS:
   - A. MATERIAL - BRASS, FED. SPEC. QQ-B-626, COMPOSITION 22, 24 KARAT GOLD PLATED, MIL-G-45204, TYPE I.
   - B. RECOMMENDED DRILL HOLE SIZE - .033 ± .001.
   - C. RECOMMENDED CLINCH ALLOWANCE - .032 NOM.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ — -	+ — -	+ — -

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 3A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 74454018001

DRAWN C. SCRICCA DATE 5-28-63
CHECKED V. Ruggerio
APPROVAL [illegible] 8-26-63
APPROVAL E. Dhoung 8-12-63
NASA APPROVAL W J Rhine 8-14-63
MIT APPROVAL W [illegible] 14 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RIVET, UNIVERSAL HEAD
MINIATURE
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. | SIZE C | NASA NUMBER 1011771
SCALE ~ | WEIGHT CALC ACTUAL | SHEET 1 OF 1

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011771

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1011773 A

REVISIONS 02560

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR NO. 06114	2/4/64	

REQUIREMENTS:

1. GENERAL:

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.

   C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III

2. INSPECTION AND ACCEPTANCE:

   A. PACKAGE AND SHIPPING CONTAINER SHALL BE MARKED WITH NASA DRAWING NUMBER AND DASH NUMBER, REVISION LETTER AND MANUFACTURER'S PART NUMBER IN ACCORDANCE WITH MIL-STD-129.

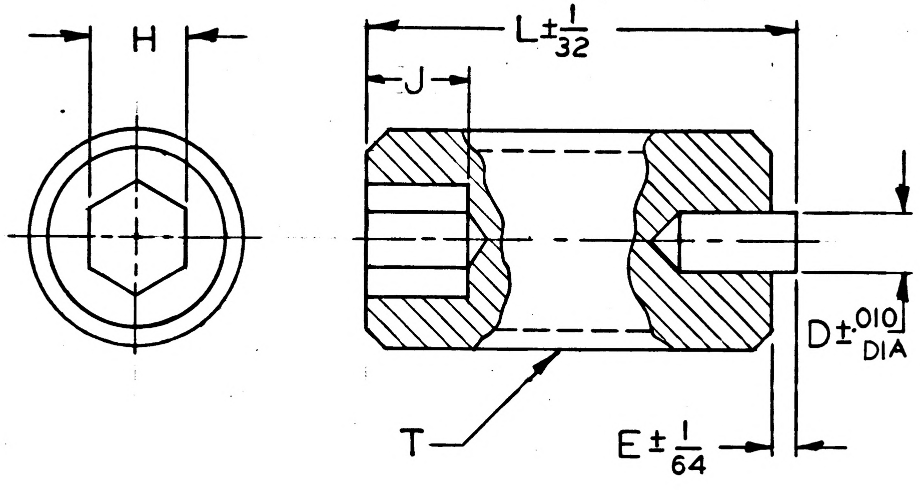
   B. DIMENSIONS AS SHOWN.

3. DESIGN REQUIREMENTS:

   A. MATERIAL:

      1. SCREW BODY - CORROSION RESISTANT STEEL 303, MIL-S-7720, COMPOSITION 303 S OR 303 SE, PASSIVATED PER MIL-F-14072, FINISH E 300.

      2. SCREW TIP - POLYAMIDE (NYLON) PLASTIC, RIGID; MIL-P-17091., TYPE I



NASA DASH NUMBER	T THREAD	L	E	D	H		J
					MAX	MIN	(±.005)
1	2-56 UNC-3A	5/32	1/32	1/32	.0355	.0350	.033
2	4-40 UNC-3A	5/32	1/32	1/16	.0510	.0500	.045
3	6-32 UNC-3A	5/32	1/32	1/16	.0635	.0625	.055
4	8-32 UNC-3A	15/64	3/64	3/32	.0791	.0781	.067
5	10-24 UNC-3A	15/64	3/64	3/32	.0947	.0937	.080
6	6-32 UNC-3A	9/32	1/32	1/16	.0635	.0625	.055
7	8-32 UNC-3A	27/64	3/64	3/32	.0791	.0781	.067
8	10-24 UNC-3A	27/64	3/64	3/32	.0947	.0937	.080
Ⓐ 9	1/4-20 UNC-3A	5/16	1/16	1/8	.1270	.1250	.105
10	1/4-20 UNC-3A	7/16	1/16	1/8	.1270	.1250	.105

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

KIC . 74455166001
PN THRU 6010

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN C. SCRICCO DATE 6-27-63
CHECKED BOHMAN 6-28-63
APPROVAL 8-12-63
APPROVAL 8-12-63
NASA APPROVAL W. J. Rhine 8-14-63
MIT APPROVAL Aug 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SETSCREW, FLAT (NYLON) POINT,
HEXAGON SOCKET
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011773
SCALE
WT
SHEET 1 OF 1

01124186

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1011773

REVISIONS 02560			
SYM	DESCRIPTION	DATE	APPROVAL

REQUIREMENTS:

1. GENERAL:

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.

C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III

2. INSPECTION AND ACCEPTANCE:

A. PACKAGE AND SHIPPING CONTAINER SHALL BE MARKED WITH NASA DRAWING NUMBER AND DASH NUMBER, REVISION LETTER AND MANUFACTURER'S PART NUMBER IN ACCORDANCE WITH MIL-STD-129.

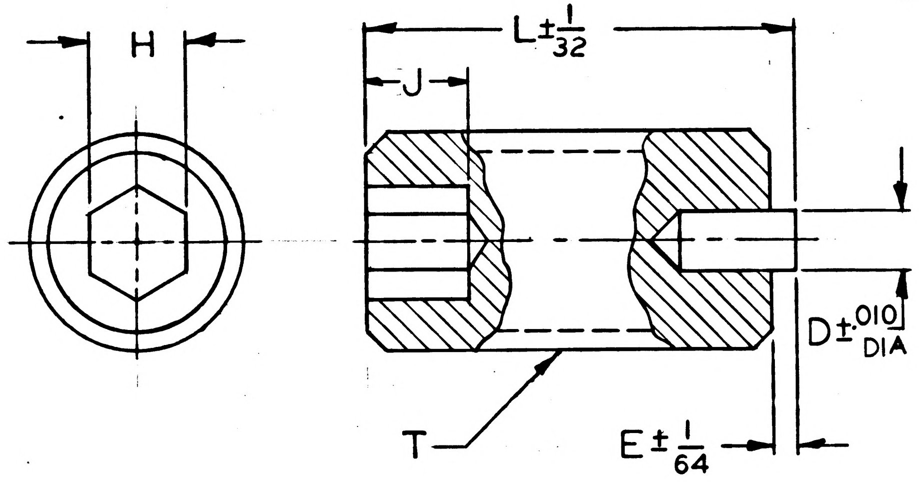
B. DIMENSIONS AS SHOWN.

3. DESIGN REQUIREMENTS:

A. MATERIAL:

1. SCREW BODY - CORROSION RESISTANT STEEL 303, MIL-S-7720, COMPOSITION 303 S OR 303 SE, PASSIVATED PER MIL-F-14072, FINISH E 300.

2. SCREW TIP - POLYAMIDE (NYLON) PLASTIC, RIGID, MIL-P-17091., TYPE I



NASA DASH NUMBER	T THREAD	L	E	D	H		J
					MAX	MIN	(±.005)
1	2-56 UNC-3A	$\frac{5}{32}$	$\frac{1}{32}$	$\frac{1}{32}$	.0355	.0350	.033
2	4-40 UNC-3A	$\frac{5}{32}$	$\frac{1}{32}$	$\frac{1}{16}$	.0510	.0500	.045
3	6-32 UNC-3A	$\frac{5}{32}$	$\frac{1}{32}$	$\frac{1}{16}$	.0635	.0625	.055
4	8-32 UNC-3A	$\frac{15}{64}$	$\frac{3}{64}$	$\frac{3}{32}$	.0791	.0781	.067
5	10-24 UNC-3A	$\frac{15}{64}$	$\frac{3}{64}$	$\frac{3}{32}$	.0947	.0937	.080
6	6-32 UNC-3A	$\frac{9}{32}$	$\frac{1}{32}$	$\frac{1}{16}$	.0635	.0625	.055
7	8-32 UNC-3A	$\frac{27}{64}$	$\frac{3}{64}$	$\frac{3}{32}$	.0791	.0781	.067
8	10-24 UNC-3A	$\frac{27}{64}$	$\frac{3}{64}$	$\frac{3}{32}$	.0947	.0937	.080

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

KIC . 74455166001
PN THRU 6008

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN C. SCRICCO DATE 6-27-63
CHECKED BOHMAN 6-28-63
APPROVAL 8-12-63
APPROVAL 8-12-63
NASA APPROVAL W. J. Rhine 8-14-63
MIT APPROVAL 14 Aug 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SETSCREW, FLAT (NYLON) POINT, HEXAGON SOCKET
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011773
SCALE
WT
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

— 1011778

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 11518		

REQUIREMENTS:

1. GENERAL

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS AS CONTAINED IN ND 1015404, CLASS 3.

C. THIS ITEM SHALL BE CONTAINED IN TIGHTLY CLOSED, BREAK-RESISTANT, BLACK GLASS BOTTLES. INTERMEDIATE PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH THE APPLICABLE SECTION OF ND 1002015 MENT AND STORAGE.

2. ACCEPTANCE AND INSPECTION

A. MARKING: ALL EXTERIOR PACKAGING AND EACH BOTTLE CONTAINED THEREIN SHALL BE MARKED IN ACCORDANCE WITH ND 1002019 WITH THE MANUFACTURER'S NAME, MANUFACTURER'S PRODUCT DESIGNATION, INDEX OF REFRACTION, NASA DRAWING NUMBER, DASH NUMBER, REVISION LETTER, DATE OF MANUFACTURE AND EXPIRATION DATE.

B. WORKMANSHIP: THIS ITEM SHALL BE UNIFORM IN QUALITY, FREE FROM FOREIGN MATERIAL AND ANY OTHER DEFECTS WHICH ARE NOT IN ACCORDANCE WITH BEST COMMERCIAL PRACTICE FOR A HIGH QUALITY PRODUCT.

C. CONTAINER: GLASS BOTTLE, BLACK, TIGHTLY CLOSED.

[illegible]

3. DESIGN

A. COMPOSITION: METHACRYLATE LIQUID CONTAINING ORGANIC DYES. (PURPLE ONLY)

B. INDEX OF REFRACTION: AS SPECIFIED IN TABLE BELOW. (TYPICAL VALUES ONLY)

C. MAXIMUM CONTINUOUS SERVICE TEMPERATURE: +200°F IN AIR
+150°F IN VACUUM

D. SHELF LIFE: ONE YEAR WHEN STORED IN A COOL (70°F MAX) DARK PLACE (SHIELDED FROM DIRECT SUNLIGHT OR BRIGHT ARTIFICIAL LIGHT) WITH THE BOTTLE TIGHTLY CLOSED.

TABLE

NASA DRAWING DASH NO.	INDEX OF REFRACTION (REF)	TOLERANCE (REF)
-1	1.572	±.003
-2	1.648	±.003

MASTER

THIS MATERIAL IS A PROPRIETARY ITEM AND SHALL BE PURCHASED FROM THE FOLLOWING SOURCE ONLY.

LUXORB RESEARCH AND DEVELOPMENT CO.
BOX 3334, TERMINAL ANNEX
LOS ANGELES 54, CALIFORNIA

TRADE NAME: LUXORB

K.I.C. NO. 74471438001

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN M. NEILL DATE 12-9-63
CHECKED A. Marts 8-11-64
APPROVAL
APPROVAL E. Thorup 8-12-64
NASA APPROVAL 8/14/64
MIT APPROVAL 12 Aug 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

COATING COMPOUND, LIGHT ABSORBING, OPTICAL
SOURCE CONTROL DRAWING

CODE IDENT NO. SIZE C NASA DRAWING NO. 1011778
SCALE WT SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011778

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

—	1011779

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 11518		

REQUIREMENTS:

1. GENERAL

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS AS CONTAINED IN ND 1015404, CLASS 3.

C. THIS ITEM SHALL BE CONTAINED IN TIGHTLY CLOSED, BREAK-RESISTANT, BLACK GLASS BOTTLES. INTERMEDIATE PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH THE APPLICABLE SECTIONS OF ND 1002215 SHIPMENT AND STORAGE.

2. ACCEPTANCE AND INSPECTION

A. MARKING: ALL EXTERIOR PACKAGING AND EACH BOTTLE CONTAINED THEREIN SHALL BE MARKED IN ACCORDANCE WITH ND 1002019 WITH THE MANUFACTURER'S NAME, MANUFACTURER'S PRODUCT DESIGNATION, INDEX OF REFRACTION, NASA DRAWING NUMBER, DASH NUMBER, REVISION LETTER, DATE OF MANUFACTURE AND EXPIRATION DATE.

B. WORKMANSHIP: THIS ITEM SHALL BE UNIFORM IN QUALITY, FREE FROM FOREIGN MATERIAL AND OTHER DEFECTS WHICH ARE NOT IN ACCORDANCE WITH BEST COMMERCIAL PRACTICE FOR A HIGH QUALITY PRODUCT OF THIS TYPE.

C. COLOR: BLACK

D. CONTAINER: GLASS BOTTLE, BLACK, TIGHTLY CLOSED.

E. THE SUPPLIER SHALL PROVIDE WRITTEN CERTIFICATION THAT THE COATING COMPOUND TOPCOAT HAS THE SAME INDEX OF REFRACTION AS THAT SPECIFIED ON THIS DOCUMENT BY THE NASA DRAWING DASH NUMBER.

3. DESIGN

A. COMPOSITION: METHACRYLATE LIQUID CONTAINING CARBON BLACK.

B. INDEX OF REFRACTION: AS SPECIFIED IN TABLE BELOW. (TYPICAL VALUES ONLY)

C. MAXIMUM CONTINUOUS SERVICE TEMPERATURE: +200°F IN AIR
+150°F IN VACUUM

D. SHELF LIFE: ONE YEAR WHEN STORED IN A COOL (70°F MAX.) DARK PLACE (SHIELDED FROM DIRECT SUNLIGHT OR BRIGHT ARTIFICIAL LIGHT) WITH THE BOTTLE TIGHTLY CLOSED.

TABLE

NASA DRAWING DASH NO.	INDEX OF REFRACTION (REF)	TOLERANCE (REF)
-1	1.572	±.003
-2	1.648	±.003

MASTER

THIS MATERIAL IS A PROPRIETARY ITEM AND SHALL BE PURCHASED FROM THE FOLLOWING SOURCE ONLY.

LUXORB RESEARCH AND DEVELOPMENT CO.
BOX 3334, TERMINAL ANNEX
LOS ANGELES 54, CALIFORNIA

TRADE NAME: LUXORB, TOP COAT

NEXT ASSY	USED ON
APPLICATION	

K.I.C. NO. 74471439001

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN H NEILL DATE 12-9-63
CHECKED A. Marta 8-12-64
APPROVAL
APPROVAL E Thorup 8/12/64
NASA APPROVAL 8/14/64
MIT APPROVAL W Kupfer 14 Aug 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

COATING COMPOUND, LIGHT ABSORBING TOPCOAT OPTICAL

SOURCE CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	C	1011779

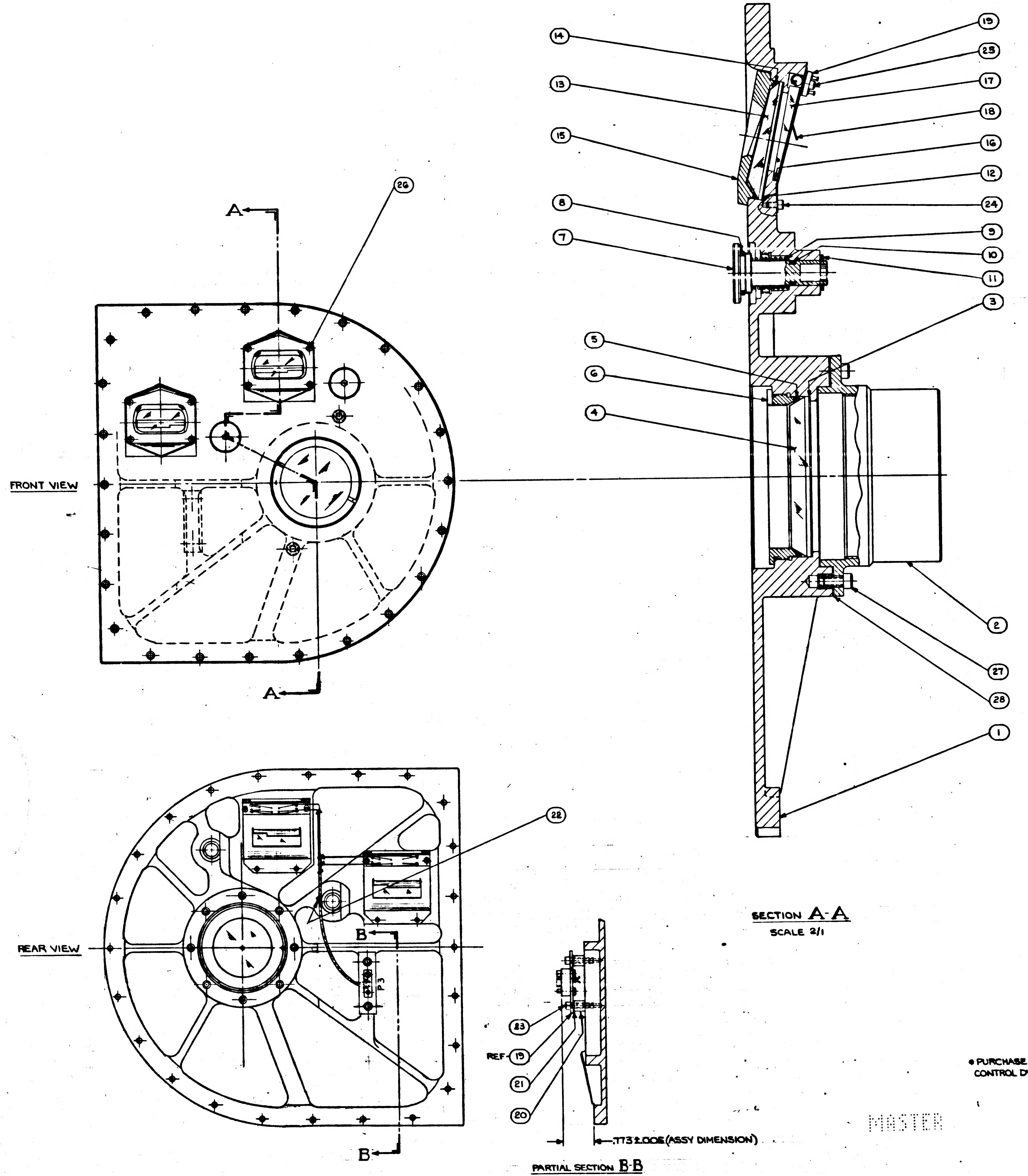
SCALE WT SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLY AND TEST PROCEDURE IN ACCORDANCE WITH ATP 1011784.
3. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019

1011784 A

REVISIONS TDRR 02424				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	D3	RIVISED PER TDRR NO. 05506		WK



SECTION A-A
SCALE 2/1

PARTIAL SECTION B-B

MASTER

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
28	AR		1011955-	5738690161...		SPACER			
Ⓐ 27	8		1011625-28	74455151028		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
26	8		NAS1352C02LL3	74455157005		↕		↕	
25	4		NAS1352C01LL3	74455157002		↕		↕	
24	4		NAS1352C01LL2	74455157001		↕		↕	
23	2		NAS1352C06LL8	74455157020		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
22	AR	*	1011753	—		TAPE, LACING & TYING			
21	AR		1011885	45386900170		SHIM			
20	2		1011886	45386900180		SPACER, CONNECTOR MTG. PLATE			
19	1		1011913	85386901000		LAMP AND HARNESS, ASSY OF			
18	2		1011826	56386900430		PLATE, MASK			
17	2		1011828	28386900640		WEDGE, ILLUMINATING			
16	2		1011830	26386900020		GASKET, WEDGE, BOTTOM			
15	2		1011699	52386900850		BEZEL			
14	2	*	1011768-28	74453043028		PACKING, PREFORMED			
13	2		1011829	28386900650		WINDOW, GLASS			
12	2		1011831	26386900030		GASKET, WINDOW			
11	2	*	1011770-3	74453044003		RING, RETAINING			
10	2	*	1011768-8	74453043008		PACKING, PREFORMED			
9	2		1011821	56386900420		SPRING, HELICAL, COMPRESSION			
8	2	*	1011768-14	74453043014		PACKING, PREFORMED			
7	2		1011820	57386901360		SHAFT, MANUAL ADJUSTMENT			
6	1		1011808	57386901350		RING, RETAINING			
5	1	*	1011768-32	74453043032		PACKING, PREFORMED			
4	1		1011816	28386900600		WINDOW, GLASS			
3	1		1011809	26386900010		GASKET, WINDOW			
2	1		1011732	85386900500		LENS, TELESCOPE RELAY, ASSY OF			
1	1		1011717	85386900410		TELESCOPE PANEL & INSERT, ASSY OF			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900960
DRAWN [illegible] DATE 7-18-63
CHECKED [illegible] 8-15-63
APPROVAL [illegible] 8-15-63
APPROVAL [illegible] 8-15-63
NASA APPROVAL W.J. [illegible] 8-16-63
MIT APPROVAL [illegible] 16 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PANEL ASSEMBLY
(SCT)

CODE IDENT NO.
SIZE E
NASA NUMBER 1011784
SCALE 1/1 & 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

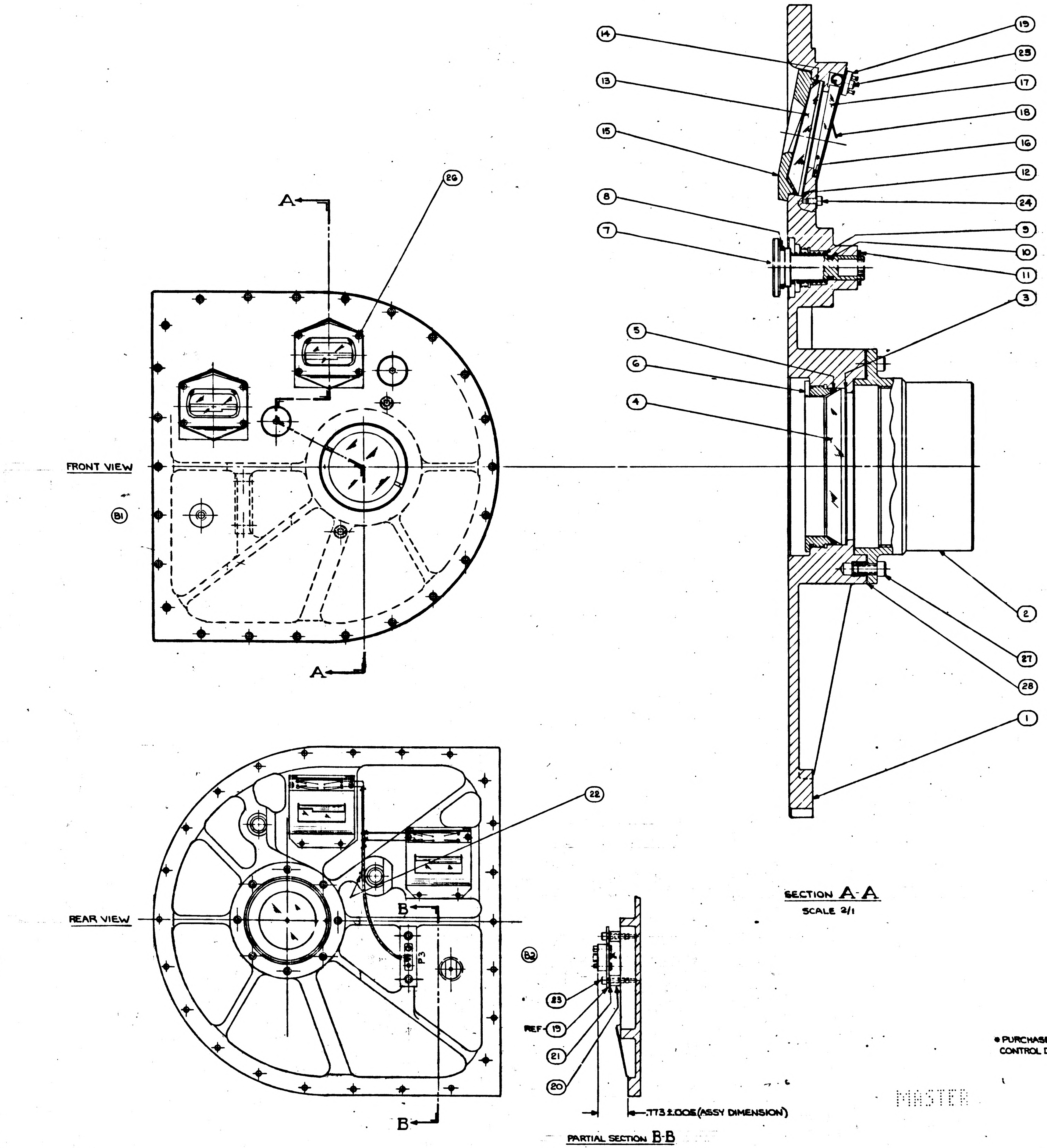
INCHES
PHOTOGRAPHIC SCALE ONLY

1011784 B

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLY AND TEST PROCEDURE IN ACCORDANCE WITH ATP 1011784.
3. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019

REVISIONS TDRR 02424

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	D3	RIVISED PER TDRR NO. 05506	2 [illegible] 64	WK
B2		REVISED PER TDRR NO 06511	26 FEB 64	



* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
28	AR		1011955-	5738690161...		SPACER			
27	8		1011625-28	74455151028		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
26	8		NAS 1352C02LL3	74455157005		↕			
25	4		NAS 1352C01LL3	74455157002		↕			
24	4		NAS 1352C01LL2	74455157001		↕			
23	2		NAS 1352C06LL8	74455157020		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
22	AR	*	1011753	—		TAPE, LACING & TYING			
21	AR		1011885	45386900170		SHIM			
20	2		1011886	45386900180		SPACER, CONNECTOR MTG. PLATE			
19	1		1011913	85386901000		LAMP AND HARNESS, ASSY OF			
18	2		1011826	56386900430		PLATE, MASK			
17	2		1011828	28386900640		WEDGE, ILLUMINATING			
16	2		1011830	26386900020		GASKET, WEDGE, BOTTOM			
15	2		1011699	52386900850		BEZEL			
14	2	*	1011768-28	74453043028		PACKING, PREFORMED			
13	2		1011829	28386900650		WINDOW, GLASS			
12	2		1011831	26386900030		GASKET, WINDOW			
11	2	*	1011770-3	74453044003		RING, RETAINING			
10	2	*	1011768-8	74453043008		PACKING, PREFORMED			
9	2		1011821	56386900420		SPRING, HELICAL, COMPRESSION			
8	2	*	1011768-14	74453043014		PACKING, PREFORMED			
7	2		1011820	5738 901360		SHAFT, MANUAL ADJUSTMENT			
6	1		1011808	57386 01350		RING, RETAINING			
5	1	*	1011768-32	74453043032		PACKING, PREFORMED			
4	1		1011816	28386900600		WINDOW, GLASS			
3	1		1011809	26386900010		GASKET, WINDOW			
2	1		1011732	85386900500		LENS, TELESCOPE RELAY, ASSY OF			
1	1		1011717	85386900410		TELESCOPE PANEL & INSERT, ASSY OF			

LIST OF PARTS AND MATERIALS

MASTER

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900960
DRAWN DATE 7-19-63
CHECKED 8-15-63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-12-63
MIT APPROVAL 16 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PANEL ASSEMBLY
(SCT)

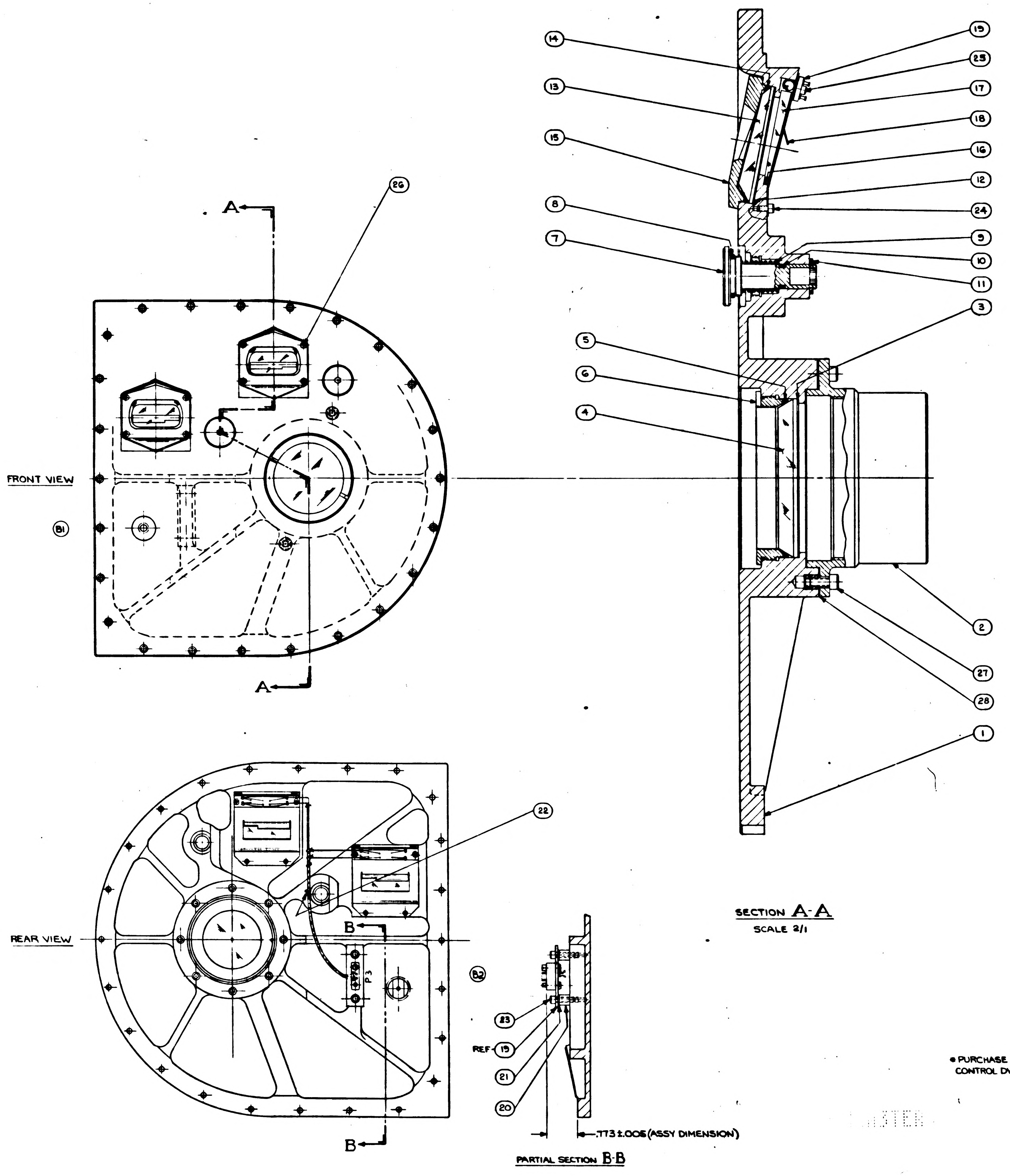
CODE IDENT NO.
SIZE E
NASA NUMBER 1011784
SCALE 1/1 & 2/1
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLY AND TEST PROCEDURE IN ACCORDANCE WITH ATP 1011784.
3. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019

1011784 C

REVISIONS TDRR 02624

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	D3	REVISED PER TDRR NO. 05506	27 Dec 63	WK
B2		REVISED PER TDRR NO 06611	26 FEB 64	
C		REVISED PER TDRR NO 07671	14 APRIL 64	



* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
28	AR		1011955-	5738690161...		SPACER			
27	8		NAS1352C04LL6	74455157014		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
26	8		NAS1352C02LL3	74455157005		↕			
25	4		NAS1352C01LL3	74455157002		↕			
24	4		NAS1352C01LL2	74455157001		↕			
23	2		NAS1352C06LL8	74455157020		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
22	AR	*	1011753	—		TAPE, LACING & TYING			
21	AR		1011885	45386900170		SHIM			
20	2		1011886	45386900180		SPACER, CONNECTOR MTG. PLATE			
19	1		1011913	85386901000		LAMP AND HARNESS, ASSY OF			
18	2		1011826	56386900430		PLATE, MASK			
17	2		1011828	28386900640		WEDGE, ILLUMINATING			
16	2		1011830	26386900020		GASKET, WEDGE, BOTTOM			
15	2		1011699	52386900850		BEZEL			
14	2	*	1011768-28	74453043028		PACKING, PREFORMED			
13	2		1011829	28386900650		WINDOW, GLASS			
12	2		1011831	26386900030		GASKET, WINDOW			
11	2	*	1011770-3	74453044003		RING, RETAINING			
10	2	*	1011768-8	74453043008		PACKING, PREFORMED			
9	2		1011821	56386900420		SPRING, HELICAL, COMPRESSION			
8	2	*	1011768-14	74453043014		PACKING, PREFORMED			
7	2		1011820	57386901360		SHAFT, MANUAL ADJUSTMENT			
6	1		1011808	57386901350		RING, RETAINING			
5	1	*	1011768-32	74453043032		PACKING, PREFORMED			
4	1		1011816	28386900600		WINDOW, GLASS			
3	1		1011809	26386900010		GASKET, WINDOW			
2	1		1011732	85386900500		LENS, TELESCOPE RELAY ASSY OF			
1	1		1011717	85386900410		TELESCOPE PANEL & INSERT, ASSY OF			

LIST OF PARTS AND MATERIALS

1011000	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900960
DRAWN DATE 7-18-63
CHECKED 8-5-63
APPROVAL 8-7-63
APPROVAL 8-5-63
NASA APPROVAL W. J. 8-16-63
MIT APPROVAL 16 Aug 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
TITLE
PANEL ASSEMBLY
(SCT)
CODE IDENT NO.
SIZE E
NASA NUMBER 1011784
SCALE 1/1 & 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

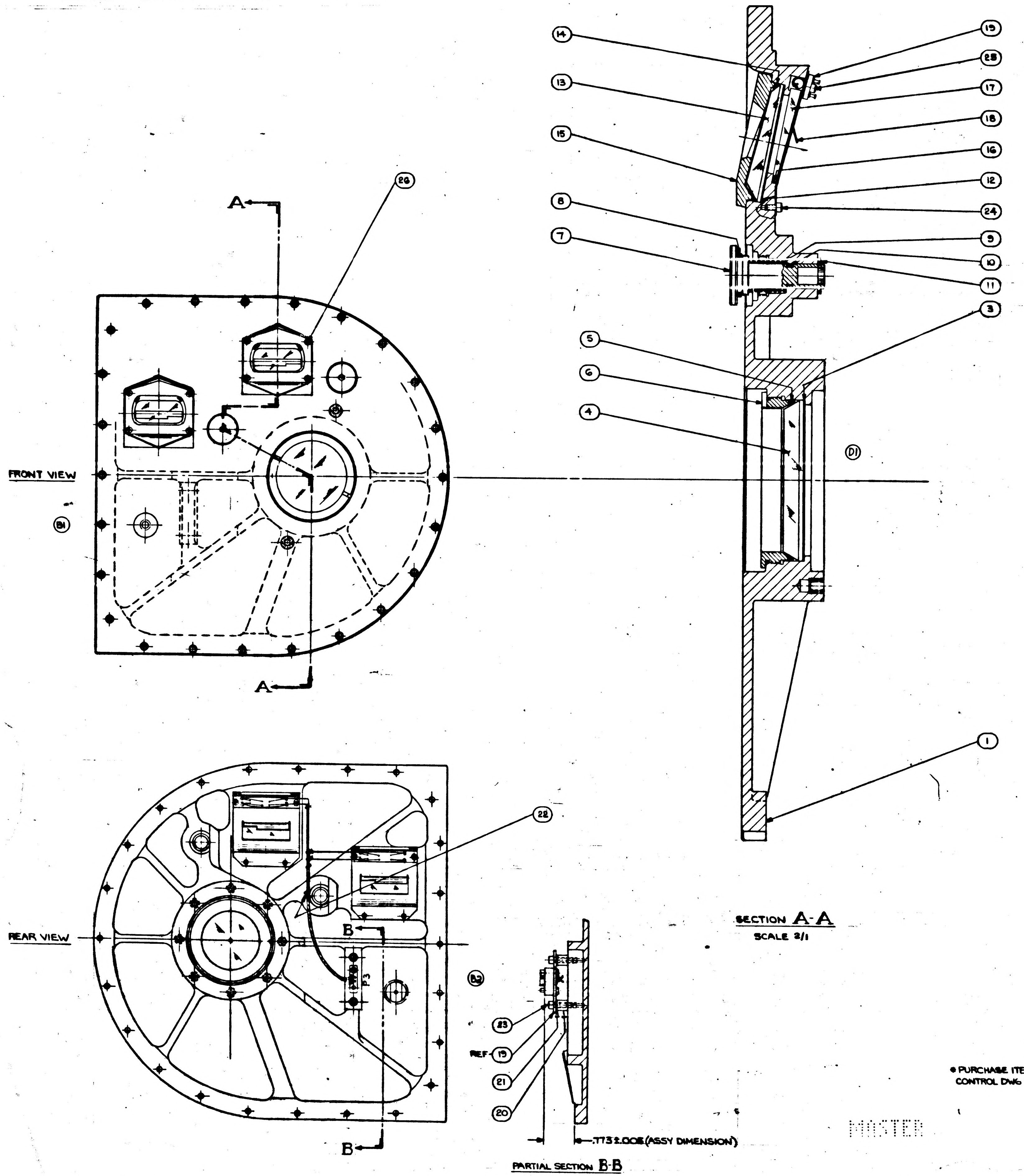
1011784 C

1011784 D

NOTES: ⓓ2
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURER'S SYMBOL PER ND-1002019.

REVISIONS TDRR 06624

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	D3	REVISED PER TDRR NO. 05506	[illegible]	WK
B2		REVISED PER TDRR NO 0681	26 FEB 64	
C		REVISED PER TDRR NO. 07671	14 APR 64	
D2		REVISED PER TDRR NO. 08452.	6-12-64	



* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
28									
27									
26	8		NAS1352C02LL3	74455157005		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
25	4		NAS1352C01LL3	74455157002		↓			
24	4		NAS1352C01LL2	74455157001		↓			
23	2		NAS1352C06LL8	74455157020		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
22	AR	*	1011753	—		TAPE, LACING & TYING			
21	AR		1011885	45386900170		SHIM			
20	2		1011886	45386900180		SPACER, CONNECTOR MTG. PLATE			
19	1		1011913	85386901000		LAMP AND HARNESS, ASSY OF			
18	2		1011826	56386900430		PLATE, MASK			
17	2		1011828	28386900640		WEDGE, ILLUMINATING			
16	2		1011830	26386900020		GASKET, WEDGE, BOTTOM			
15	2		1011699	52386900850		BEZEL			
14	2	*	1011768-28	74453043028		PACKING, PREFORMED			
13	2		1011829	28386900650		WINDOW, GLASS			
12	2		1011831	26386900030		GASKET, WINDOW			
11	2	*	1011770-3	74453044003		RING, RETAINING			
10	2	*	1011768-8	74453043008		PACKING, PREFORMED			
9	2		1011821	56386900420		SPRING, HELICAL, COMPRESSION			
8	2	*	1011768-14	74453043014		PACKING, PREFORMED			
7	2		1011820	57386901360		SHAFT, MANUAL ADJUSTMENT			
6	1		1011808	57386901350		RING, RETAINING			
5	1	*	1011768-32	74453043032		PACKING, PREFORMED			
4	1		1011816	28386900600		WINDOW, GLASS			
3	1		1011809	26386900010		GASKET, WINDOW			
2									
1	1		1011717	85386900410		TELESCOPE PANEL & INSERT, ASSY OF			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900960
DRAWN DATE 7-18-63
CHECKED 8-15-63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PANEL ASSEMBLY
(SCT)

CODE IDENT NO.
SIZE E
NASA NUMBER 1011784
SCALE 1/1 & 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

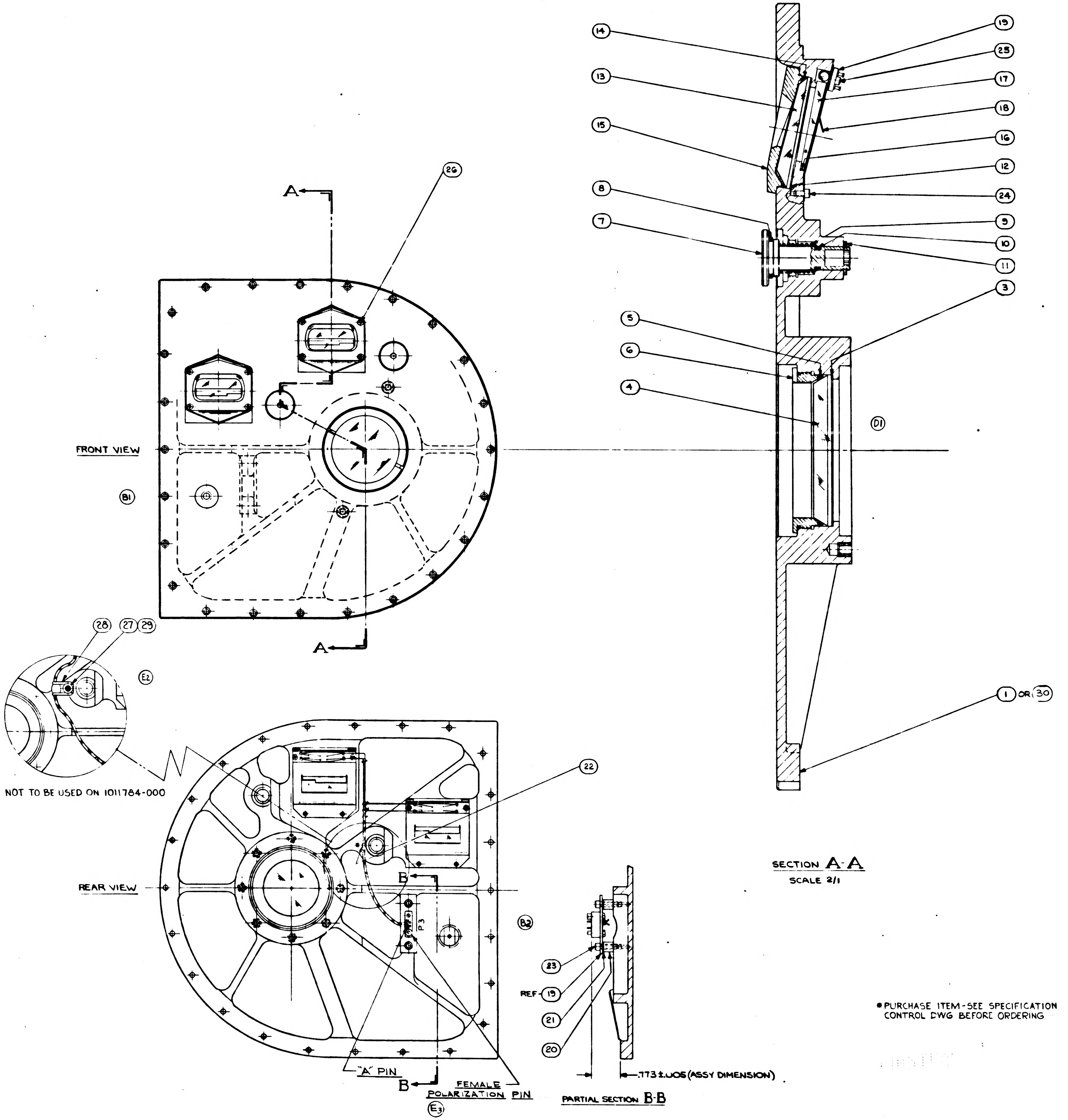
1011784 D

E	1011784	

NOTES: (E2)
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURER'S SYMBOL PER ND-1002019.

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	D3	RIVISED PER TDRR NO 05506	[illegible]	WK
B2		REVISED PER TDRR NO 06511	26 FEB 64	
C		REVISED PER TDRR NO 07671	14 APRIL 64	
D2		REVISED PER TDRR NO. 08452	5-12-64	
E3		REVISED PER TDRR NO. 12667	9-7-64	

REVISIONS TDRR 01624



SECTION A-A
SCALE 2/1

PARTIAL SECTION B-B

*PURCHASE ITEM-SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

001	000	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
1	0	30			1011717-001			TELESCOPE PANEL & INSERT, ASSY OF			
1	0	29			NAS1352C02LL4			SCREW, CAP, SOC. HD SELF LOCKING			
1	0	28			1000220-3			CLAMP, CABLE			
1	0	27			MS15795-302			WASHER, FLAT			
8	8	26			NAS1352C02LL3	74455157005		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
4	4	25			NAS1352C01LL3	74455157002		↓			
4	4	24			NAS1352C01LL2	74455157001		↓			
2	2	23			NAS1352C06LL8	74455157020		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
AR	AR	22		*	1011753	—		TAPE, LACING & TYING			
AR	AR	21			1011885	45386900170		SHIM			
2	2	20			1011886	45386900180		SPACER, CONNECTOR MTG. PLATE			
1	1	19			1011913	85386901000		LAMP AND HARNESS, ASSY OF			
2	2	18			1011826	56386900430		PLATE, MASK			
2	2	17			1011828	28386900640		WEDGE, ILLUMINATING			
2	2	16			1011830	26386900020		GASKET, WEDGE, BOTTOM			
2	2	15			1011699	52386900850		BEZEL			
2	2	14		*	1011768-28	74453043028		PACKING, PREFORMED			
2	2	13			1011829	28386900650		WINDOW, GLASS			
2	2	12			1011831	26386900030		GASKET, WINDOW			
2	2	11		*	1011770-3	74453044003		RING, RETAINING			
2	2	10		*	1011768-8	74453043008		PACKING, PREFORMED			
2	2	9			1011821	56386900420		SPRING, HELICAL, COMPRESSION			
2	2	8		*	1011768-14	74453043014		PACKING, PREFORMED			
2	2	7			1011820	57386901360		SHAFT, MANUAL ADJUSTMENT			
1	1	6			1011808	57386901350		RING, RETAINING			
1	1	5		*	1011768-32	74453043032		PACKING, PREFORMED			
1	1	4			1011816	28386900600		WINDOW, GLASS			
1	1	3			1011809	26386900010		GASKET, WINDOW			
		2									
0	1	1			1011717	85386900410		TELESCOPE PANEL & INSERT, ASSY OF			

QTY REQD
LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900960
DRAWN DATE 7-18-63
CHECKED 8-5-63
APPROVAL 8-7-63
APPROVAL
NASA APPROVAL 8-?-63
MIT APPROVAL 12 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PANEL ASSEMBLY
(SCT)

CODE IDENT NO.
SIZE E
NASA NUMBER 1011784
SCALE 1/1 & 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

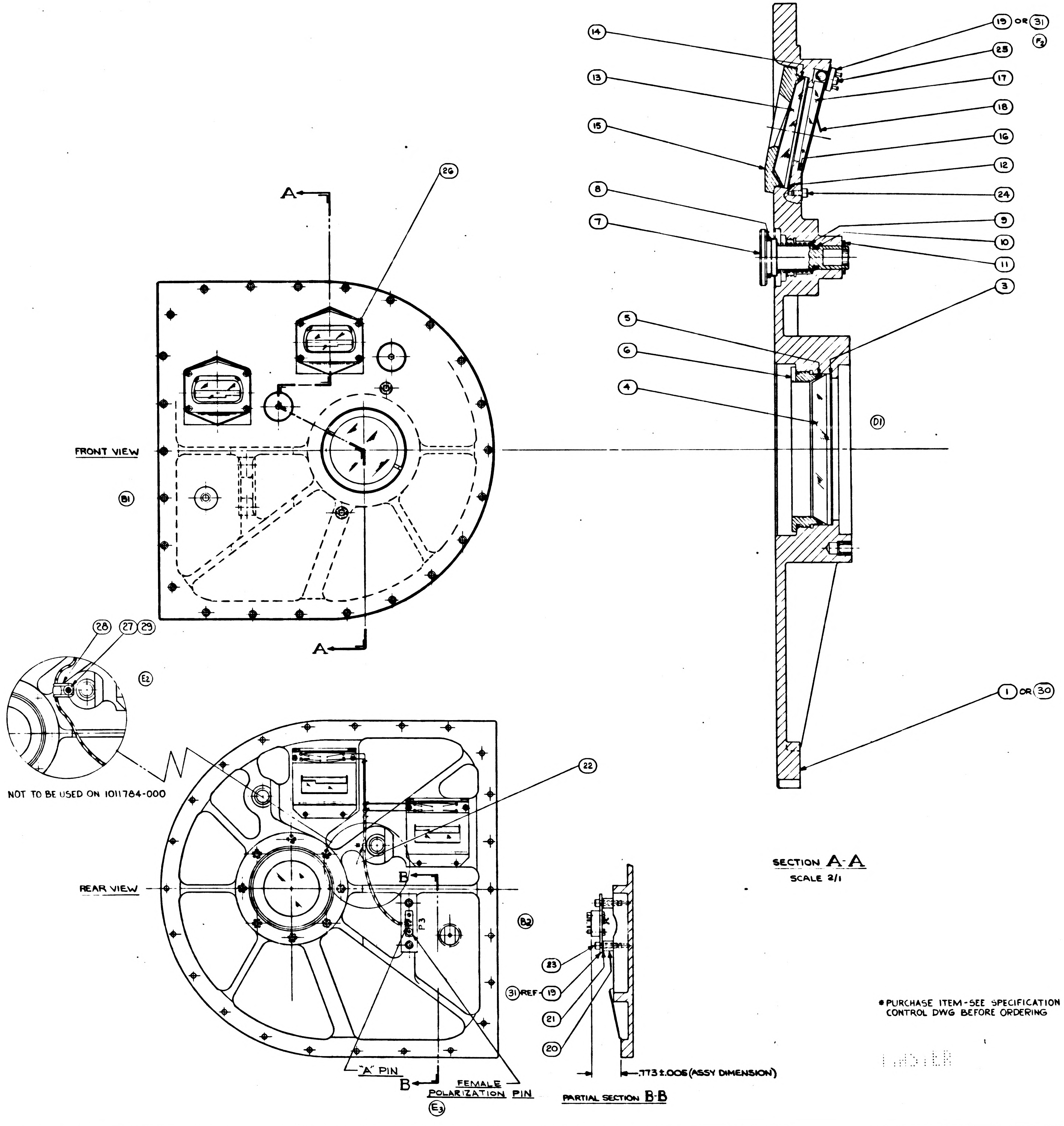
1011784 E

1011784 F

NOTES: (D2)
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURER'S SYMBOL PER ND-1002019.

REVISIONS TDRR 02624

	SYM	ZONE	DESCRIPTION	DATE	APPROVAL
(A)	A	D3	RIVISED PER TDRR NO 05506		WK
(B)	B2		REVISED PER TDRR NO 06511	26 FEB 64	
(C)	C		REVISED PER TDRR NO 07671	4 APRIL 64	
(D)	D2		REVISED PER TDRR NO. C8452	5-12-64	
(E)	E3		REVISED PER TDRR NO. 12667		
	F2		REVISED PER TDRR NO. [illegible]		



* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

	QTY REQD 001	QTY REQD 000	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
(F1)	1	0	31			1011913-001			LAMP AND HARNESS, ASSY OF			
	1	0	30			1011717-001			TELESCOPE PANEL & INSERT, ASSY OF			
(E1)	1	0	29			NAS1352C02LL4			SCREW, CAP, SOC. HD SELF LOCKING			
	1	0	28			1000220-3			CLAMP, CABLE			
(C) (A)	1	0	27			MS15795-302			WASHER, FLAT			
	8	8	26			NAS1352C02LL3	74455157005		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
	4	4	25			NAS1352C01LL3	74455157002		↓			
	4	4	24			NAS1352C01LL2	74455157001		↓			
	2	2	23			NAS1352C06LL8	74455157020		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
	AR	AR	22		*	1011753	—		TAPE, LACING & TYING			
	AR	AR	21			1011885	45386900170		SHIM			
	2	2	20			1011886	45386900180		SPACER, CONNECTOR MTG. PLATE			
	0	1	19			1011913-000	85386901000		LAMP AND HARNESS, ASSY OF			
	2	2	18			1011826	56386900430		PLATE, MASK			
	2	2	17			1011828	28386900640		WEDGE, ILLUMINATING			
	2	2	16			1011830	26386900020		GASKET, WEDGE, BOTTOM			
	2	2	15			1011699	52386900850		BEZEL			
	2	2	14		*	1011768-28	74453043028		PACKING, PREFORMED			
	2	2	13			1011829	28386900650		WINDOW, GLASS			
	2	2	12			1011831	26386900030		GASKET, WINDOW			
	2	2	11		*	1011770-3	74453044003		RING, RETAINING			
	2	2	10		*	1011768-8	74453043008		PACKING, PREFORMED			
	2	2	9			1011821	56386900420		SPRING, HELICAL, COMPRESSION			
	2	2	8		*	1011768-14	74453043014		PACKING, PREFORMED			
	2	2	7			1011820	57386901360		SHAFT, MANUAL ADJUSTMENT			
	1	1	6			1011808	57386901350		RING, RETAINING			
	1	1	5		*	1011768-32	74453043032		PACKING, PREFORMED			
	1	1	4			1011816	28386900600		WINDOW, GLASS			
	1	1	3			1011809	26386900010		GASKET, WINDOW			
			2									
	0	1	1			1011717	85386900410		TELESCOPE PANEL & INSERT, ASSY OF			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900960
DRAWN DATE 7-18-63
CHECKED 8-5-63
APPROVAL 8-7-63
APPROVAL
NASA APPROVAL 8-14-63
MIT APPROVAL 16 Aug 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PANEL ASSEMBLY
(SCT)

CODE IDENT NO. SIZE E NASA NUMBER 1011784
SCALE 1/1 & 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

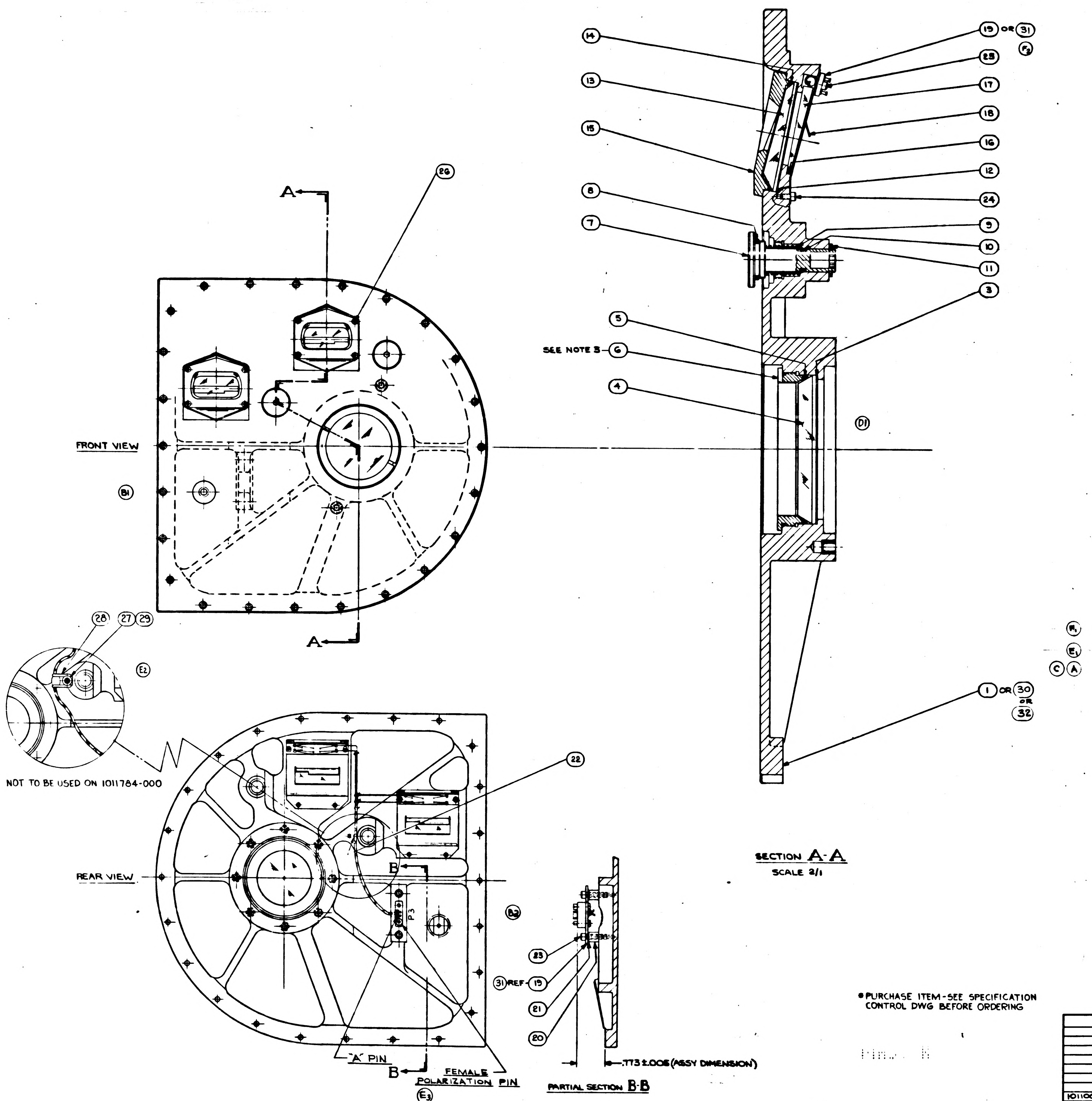
1011784

1011784 G

NOTES: (D2)
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURER'S SYMBOL PER ND-1002019.
3. VIBRATION PROOF ITEM ⑥ (1011808) BY APPLYING LOCKING COMPOUND GRADE "HV" OF MIL-S-22473 TO 1/3 OF LAST THREAD PER ND 1002211 (FOR 1011784-002)

REVISIONS TDRR 02624

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	D3	REVISED PER TDRR NO. 05506	[illegible]	WK
B2		REVISED PER TDRR NO 0681	26 FEB 64	
C		REVISED PER TDRR NO 07671	14 APRIL 64	
D2		REVISED PER TDRR NO. 08452	5-12-64	
E3		REVISED PER TDRR NO. 12667	9-764	
F2		REVISED PER TDRR No. 16903	8-20-65	
G		REVISED PER TDRR NO. 22250	9/16/65	



002 QTY REQD	001 QTY REQD	000 QTY REQD	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
1	0	0	32			1011717-002			TELESCOPE PANEL & INSERT, ASSY OF			
1	1	0	31			1011913-001			LAMP AND HARNESS, ASSY OF			
0	1	0	30			1011717-001			TELESCOPE PANEL & INSERT, ASSY OF			
1	1	0	29			NAS1352C02LL4			SCREW, CAP. SOC. HD SELF LOCKING			
1	1	0	28			1000220-3			CLAMP, CABLE			
1	1	0	27			MS15795-302			WASHER, FLAT			
8	8	8	26			NAS1352C02LL3	74455157005		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
4	4	4	25			NAS1352C01LL3	74455157002		↓			
4	4	4	24			NAS1352C01LL2	74455157001		↓			
2	2	2	23			NAS1352C06LL8	74455157020		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
AR	AR	AR	22		*	1011753	—		TAPE, LACING & TYING			
AR	AR	AR	21			1011885	45386900170		SHIM			
2	2	2	20			1011886	45386900180		SPACER, CONNECTOR MTG. PLATE			
0	0	1	19			1011913-000	85386901000		LAMP AND HARNESS, ASSY OF			
2	2	2	18			1011826	56386900430		PLATE, MASK			
2	2	2	17			1011828	28386900640		WEDGE, ILLUMINATING			
2	2	2	16			1011830	26386900020		GASKET, WEDGE, BOTTOM			
2	2	2	15			1011699	52386900850		BEZEL			
2	2	2	14		*	1011768-28	74453043028		PACKING, PREFORMED			
2	2	2	13			1011829	28386900650		WINDOW, GLASS			
2	2	2	12			1011831	26386900030		GASKET, WINDOW			
2	2	2	11		*	1011770-3	74453044003		RING, RETAINING			
2	2	2	10		*	1011768-8	74453043008		PACKING, PREFORMED			
2	2	2	9			1011821	56386900420		SPRING, HELICAL, COMPRESSION			
2	2	2	8		*	1011768-14	74453043014		PACKING, PREFORMED			
2	2	2	7			1011820	57386901360		SHAFT, MANUAL ADJUSTMENT			
1	1	1	6			1011808	57386901350		RING, RETAINING			
1	1	1	5		*	1011768-32	74453043032		PACKING, PREFORMED			
1	1	1	4			1011816	28386900600		WINDOW, GLASS			
1	1	1	3			1011809	26386900010		GASKET, WINDOW			
			2									
0	0	1	1			1011717	85386900410		TELESCOPE PANEL & INSERT, ASSY OF			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900960
DRAWN DATE 7-18-63
CHECKED 8-5-63
APPROVAL 8-7-63
APPROVAL 8-63
NASA APPROVAL 8-16-63
MIT APPROVAL 16 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PANEL ASSEMBLY
(SCT)

CODE IDENT NO.
SIZE E
NASA NUMBER 1011784
SCALE 1/1 & 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

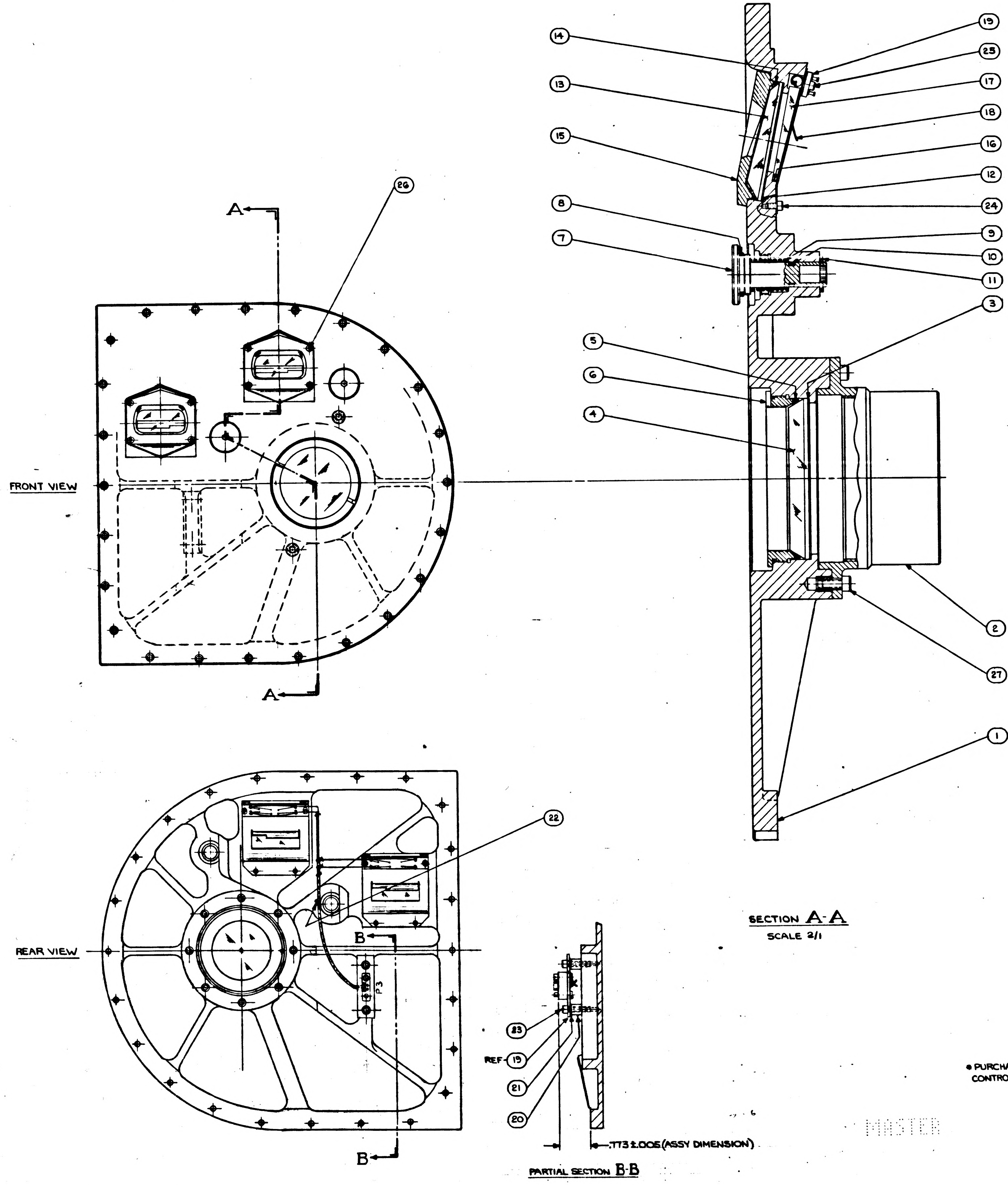
1011784

1011784

REVISIONS IDRR 02624

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLY AND TEST PROCEDURE IN ACCORDANCE WITH ATP 1011784.
3. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019



* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
27	8	NAS	1352C04LL4	74455157013		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
26	8	NAS	1352C02LL3	74455157005		↕			
25	4	NAS	1352C01LL3	74455157002		↕			
24	4	NAS	1352C01LL2	74455157001		↕			
23	2	NAS	1352C06LL8	74455157020		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
22	AR	*	1011753	—		TAPE, LACING & TYING			
21	AR		1011885	45386900170		SHIM			
20	2		1011886	45386900180		SPACER, CONNECTOR MTG. PLATE			
19	1		1011913	85386901000		LAMP AND HARNESS, ASSY OF			
18	2		1011826	56386900430		PLATE, MASK			
17	2		1011828	28386900640		WEDGE, ILLUMINATING			
16	2		1011830	26386900020		GASKET, WEDGE, BOTTOM			
15	2		1011699	52386900850		BEZEL			
14	2	*	1011768-28	74453043028		PACKING, PREFORMED			
13	2		1011829	28386900650		WINDOW, GLASS			
12	2		1011831	26386900030		GASKET, WINDOW			
11	2	*	1011770-3	74453044003		RING, RETAINING			
10	2	*	1011768-8	74453043008		PACKING, PREFORMED			
9	2		1011821	56386900420		SPRING, HELICAL, COMPRESSION			
8	2	*	1011768-14	74453043014		PACKING, PREFORMED			
7	2		1011820	57386901360		SHAFT, MANUAL ADJUSTMENT			
6	1		1011808	57386901350		RING, RETAINING			
5	1	*	1011768-32	74453043032		PACKING, PREFORMED			
4	1		1011816	28386900600		WINDOW, GLASS			
3	1		1011809	26386900010		GASKET, WINDOW			
2	1		1011732	85386900500		LENS, TELESCOPE RELAY, ASSY OF			
1	1		1011717	85386900410		TELESCOPE PANEL & INSERT, ASSY OF			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900960
DRAWN DATE 7-18-63
CHECKED 8-5-63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL W J [illegible] 8-16-63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PANEL ASSEMBLY
(SCT)

CODE IDENT NO.
SIZE E
NASA NUMBER 1011784
SCALE 1/1 & 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

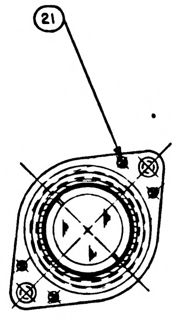
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011786 A

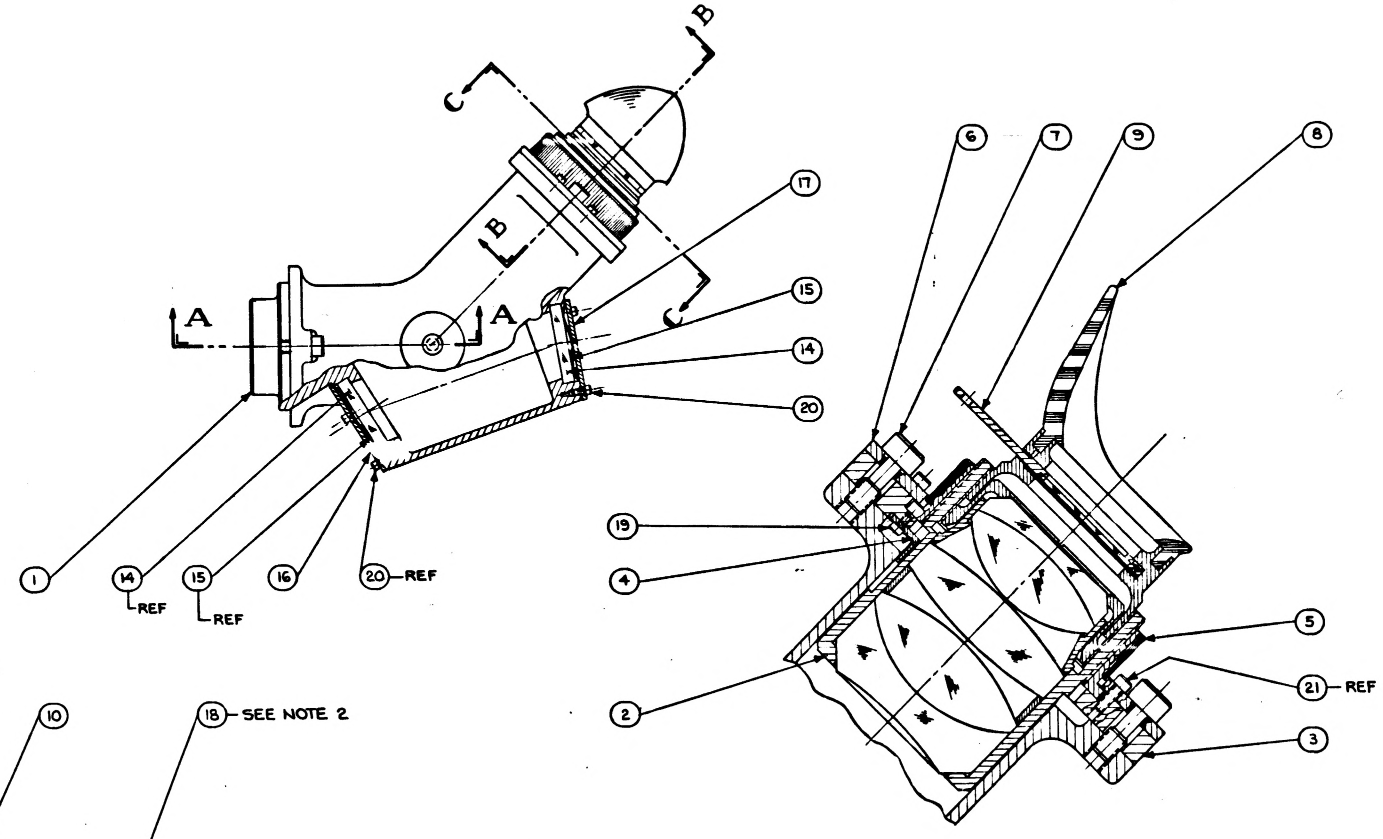
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REPLACED WITH CHANGE BY REV B 02964		

REVISIONS 02623

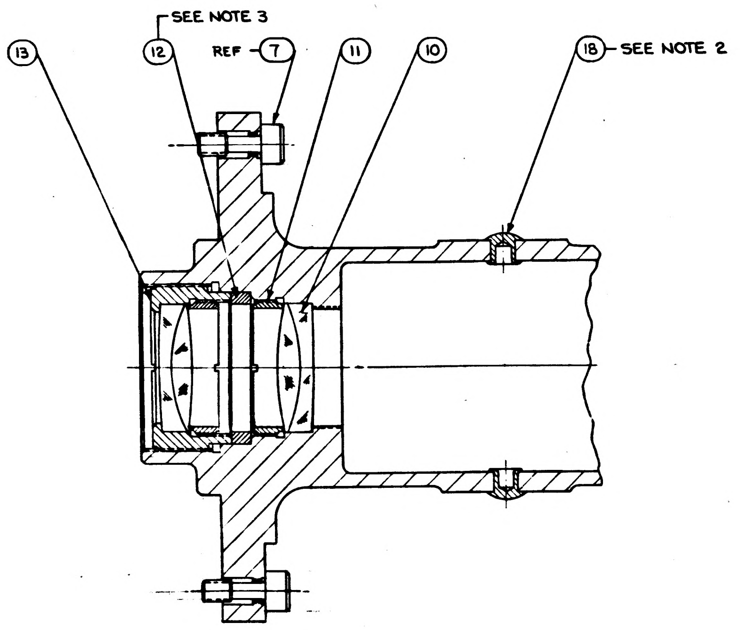
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ITEM ⑱ TO BE INSTALLED (SWAGED) PRIOR TO ASSEMBLY OF OTHER ITEMS.
3. ITEM ⑫ TO BE GROUND TO SUIT OPTICAL ALIGNMENT REQUIREMENTS IN ACCORDANCE WITH ATP1011786.



SECTION C-C



PARTIAL SECTION B-B
SCALE 2/1



PARTIAL SECTION A-A
SCALE 2/1

Ⓐ REPLACED WITH CHANGE BY REV. B

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
21	4		NAS1352C02LL4	74455157006		SCREW, CAP, SOCKET HEAD-SELF LOCKING			
20	6		NAS1352C02LL3	74455157005		SCREW, CAP, SOCKET HEAD-SELF LOCKING			
19	2		NAS1352C01LL2	74455157001		SCREW, CAP, SOCKET HEAD-SELF LOCKING			
18	2		MS16535-338			RIVET, TUBULAR OVAL HEAD			
17	1		1011681	52386900820		PLATE, COVER, MIRROR			
16	1		1011680	52386900810		PLATE, COVER, MIRROR			
15	2		1011685	56386900380		WASHER, WAVE			
14	2		1011863	28386900750		MIRROR			
13	1		1011794	85386900800		HOLDER & LENS, ASSY OF			
12	1		1011665	57386901150		RING, SPACER			
11	1		1011667	57386901170		RING, LOCKING			
10	1		1011781	76386900260		LENS, ASSY. OF			
9	1		1011790	8538690550		POLAROID FILTER & SPRING, ASSY. OF			
8	1		1011789	85386900560		SXT. EYEGUARD ASSY.			
7	4		1011282	45386900140		SCREW, CAPTIVE, HEX. SOCKET HEAD			
6	1		1011874	52386900940		RETAINER, ADJUSTMENT NUT			
5	1		1011881	57386901510		RING, ADJUSTING			
4	1		1011882	52386900960		KEY			
3	1		1011880	52386900950		PLATE, MOUNTING			
2	1		1011793	85386900810		HOUSING & LENS, ASSY. OF			
1	1		1011640	52386900920		HOUSING, EYEPIECE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900600

DRAWN F. Schuller DATE 6-6-63
CHECKED W. CABAN 7-20-63
APPROVAL 8-15-63
APPROVAL 8-19-63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SEXTANT EYEPIECE
ASSEMBLY

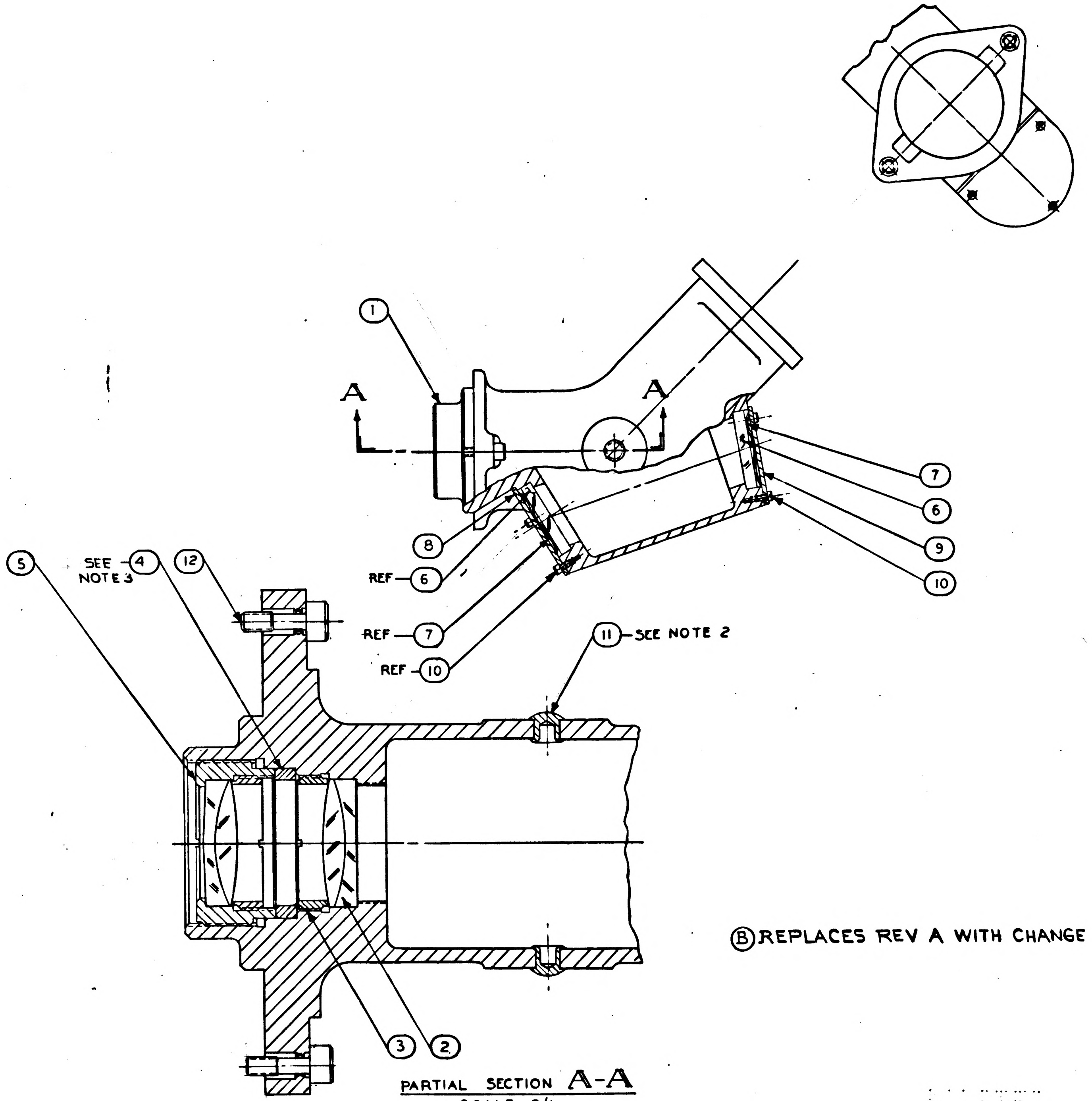
CODE IDENT NO.
SIZE E
NASA NUMBER 1011786
SCALE 1/1
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

INCHES
PHOTOGRAPHIC SCALE ONLY

1011786 B

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ITEM ⑪ TO BE INSTALLED (SWAGED) PRIOR TO ASSEMBLY OF OTHER ITEMS.
3. ITEM ④ TO BE GROUND TO SUIT OPTICAL ALIGNMENT REQUIREMENTS IN ACCORDANCE WITH AT.P. 1011786.

REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
B		1) REPLACES REV A WITH CHANGE REVISED PER TDRR 02964	9/5/63	



PARTIAL SECTION A-A
SCALE 2/1

Ⓑ REPLACES REV A WITH CHANGE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
12	2		1011282	45386900140		SCREW, CAPTIVE, HEX, SOCKET HEAD			
11	2	MS	16535-338	———		RIVET, TUBULAR OVAL HEAD			
10	6	NAS	1352C02LL3	74455157005		SCREW, CAP, SOCKET HEAD-SELF LOCKING			
9	1		1011681	52386900820		PLATE COVER, MIRROR			
8	1		1011680	52386900810		PLATE COVER, MIRROR			
7	2		1011685	56386900380		WASHER, WAVE			
6	2		1011863	28386900750		MIRROR			
5	1		1011794	85386900800		HOLDER AND LENS, ASSY OF			
4	1		1011665	57386901150		RING, SPACER			
3	1		1011667	57386901170		RING, LOCKING			
2	1		1011781	76386900260		LENS, ASSY OF			
1	1		1011640	52386900920		HOUSING, EYEPIECE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± —; DECIMALS ± —; ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900600
DRAWN E. DRAPALA DATE 8-22-63
CHECKED 8-27-63
APPROVAL F. Kuschman 8-29-63
APPROVAL 8-29-63
NASA APPROVAL 9/5/63
MIT APPROVAL 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SEXTANT EYEPIECE
ASSEMBLY

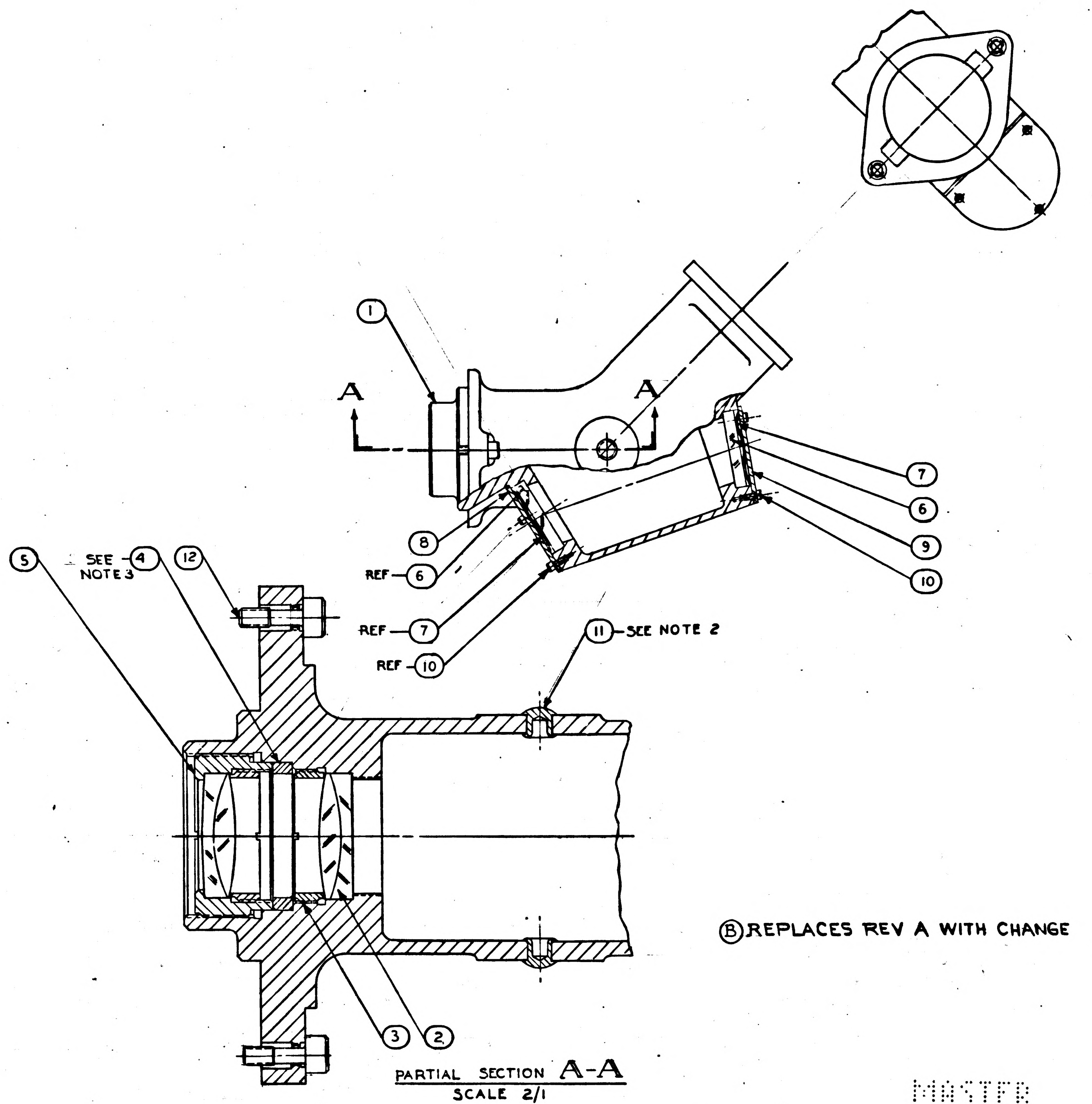
CODE IDENT NO.
SIZE D
NASA NUMBER 1011786
SCALE 1/1 & 2/1
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

INCHES
0 2
PHOTOGRAPHIC SCALE ONLY

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ITEM ⑪ TO BE INSTALLED (SWAGED) PRIOR TO ASSEMBLY OF OTHER ITEMS.
3. ITEM ④ TO BE GROUND TO SUIT OPTICAL ALIGNMENT REQUIREMENTS FOR THE OPTICAL UNIT FINAL ASSEMBLY DWG 1011000

REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
B		1) REPLACES REV A WITH CHANGE REVISED PER TDRR 02964	9/5/63	
C1		REVISED PER TDRR NO. 06119	11 FEB 64	WK

1011786 C



PARTIAL SECTION A-A
SCALE 2/1

Ⓑ REPLACES REV A WITH CHANGE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
12	2		1011282	45386900140		SCREW, CAPTIVE, HEX, SOCKET HEAD			
11	2	MS	16535-338	—		RIVET, TUBULAR OVAL HEAD			
10	6	NAS	1352C02LL3	74455157005		SCREW, CAP, SOCKET HEAD-SELF LOCKING			
9	1		1011681	52386900820		PLATE COVER, MIRROR			
8	1		1011680	52386900810		PLATE COVER, MIRROR			
7	2		1011685	56386900380		WASHER, WAVE			
6	2		1011863	28386900750		MIRROR			
5	1		1011794	85386900800		HOLDER AND LENS, ASSY OF			
4	1		1011665	57386901150		RING, SPACER			
3	1		1011667	57386901170		RING, LOCKING			
2	1		1011781	76386900260		LENS, ASSY OF			
1	1		1011640	52386900920		HOUSING, EYEPIECE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900600

DRAWN E. DRAPALA DATE 8-22-63
CHECKED 8-27-63
APPROVAL 8-29-63
APPROVAL 8-29-63
NASA APPROVAL 9/4/63
MIT APPROVAL 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SEXTANT EYEPIECE
ASSEMBLY

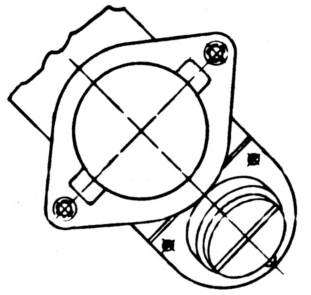
CODE IDENT NO.
SIZE D
NASA NUMBER 1011786
SCALE 1/1 & 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

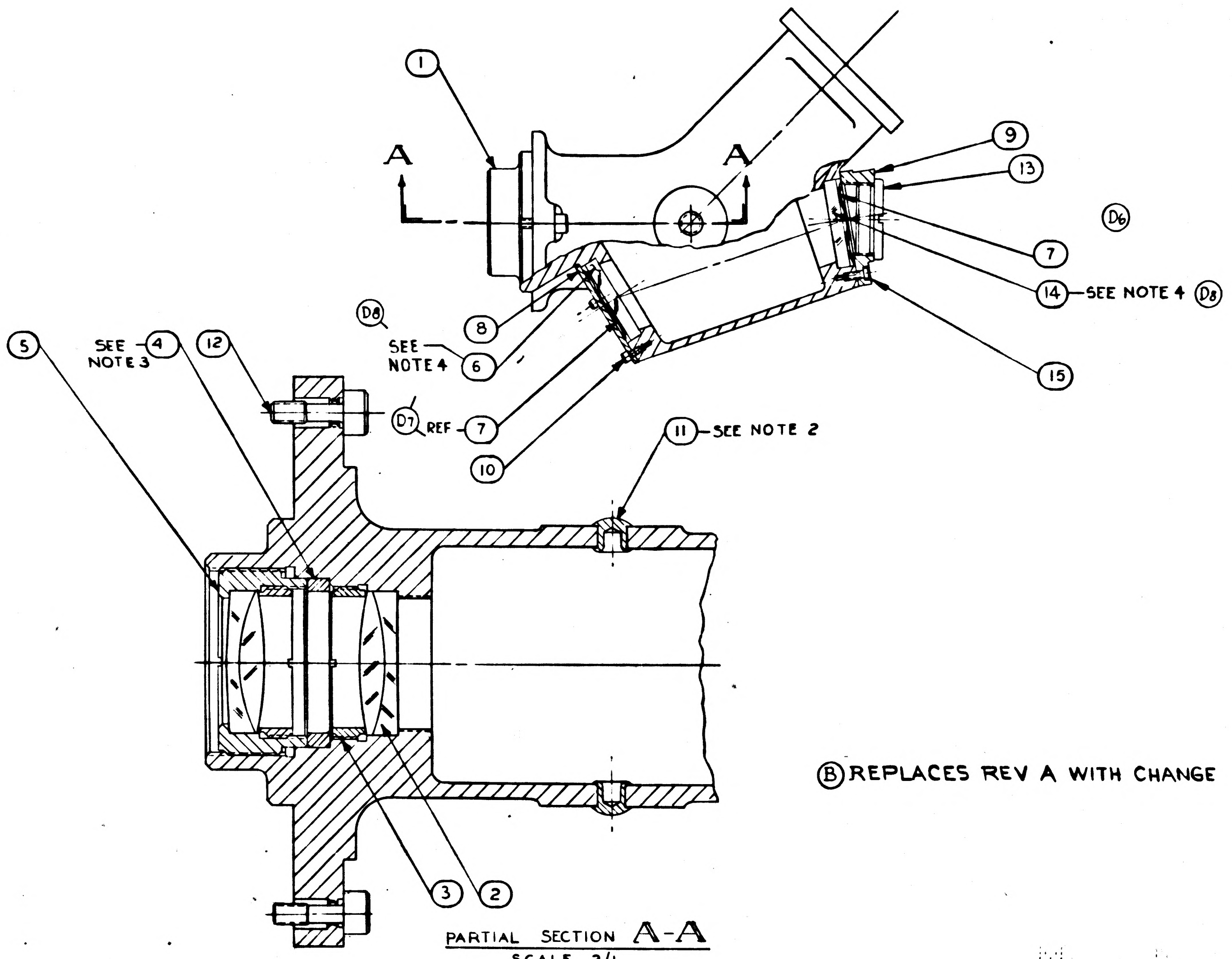
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ITEM ⑪ TO BE INSTALLED (SWAGED) PRIOR TO ASSEMBLY OF OTHER ITEMS.
3. ITEM ④ TO BE GROUND TO SUIT OPTICAL ALIGNMENT REQUIREMENTS FOR THE OPTICAL UNIT FINAL ASSEMBLY DWG 1011000 (C1)
4. ITEM 6 & ITEM 14 TO BE MOUNTED WITH REFLECTIVE SURFACES INBOARD (D1)

D	1011786

REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
B		1) REPLACES REV A WITH CHANGE REVISED PER TDRR 02964	9/5/63	
C1		REVISED PER TDRR NO. 06119	11 FEB 64	WK
D8		REVISED PER TDRR NO. 10234	6-16-64	





PARTIAL SECTION A-A
SCALE 2/1

(B) REPLACES REV A WITH CHANGE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
15	3		NAS 1352C02LL4			SCREW, CAP, SOCKET HD. SELF-LOCKING			
14 (D4)	1		1012162			MIRROR			
13	1		1012124			PLUG			
12	2		1011282	45386900140		SCREW, CAPTIVE, HEX, SOCKET HEAD			
11	2		MS 16535-338	—		RIVET, TUBULAR OVAL HEAD			
10 (D3)	3		NAS 1352C02LL3	74455157005		SCREW, CAP, SOCKET HEAD-SELF LOCKING			
9 (D5)	1		1012195			PLATE COVER, MIRROR			
8	1		1011680	52386900810		PLATE COVER, MIRROR			
7	2		1011685	56386900380		WASHER, WAVE			
6 (D2)	1		1011863	28386900750		MIRROR			
5	1		1011794	85386900800		HOLDER AND LENS, ASSY OF			
4	1		1011665	57386901150		RING, SPACER			
3	1		1011667	57386901170		RING, LOCKING			
2	1		1011781	76386900260		LENS, ASSY OF			
1	1		1011640	52386900920		HOUSING, EYEPIECE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± —	± —

DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900600

DRAWN E. DRAPALA DATE 8-22-63
CHECKED 8-27-63
APPROVAL 8-29-63
APPROVAL 8-29-63
NASA APPROVAL
MIT APPROVAL 10/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SEXTANT EYEPIECE
ASSEMBLY

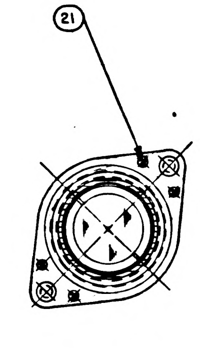
CODE IDENT NO. | SIZE D | NASA NUMBER 1011786
SCALE 1/1 & 2/1 | WEIGHT | CALC ACTUAL | SHEET 1 OF 1

1011786 D

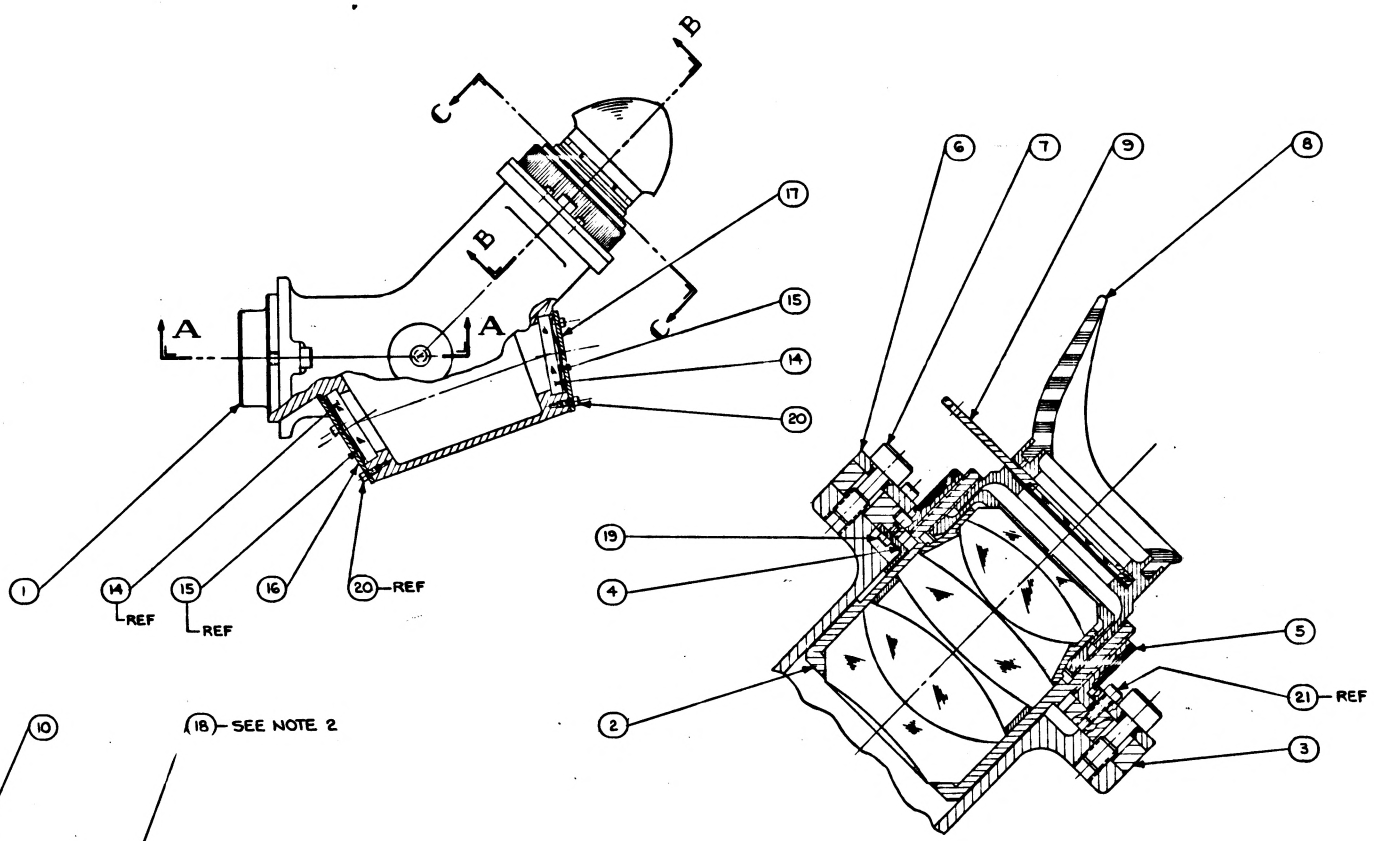
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ITEM ⑱ TO BE INSTALLED (SWAGED) PRIOR TO ASSEMBLY OF OTHER ITEMS.
3. ITEM ⑫ TO BE GROUND TO SUIT OPTICAL ALIGNMENT REQUIREMENTS IN ACCORDANCE WITH ATP1011786.

1011786

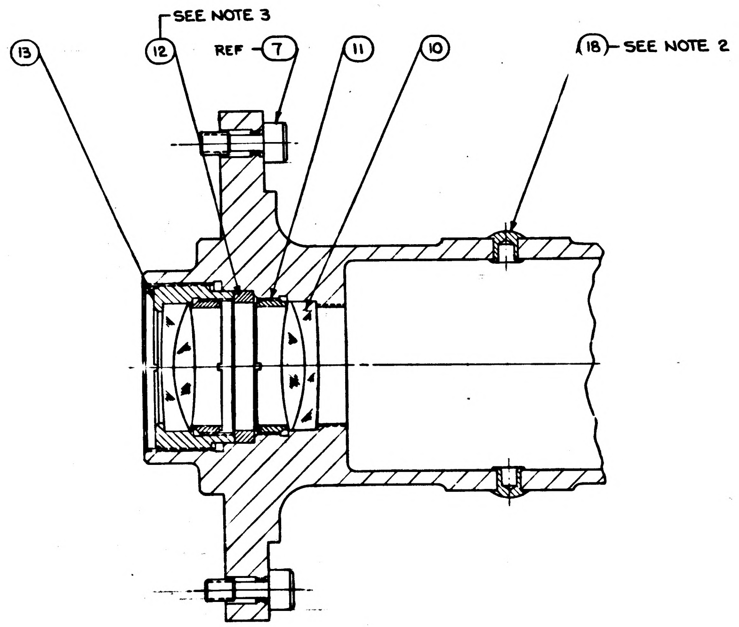
REVISIONS 02023				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL



SECTION C-C



PARTIAL SECTION B-B
SCALE 2/1



PARTIAL SECTION A-A
SCALE 2/1

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
21	4		NAS1352C02LL4	74455157006		SCREW, CAP, SOCKET HEAD-SELF LOCKING			
20	6		NAS1352C02LL3	74455157005		SCREW, CAP, SOCKET HEAD-SELF LOCKING			
19	2		NAS1352C01LL2	74455157001		SCREW, CAP, SOCKET HEAD-SELF LOCKING			
18	2		MS16535-338			RIVET, TUBULAR OVAL HEAD			
17	1		1011681	52386900820		PLATE, COVER, MIRROR			
16	1		1011680	52386900810		PLATE, COVER, MIRRCR			
15	2		1011685	56386900380		WASHER, WAVE			
14	2		1011863	28386900750		MIRROR			
13	1		1011794	85386900800		HOLDER & LENS, ASSY OF			
12	1		1011665	57386901150		RING, SPACER			
11	1		1011667	57386901170		RING, LOCKING			
10	1		1011781	76386900260		LENS, ASSY. OF			
9	1		1011790	8538690550		POLAROID FILTER & SPRING, ASSY. OF			
8	1		1011789	35386900560		SXT. EYEGUARD ASSY.			
7	4		1011282	45386900140		SCREW, CAPTIVE, HEX. SOCKET HEAD			
6	1		1011874	52386900940		RETAINER, ADJUSTMENT NUT			
5	1		1011881	57386901510		RING, ADJUSTING			
4	1		1011882	52386900960		KEY			
3	1		1011880	52386900950		PLATE, MOUNTING			
2	1		1011793	85386900810		HOUSING & LENS, ASSY. OF			
1	1		1011640	52386900920		HOUSING, EYEPIECE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 35386900600
DRAWN F. DeAlba DATE 6-6-63
CHECKED W. CABAN 7-26-63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SEXTANT EYEPIECE
ASSEMBLY

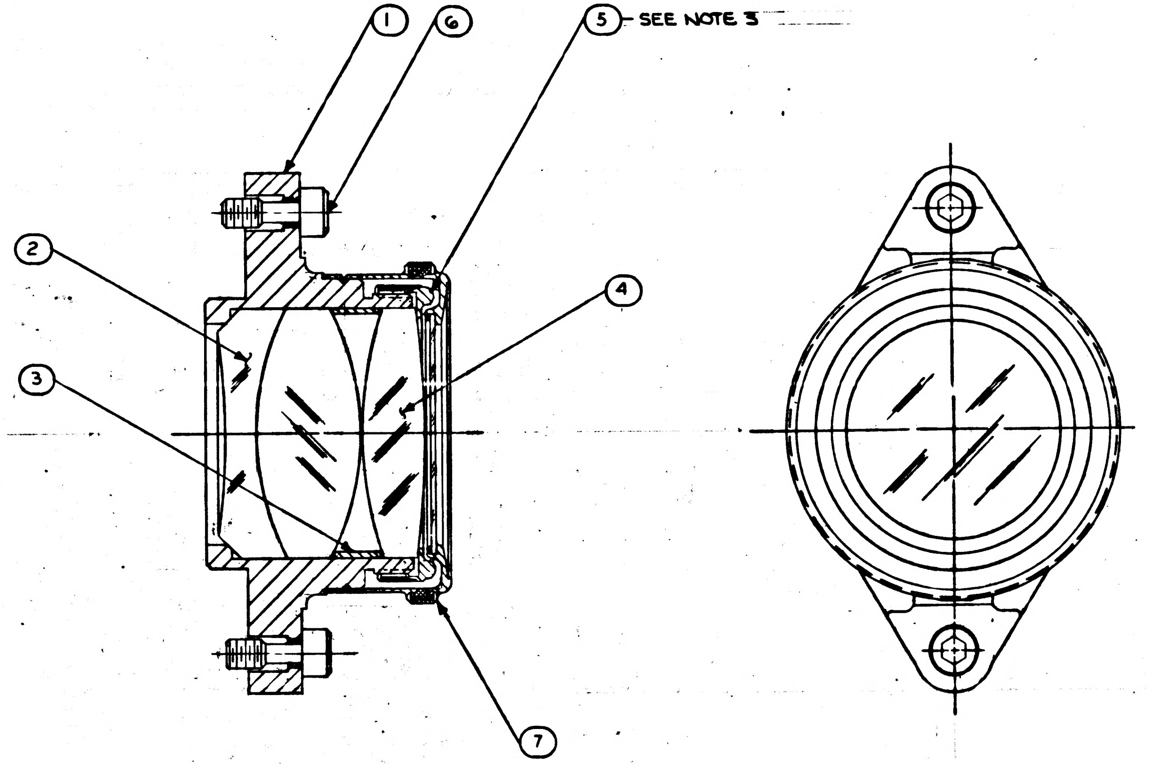
CODE IDENT NO.
SIZE E
NASA NUMBER 1011786
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

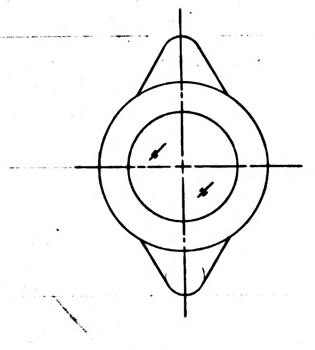
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

	1011787	ⓜ	REVISIONS TDRR 05

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. VIBRATION PROOF IN ACCORDANCE WITH MIL-S-22473 GRADE B.





ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
7	1		1011931	85386901010		RETAINER & FILTER, ASSY OF			
6	2		1011282	45386900140		SCREW, CAPTIVE HEX SOCKET HEAD			
5	1		1011927	57386901530		RING, LOCKING			
4	1		1011922	28386900790		LENS, POSITIVE (SXT ½X)			
3	1		1011929	57386901570		SPACER, LENS			
2	1		1011921	76386900300		LENS, ASSY OF (SXT ½X)			
1	1		1011926	52386900980		HOUSING, LONG EYE RELIEF EYEPIECE (SXT)			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386901020
DRAWN E. DRUPALA DATE 8-19-63
CHECKED 9-3-63
APPROVAL 10/18/63
APPROVAL 12-3-63
NASA APPROVAL
MIT APPROVAL 12/10/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LONG EYE RELIEF
EYEPIECE ASSEMBLY (SXT)

CODE IDENT NO.
SIZE D
NASA NUMBER 1011787
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011787

E-186

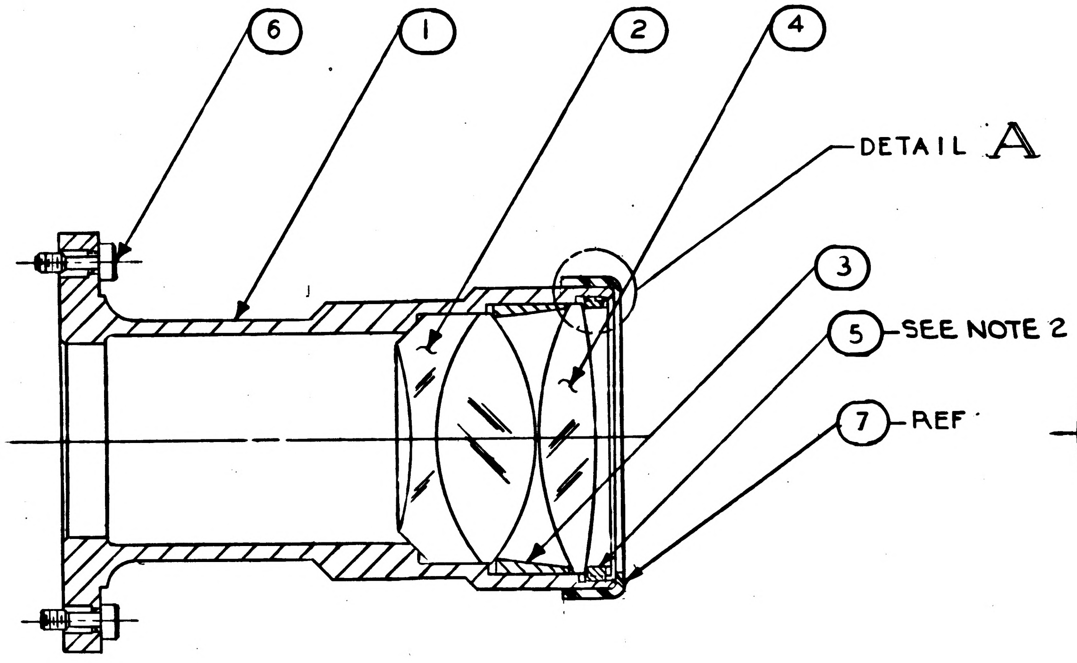
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

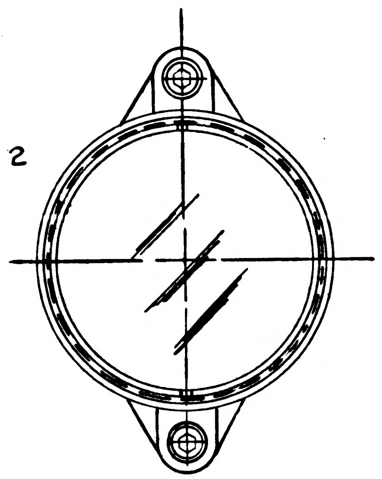
1011788

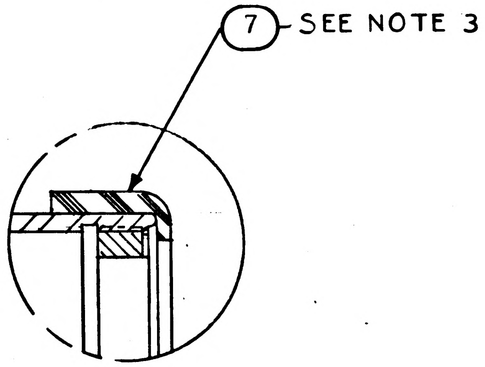
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REVISIONS TORR 0523?

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. VIBRATION PROOF IN ACCORDANCE WITH MIL-3-22473 GRADE H.
3. CEMENT IN PLACE ALL AROUND IN ACCORDANCE WITH MIL-A-1154







DETAIL A
SCALE 2/1

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
7	1		1011974	26386900060		RUBBER, GUARD			
6	2		1011282	4586900140		SCREW, CAPTIVE HEX SOCKET HEAD			
5	1		1011916	57386901540		RING, LOCKING			
4	1		1011824	28386900630		LENS, POSITIVE (TELESCOPE 1/2X)			
3	1		1011917	57386901550		SPACER, LENS			
2	1		1011730	76386900240		LENS, ASSY OF (TELESCOPE 1/2X)			
1	1		1011915	52386900970		HOUSING, LONG EYE RELIEF EYEPIECE, SCT			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± —	± —

DO NOT SCALE THIS DRAWING

MATERIAL ————

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386901030

DRAWN E.DRAPALA DATE 8-16-63
CHECKED J. J. Schilling 9-3-63
APPROVAL G. Rankin 10/14/63
APPROVAL E. Thorup 12/12/63
NASA APPROVAL [illegible] 12/16/[illegible]
MIT APPROVAL [illegible] 12/17/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LONG EYE RELIEF
EYEPIECE ASSEMBLY (SCT)

CODE IDENT NO. | SIZE C | NASA NUMBER 1011788

SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

MASTER

E-154

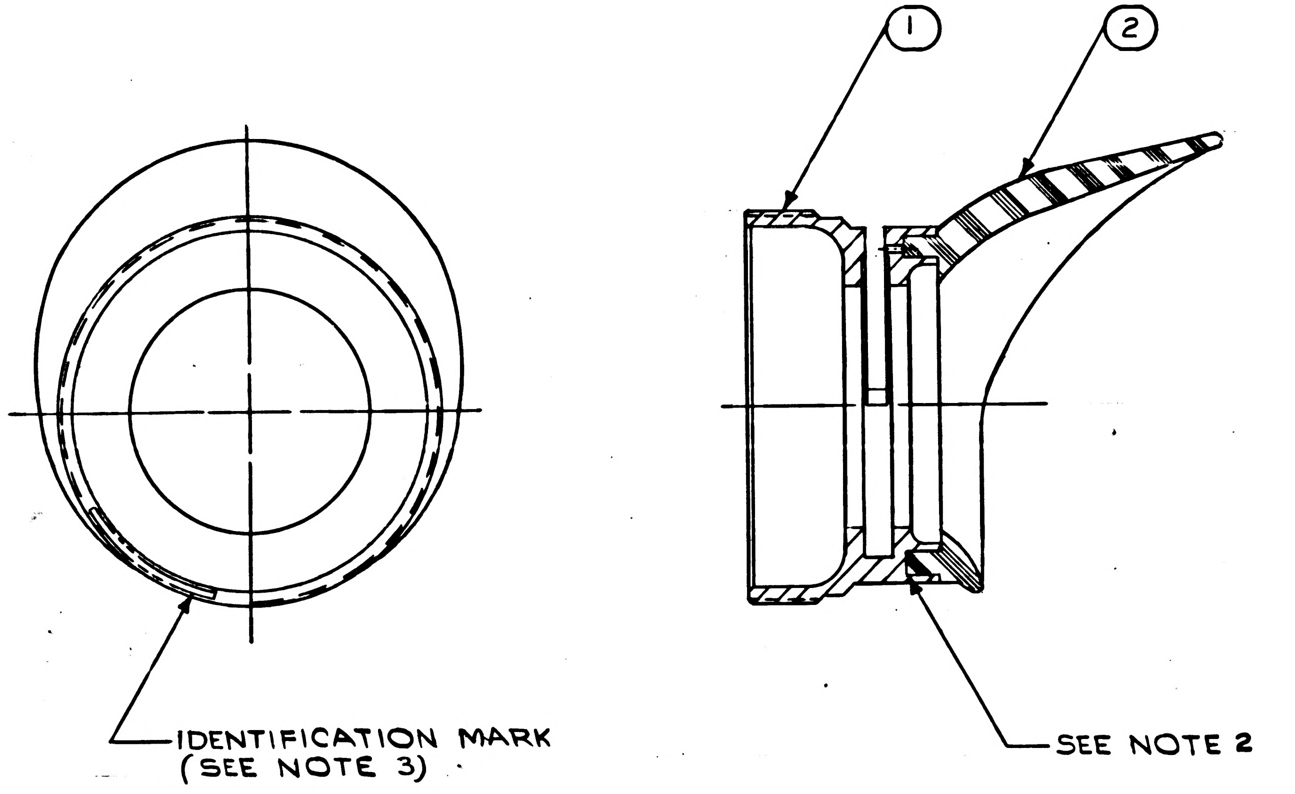
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011789

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REVISIONS TDRR 01565

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. CEMENT IN PLACE ALL AROUND IN ACCORDANCE WITH MIL-A-1154.
3. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND1002019.



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	1		1011879	26386900050		EYEGUARD			
1	1		1011872	57386901490		HOLDER, SEXTANT EYEGUARD & FILTER			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011786	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ —— −	+ —— −	+ —— −

DO NOT SCALE THIS DRAWING

MATERIAL ——

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900560

DRAWN E. DRAPALA DATE 6-3-63
CHECKED W. Farwell
APPROVAL Thornton Stearns 6-11-63
APPROVAL P Bonnett TL 6-11-63
NASA APPROVAL Jack Barnard
MIT APPROVAL Perry K Bryant

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SXT EYEGUARD
ASSEMBLY

CODE IDENT NO.
SIZE C
NASA NUMBER 1011789
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011789

MASTER

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

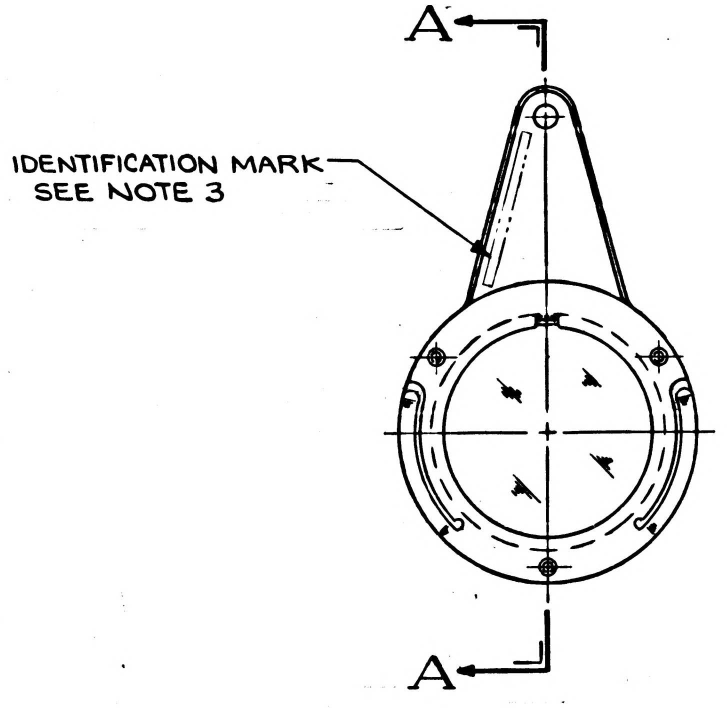
06L1101

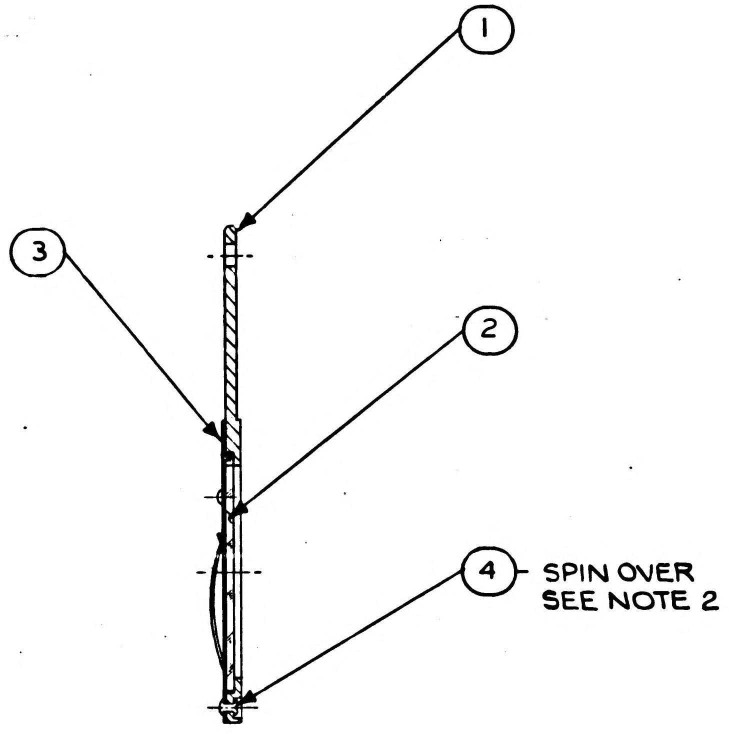
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REVISIONS TD RR 01565

NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. SELECT RIVETS, (ITEM ④) WHICH MEASURE IN LENGTH $1/16 {}^{+1/64}_{-0}$
3. IDENTIFY USING NASA DWG NO. REVISION LETTER, AND MANUFACTURES SYMBOL IN ACCORDANCE WITH ND1002019.





SECTION A-A

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
4	3		1011771			RIVET, MINIATURE			
3	1		1011870	56386900480		SPRING, POLAROID FILTER			
2	1		1011878	25386900070		POLARIZATION FILTER			
1	1		1011871	52386900930		HOLDER, FILTER			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011786	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900550
DRAWN J. Dellia DATE 6-3-63
CHECKED M Faurell
APPROVAL Thornton Hearns 6-11-63
APPROVAL P Bondick 6-1-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
POLAROID FILTER & SPRING,
ASSY OF

CODE IDENT NO.
SIZE C
NASA NUMBER 1011790
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

1011790

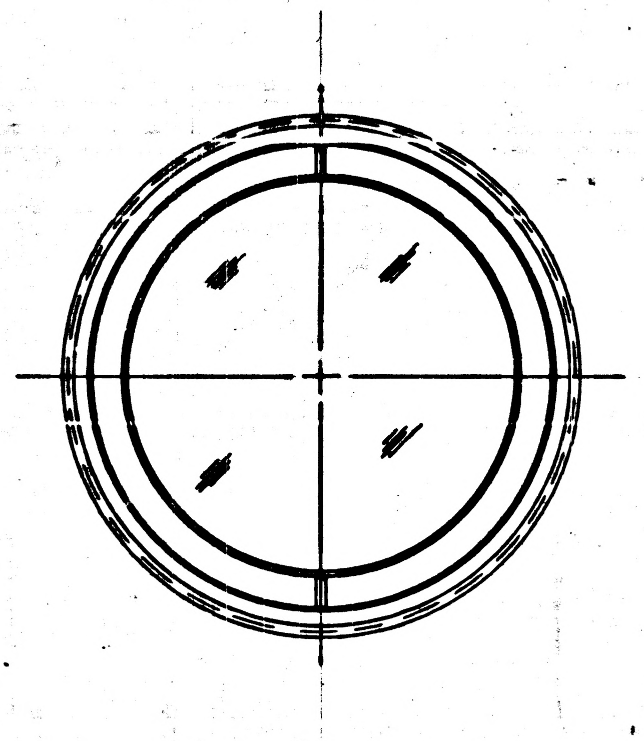
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

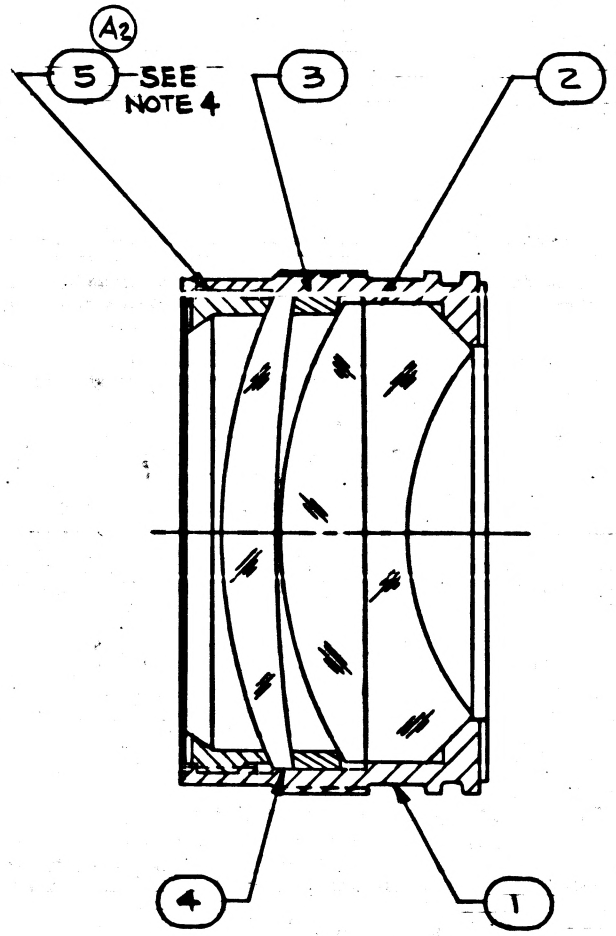
1011792 A

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLE PER ATP 1011792.
3. IDENTIFY USING NASA DWG. NO, REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019.
4. APPLY TO 1/3 CIRC OF THE LAST THREAD TO ENTER THREADED HOLE, SEALING COMPOUND (A1) PER MIL-S-22473 GRADE HV.

REVISIONS TDRR 02624 (A1)

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A_2		REVISED PER TDRR NO.08604	[illegible]	





ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
5	1		1011677	57386901210		RING, LOCKING			
4	1		1011172	28386900330		LENS, POSITIVE (TELESCOPE RELAY)			
3	1		1011676	57386901200		SPACER, LENS			
2	1		1011175	76386900130		LENS, ASSY OF			
1	1		1011678	57386901220		HOUSING, LENS			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011724	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	±	±	±

DO NOT SCALE THIS DRAWING

MATERIAL

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900590

DRAWN R. BRUNELLE DATE 6-6-63
CHECKED Paul Pappachristou
APPROVAL E. Kusselmann 8-15-63
APPROVAL J. P. Swiacz 8-15-63
NASA APPROVAL W J [illegible] 8-16-63
MIT APPROVAL [illegible]

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING & LENS,
ASSEMBLY OF

CODE IDENT NO.
SIZE C
NASA NUMBER 1011792
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011792A

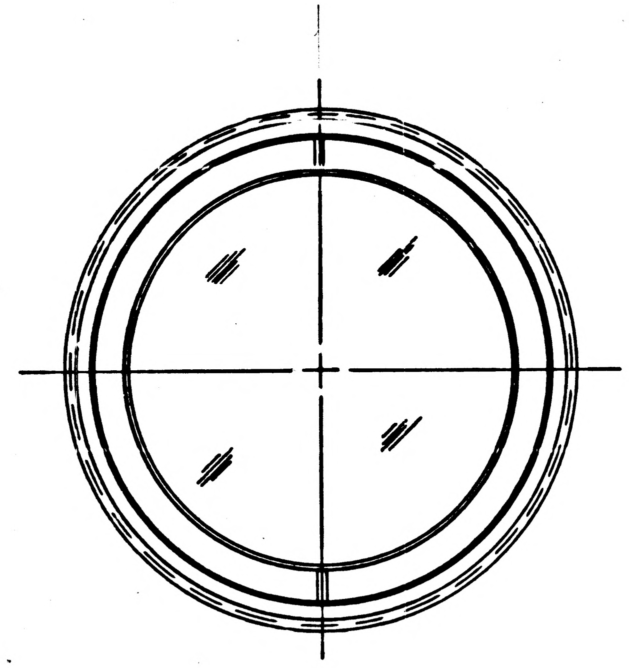
E-184

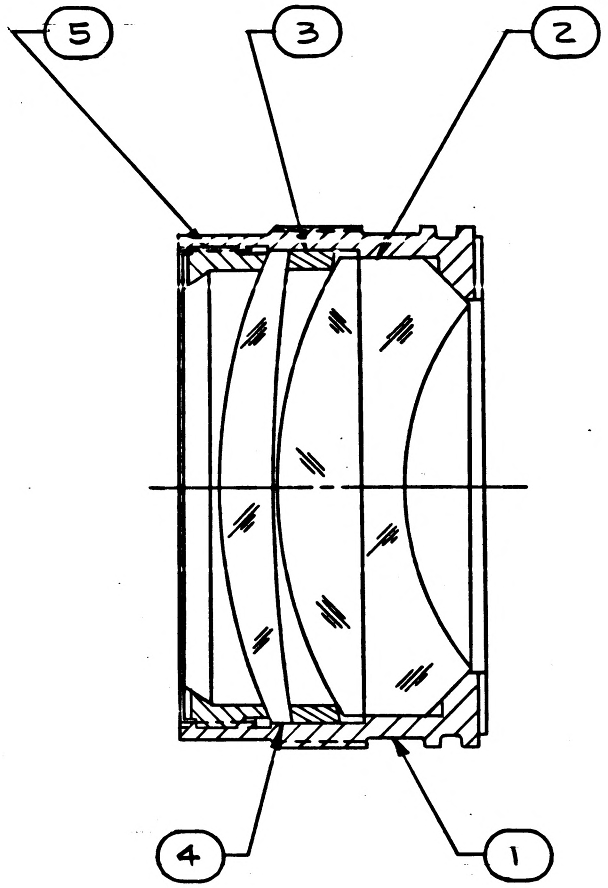
1011792

REVISIONS TDRR 02624

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. ASSEMBLE PER ATP 1011792
3. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019





ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
5	1		1011677	57386901210		RING, LOCKING			
4	1		1011172	28386900330		LENS, POSITIVE (TELESCOPE RELAY)			
3	1		1011676	57386901200		SPACER, LENS			
2	1		1011175	76386900130		LENS, ASSY OF			
1	1		1011678	57386901220		HOUSING, LENS			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011724	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900590
DRAWN R. BRUNELLE DATE 6-6-63
CHECKED Paul Pappachristou
APPROVAL G. Kuselmann 8-15-63
APPROVAL J. Siraco 8-15-63
NASA APPROVAL W. J. 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING & LENS, ASSEMBLY OF

CODE IDENT NO.
SIZE C
NASA NUMBER 1011792
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

E-154

SCT

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

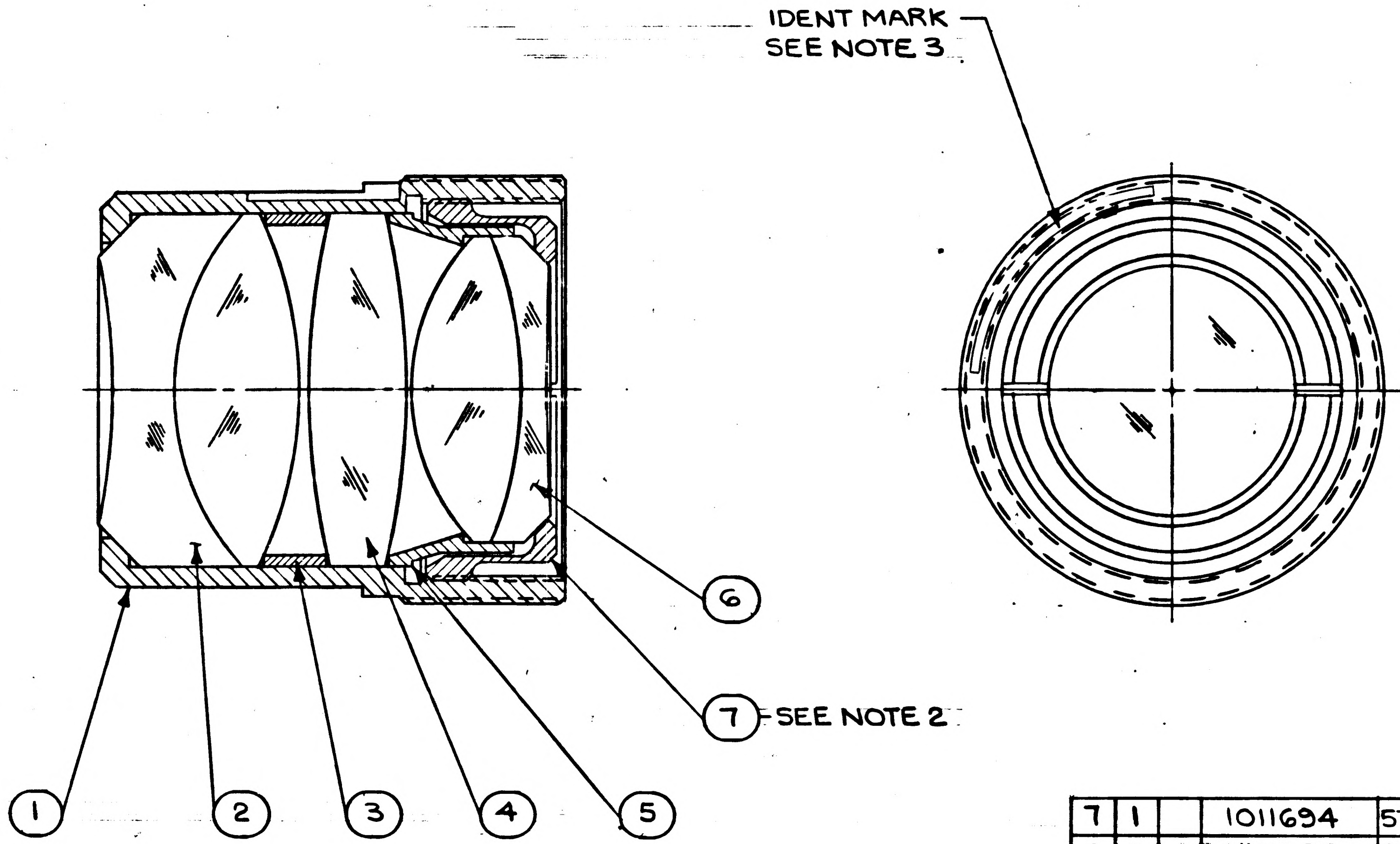
1011792

1011793 A

REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A1		REVISED PER TDRR NO. 02956	9/4/63	

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. VIBRATION PROOF ASSEMBLY IN ACCORDANCE WITH MIL-E-5400. (PAR 3.1.17e)
3. IDENTIFY USING NASA DRAWING NO. REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND1002019.



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
7	1		1011694	57386901270		RETAINER, RING, LOCKING			
6	1		1011783	76386900280		LENS, ASSY OF			
5	1		1011642	57386901090		SPACER, LENS			
4	1		1011860	28386900720		LENS, POSITIVE			
3	1		1011641	57386901080		SPACER, LENS			
2	1		1011782	76386900270		LENS, ASSY OF			
1	1		1011876	57386901500		HOUSING, SEXTANT EYEPIECE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011932	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL ~
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900810

DRAWN DATE 6-21-63
CHECKED Paul Pappachristo
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING & LENS,
ASSY OF (SXT EYEPIECE)

CODE IDENT NO. — SIZE C NASA NUMBER 1011793
SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

MASTER

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

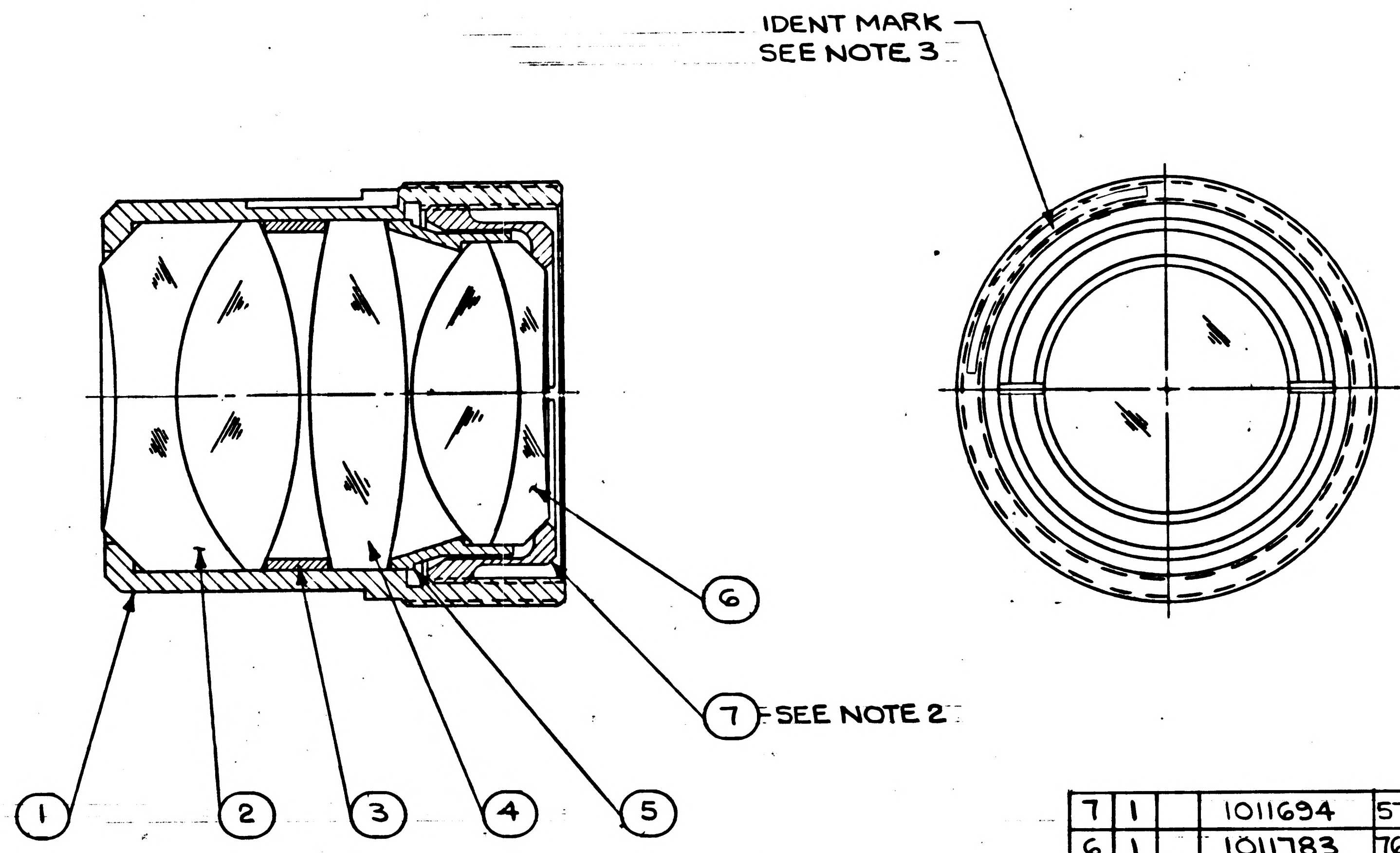
1011793 A

1011793

REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. VIBRATION PROOF ASSEMBLY IN ACCORDANCE WITH MIL-E-5400. (PAR 3.1.17e)
3. IDENTIFY USING NASA DRAWING NO. REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND1002019.



7	1		1011694	57386901270		RETAINER, RING, LOCKING			
6	1		1011783	76386900280		LENS, ASSY OF			
5	1		1011642	57386901090		SPACER, LENS			
4	1		1011860	28386900720		LENS, POSITIVE			
3	1		1011641	57386901080		SPACER, LENS			
2	1		1011782	76386900270		LENS, ASSY OF			
1	1		1011876	57386901500		HOUSING, SEXTANT EYEPIECE			
ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011786	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL ~
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900810
DRAWN J. Schiller DATE 6-21-63
CHECKED Paul Pappachristo
APPROVAL F. Ruschman 8-15-63
APPROVAL P. J. Siwac 8-15-63
NASA APPROVAL W. J. Kline 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
*HOUSING & LENS, ASSY OF (SXT EYEPIECE)

CODE IDENT NO. –
SIZE C
NASA NUMBER 1011793
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011793

K-154

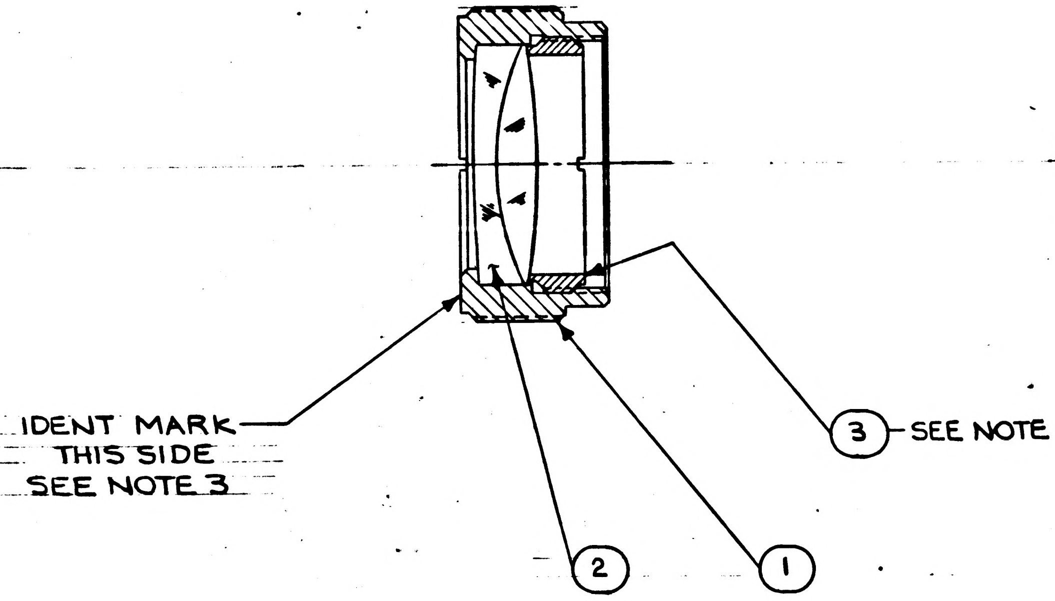
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

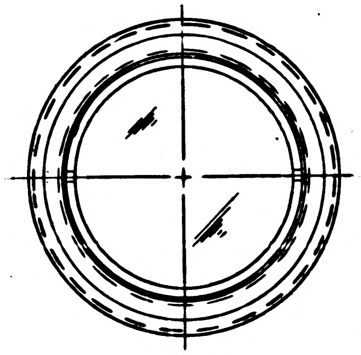
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REVISIONS 02623

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. VIBRATION PROOF ASSEMBLY IN ACCORDANCE WITH MIL-E-5400. (PAR 3.1.17e)
3. IDENTIFY USING NASA DRAWING NO. REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND1002019.





3	1		1011667	57386901170		RING, LOCKING			
2	1		1011780	76386900250		LENS, ASSY OF			
1	1		1011668	57386901180		HOLDER, LENS			
ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011786	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900800
DRAWN DATE 6-21-63
CHECKED
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL 16 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOLDER & LENS,
ASSY OF (SXT EYEPIECE)

CODE IDENT NO. SIZE C NASA NUMBER 1011794
SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

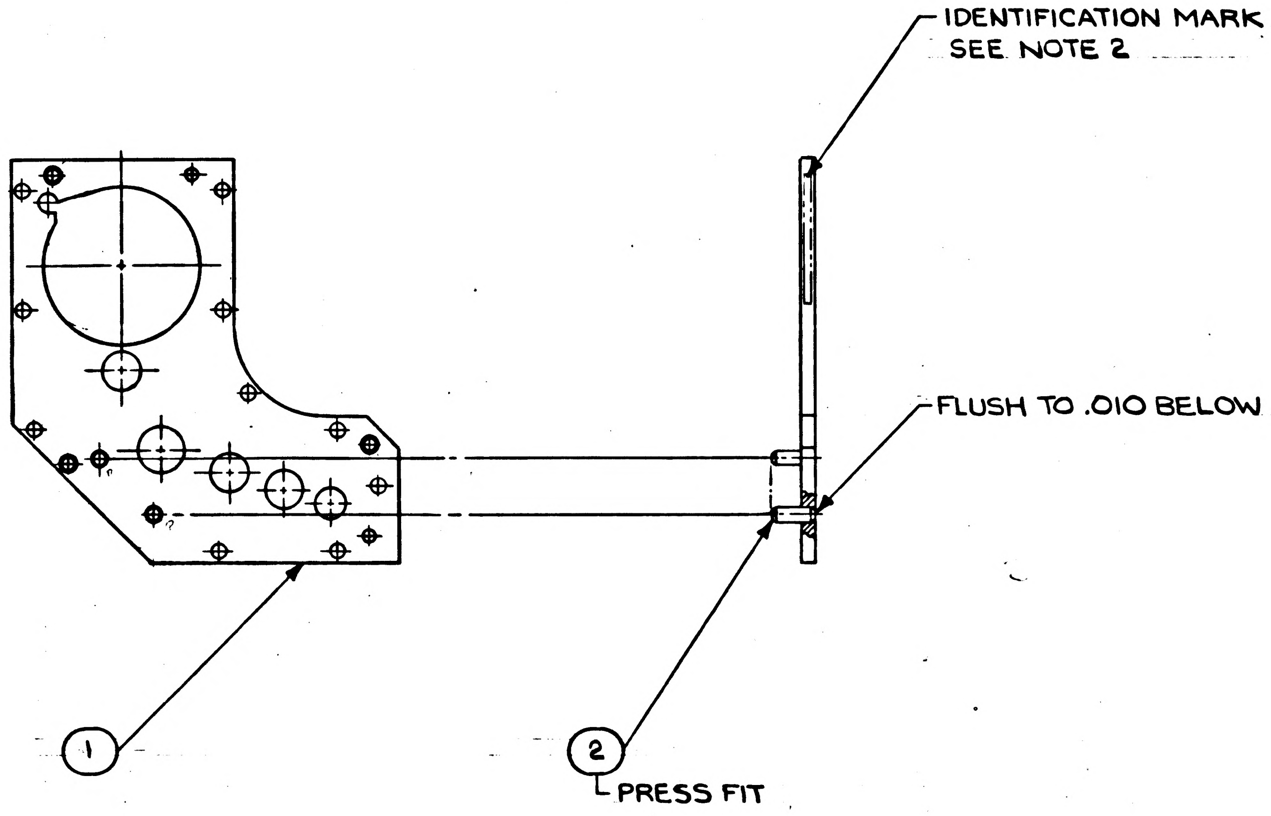
1011794

1011795

REVISIONS 02623

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA DWG NO. REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORD WITH ND 1002019.



1011795

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	2		AN122692			PIN, DOWEL			
1	1		1011600	52386900750		PLATE, BEARING			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011706	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900620
DRAWN F. Schiller DATE 6-7-63
CHECKED Paul Pappachristo
APPROVAL P. Ruedman 8-15-63
APPROVAL L.D. Siracco 8-15-63
NASA APPROVAL W.J. [illegible] 8-16-63
MIT APPROVAL W Kupfer [illegible]

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PLATE & PIN,
ASSY OF

CODE IDENT NO.
SIZE C
NASA NUMBER 1011795
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

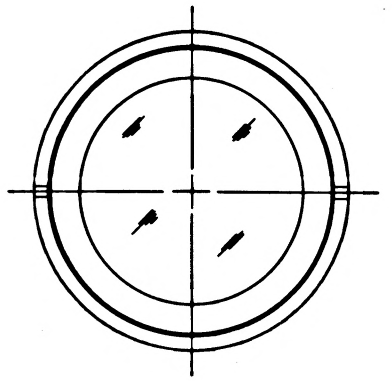
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2.
Ⓐ1
3. VIBRATION PROOF PER MIL-S-22473 GRADE H ITEM NO.'S 3&5 Ⓐ2
4. IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND1002019

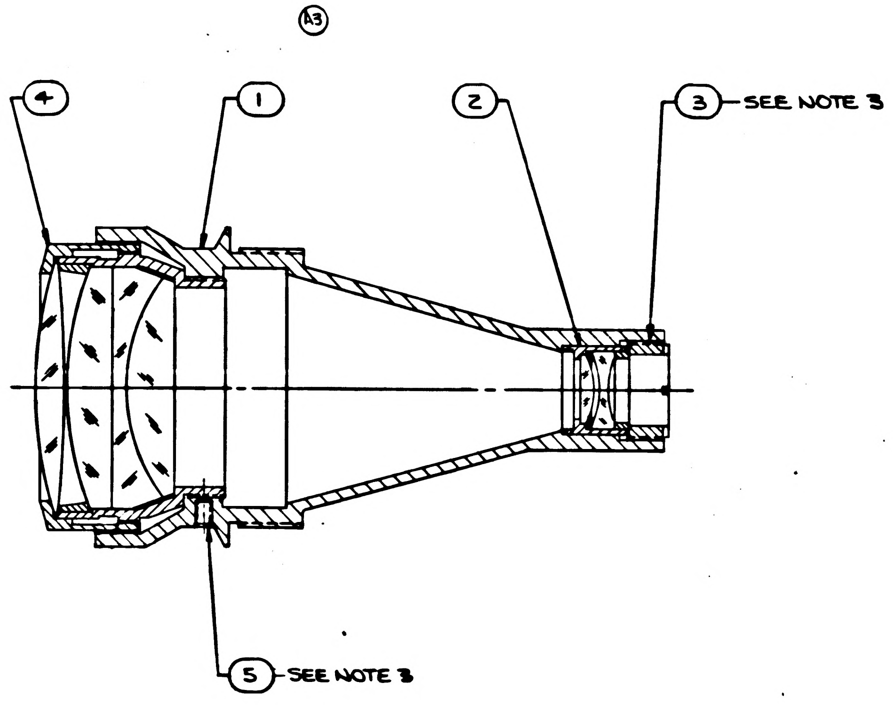
A	1011796

REVISIONS 02623

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO. 07527	4-7-64	



Ⓐ3



1011796 A

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
5	1	*	1011773-2			SETSCREW, FLAT (NYLON) POINT, HEX. SOCK			
4	1	*	1011585	74471371001		OBJECTIVE LENS ASSY			
3	1		1011303	57386900690		RING, LOCKING			
2	1	*	1011591	74471374001		INTERMEDIATE LENS ASSY			
1	1		1011302	57386900680		HOLDER, LENS			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM :- SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

NEXT ASSY	USED ON
1011704	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ −	+ −	+ −

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900630

DRAWN R. BRUNELLE DATE 6-10-63
CHECKED
APPROVAL 8-16-63
APPROVAL 8-16-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LENS HOLDER ASSY,
SEXTANT TELESCOPE

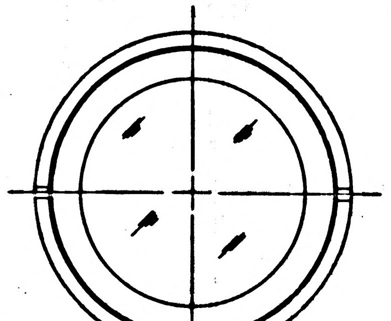
CODE IDENT NO. | SIZE D | NASA NUMBER 1011796
SCALE 2/1 | WEIGHT | CALC ACTUAL | SHEET 1 OF 1

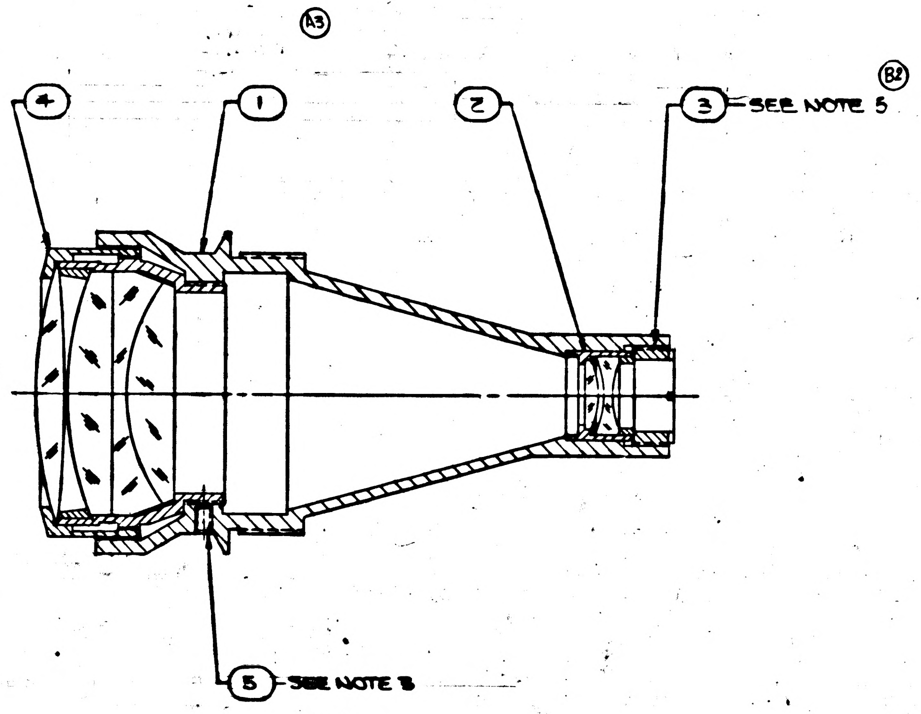
NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327 Ⓑ1
2. Ⓐ1
3. VIBRATION PROOF ITEM 5 PER MIL-S-22473 GRADE E. Ⓐ2
4. IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND1002019
5. APPLY TO LAST ½ CIRC OF THE LAST THREAD TO ENTER THREADED HOLE SEALING COMPOUND PER MIL-S-22473 GRADE HV.

B | 1011796

REVISIONS 02623

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO. 07527	4-7-64	JWB
B2		REVISED PER TDRR NO. 08602	5/13/64	JWB





1011796 B

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
5	1	*	1011773-2			SETSCREW, FLAT (NYLON) POINT, HEX. SOCK			
4	1	*	1011585	74471371001		OBJECTIVE LENS ASSY			
3	1		1011303	57386900690		RING, LOCKING			
2	1	*	1011591	74471374001		INTERMEDIATE LENS ASSY			
1	1		1011302	57386900680		HOLDER, LENS			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM :- SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

NEXT ASSY	USED ON
1011704	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900630
DRAWN R. BRUNELLE DATE 6-10-63
CHECKED
APPROVAL 8-16-63
APPROVAL 8-16-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LENS HOLDER ASSY.
SEXTANT TELESCOPE

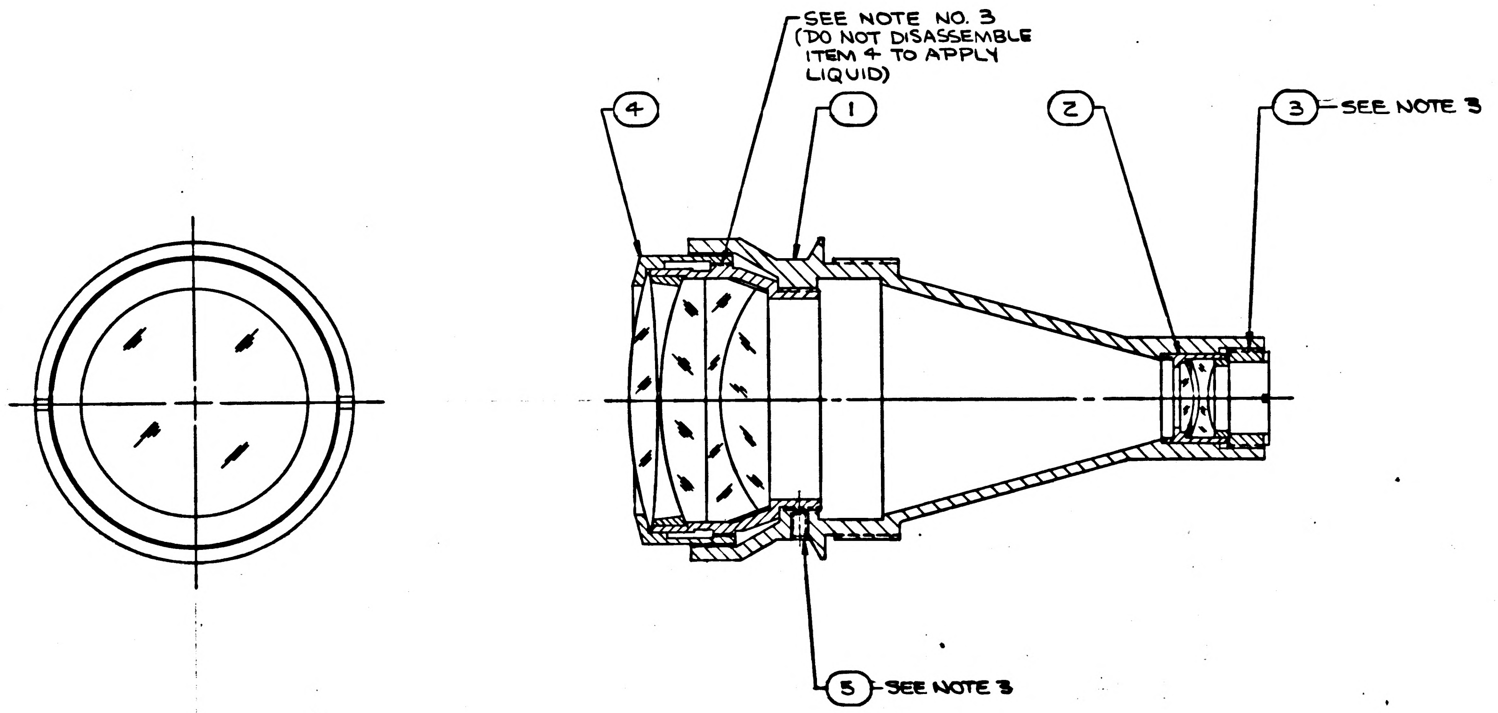
CODE IDENT NO. | SIZE D | NASA NUMBER 1011796
SCALE 2/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

96L1101

REVISIONS 026~3

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. SPOT DRILL ITEM NO. 4 AS SHOWN TO ACCOMMODATE ITEM NO. 6 (CONE POINT SET SCREW)
3. VIBRATION PROOF PER MIL-E-5400 (PAR 3.1.17e) ITEM NO.'S 3, 5, & 4
4. IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
5	1	*	1011773-2			SETSCREW, FLAT (NYLON) POINT, HEX. SOCK			
4	1	*	1011585	74471371001		OBJECTIVE LENS ASSY			
3	1		1011303	57386900690		RING, LOCKING			
2	1	*	1011591	74471374001		INTERMEDIATE LENS ASSY			
1	1		1011302	57386900680		HOLDER, LENS			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM :- SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

NEXT ASSY	USED ON
1011704	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ −	+ −	+ −

DO NOT SCALE THIS DRAWING

MATERIAL

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900630

DRAWN R.BRUNELLE DATE 6-10-63
CHECKED
APPROVAL 8-16-63
APPROVAL 8-16-63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LENS HOLDER ASSY,
SEXTANT TELESCOPE

CODE IDENT NO.
SIZE D
NASA NUMBER 1011796

SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

1011796

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

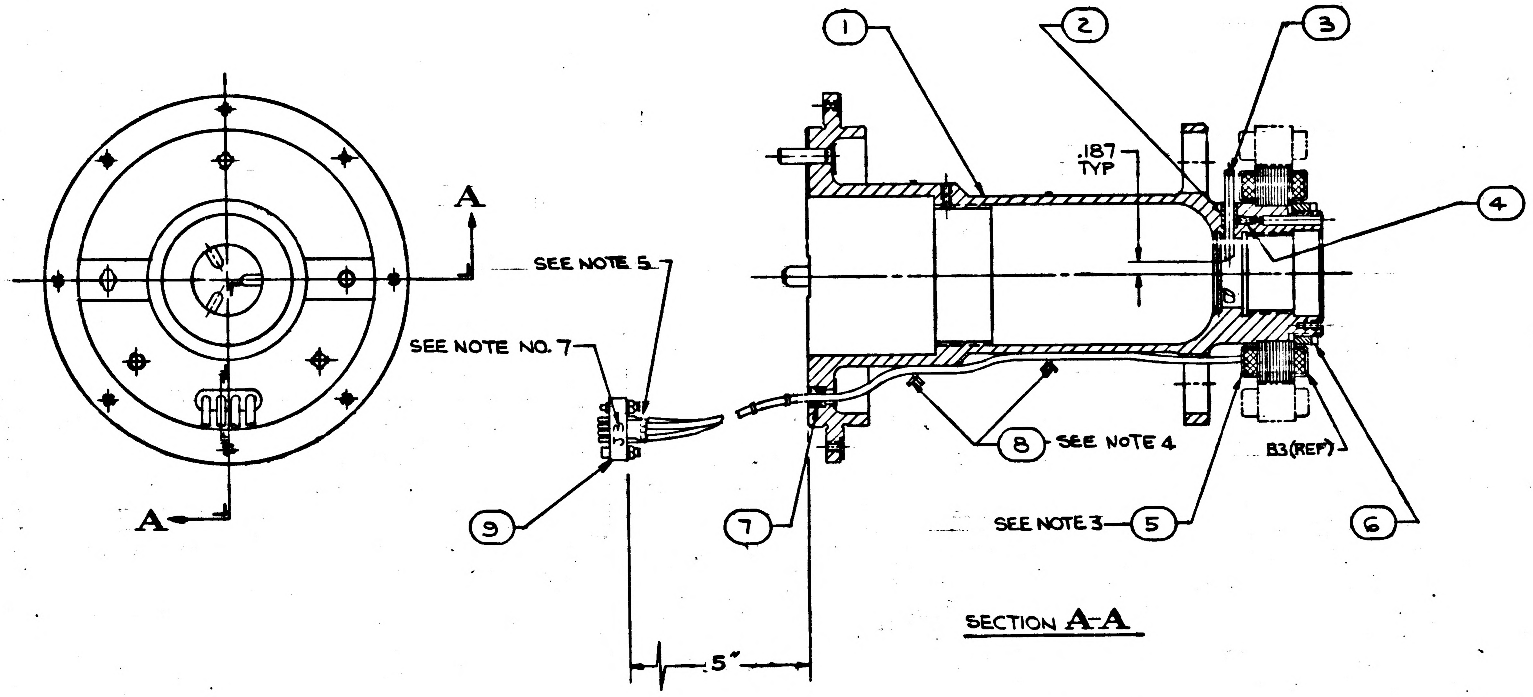
NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. SEE WIRING SCHEMATIC 1015122. (REF.)
3. ITEM NO. 5 (RESOLVER) ROTOR & STATOR, TO BE KEPT AS A MATCHED PAIR, REFER TO DRAWING NO. 1011906 FOR STATOR ASSEMBLY
4. LACE WIRES IN ACCORDANCE WITH ND1002032 USING 1011753 (ITEM 8) THEN TIE TO ITEM 1.
5. SOLDER WIRES TO CONNECTOR IN ACCORDANCE WITH MSFC-PROC-158 PROTECTING ASSEMBLY PER KES-15 W.1C (3.1).
6. TWISTED CONDUCTORS TO CONSIST OF FOUR (4) FULL TURNS PER INCH MINIMUM.
7. MARK CHARACTERS 1/8 HIGH IN APPROX LOCATION SHOWN PER ND1002019

1011797 A

REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR NO. 03363	9/25/63	9/26

WIRING LEGEND

COND NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTES
B1	RED (S1)		B3-RED	J3-A	8
B2	BLACK (S3)		B3-BLACK	J3-B	
B3	BLUE (S4)		B3-BLUE	J3-C	8
B4	YELLOW (S2)		B3-YELLOW	J3-D	



SECTION A-A

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
9	1	*	1011741	68502017001		CONNECTOR, ELECTRICAL (J3)			
8	AR	*	1011753	60035142001		TAPE, LACING & TYING			
7	1		1011632	25386900010		INSERT, CONDUIT, RESOLVER WIRE			
6	1		1011311	57386900730		NUT, LOCKING, ROTOR			
5	1	*	1000160			RESOLVER, 16 SPEED TRANSMITTER (ROTOR)			
4	3	NAS	1081C02A3L			SCREW, SELF LOCKING, SET			
3	3		1011584	25386900060		ROD, ILLUMINATING			
2	3		1011633	57386901050		SLEEVE, SPLIT, ILLUMINATING ROD			
1	1		1011893	85386900750		TELESCOPE TUBE ASSY OF			

(SEE NOTE 3)

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011704	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/8; DECIMALS ± .005; ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900650

DRAWN R. BRUNELLE DATE 6-12-63
CHECKED Paul Pappachristos
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-?-63
MIT APPROVAL W. Kupfer 16 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
TELESCOPE TUBE ASSY

CODE IDENT NO.
SIZE D
NASA NUMBER 1011797
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET OF

MASTER

* PURCHASE ITEM :- SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

B 1011797

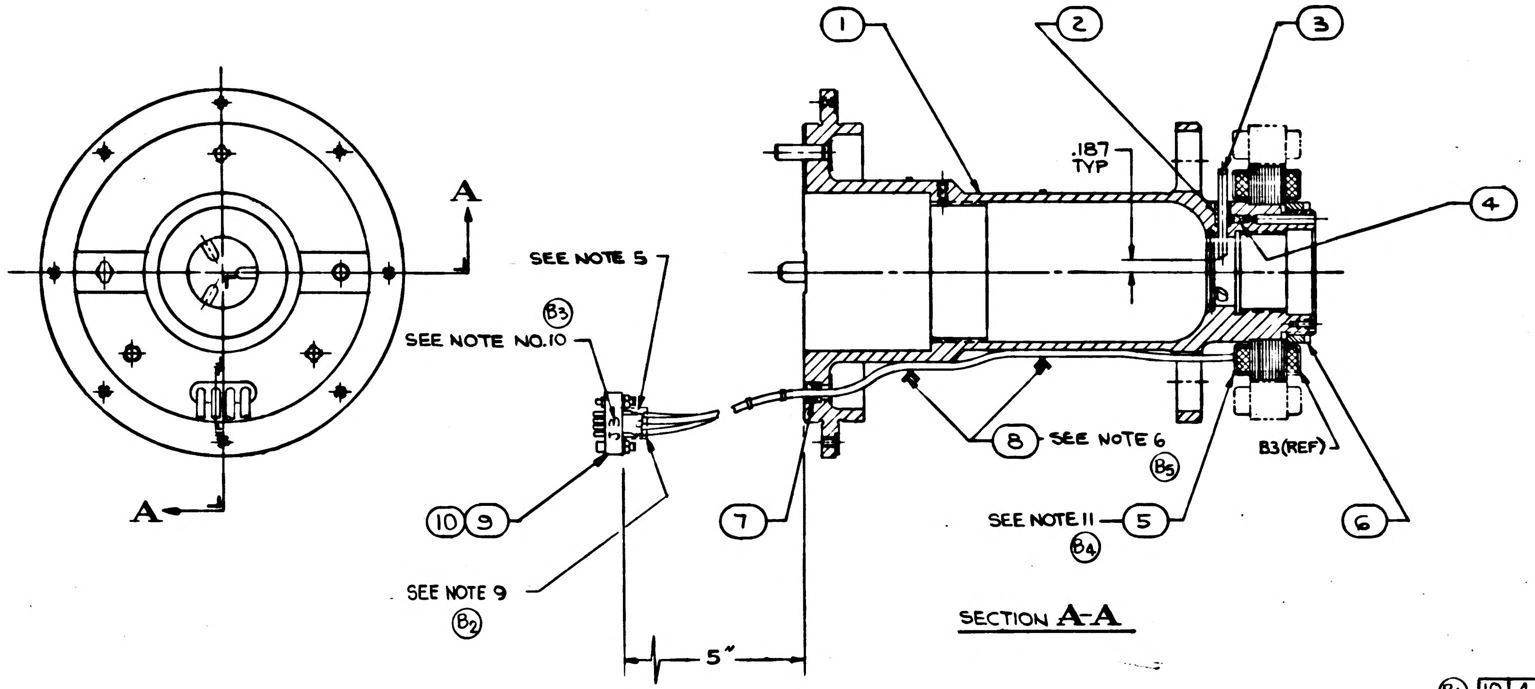
NOTES:
1-INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2-REFER TO WIRING SCHEMATIC, NASA DRAWING NO. 1015122.
3-TWIST CONDUCTORS IN ACCORDANCE WITH ND-1002032.
4-SLIDE ITEM 10 OVER WIRES BEYOND STRIPPED ENDS.
5-SOLDER CONDUCTORS, PER WIRING LEGEND, WITH Sn60WRP2 PER QQ-S-571, PER MSFC-PROC-158.
6-LACE CONDUCTORS, USING ITEM 8, IN ACCORDANCE WITH ND-1002032, THEN TIE TO ITEM 1. (B1)
7-PERFORM CONTINUITY CHECK.
8-SLIDE ITEM 10 OVER SOLDERED JOINTS AND SHRINK.
9-POT IN ACCORDANCE WITH ND-1002009, METHOD C.
A-POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
B-POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
10-MARK REF. DESIGNATIONS 1/8 INCH HIGH IN ACCORDANCE WITH ND-1002019.
11-ITEM NO. 5 (RESOLVER) ROTOR & STATOR TO BE KEPT AS A MATCHED PAIR. REFER TO DWG NO. 1011906 FOR STATOR ASSEMBLY.

WIRING LEGEND (B8)

COND NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 3
B1	RED (S1)		B3-RED	J3-A	8
B2	BLACK (S3)		B3-BLACK	J3-B	
B3	BLUE (S4)		B3-BLUE	J3-C	8
B4	YELLOW (S2)		B3-YELLOW	J3-D	

REVISIONS 02623

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR NO. 03363	9/25/63	7/26
B8		REVISED PER TDRR NO. 07517	4-7-64	



SECTION A-A

	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
(B6)	10	4	*	1010490-060			INSULATION SLEEVING, HEAT SHRINKABLE			
	9	1	*	1011741	68502017001		CONNECTOR, ELECTRICAL (J3)			
	8	AR	*	1011753	60035142001		TAPE, LACING & TYING			
(B7)	7	1		1011632	25386900010		INSERT, CONDUIT, RESOLVER WIRE			
	6	1		1011311	57386900730		NUT, LOCKING, ROTOR			
(SEE NOTE 11)	5	1	*	1000160			RESOLVER, 16 SPEED TRANSMITTER (ROTOR)			
	4	3	NAS	1081C02A3L			SCREW, SELF LOCKING, SET			
	3	3		1011584	25386900060		ROD, ILLUMINATING			
	2	3		1011633	57386901050		SLEEVE, SPLIT, ILLUMINATING ROD			
	1	1		1011893	85386900750		TELESCOPE TUBE ASSY OF			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM :- SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

NEXT ASSY	USED ON
1011704	211000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/8; DECIMALS ± .005; ANGLES ± –
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900650

DRAWN R. BRUNELLE DATE 6-12-63
CHECKED Paul Pappachristo
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-14-63
MIT APPROVAL 16 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
TELESCOPE TUBE ASSY

CODE IDENT NO.
SIZE D
NASA NUMBER 1011797
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011797 B

C 1011797

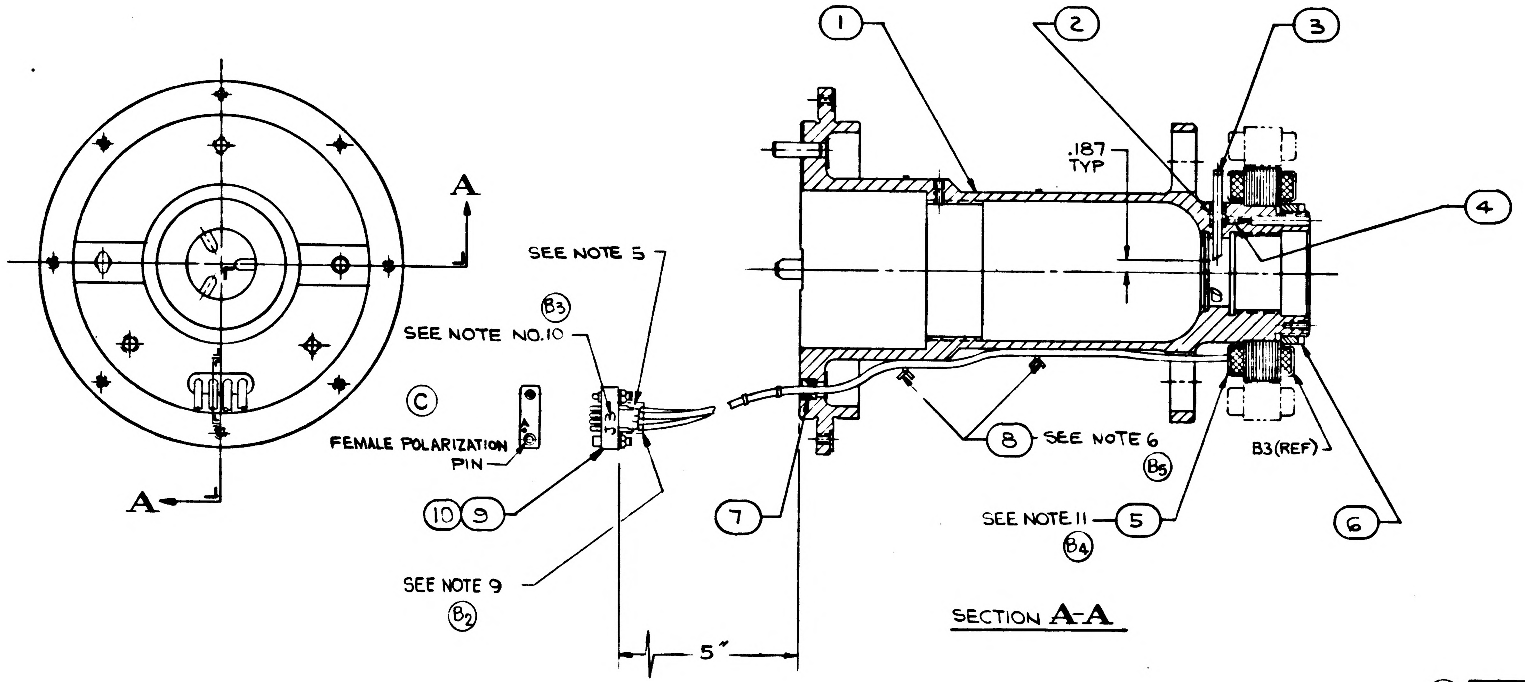
NOTES:
-INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2-REFER TO WIRING SCHEMATIC, NASA DRAWING NO. 1015122.
3-TWIST CONDUCTORS IN ACCORDANCE WITH ND-1002032.
4-SLIDE ITEM 10 OVER WIRES BEYOND STRIPPED ENDS.
5-SOLDER CONDUCTORS, PER WIRING LEGEND, WITH Sn60WRP2 PER QQ-S-571, PER MSFC-PROC-158.
6-LACE CONDUCTORS, USING ITEM 8, IN ACCORDANCE WITH ND-1002032, THEN TIE TO ITEM 1. (B1)
7-PERFORM CONTINUITY CHECK.
8-SLIDE ITEM 10 OVER SOLDERED JOINTS AND SHRINK.
9-POT IN ACCORDANCE WITH ND-1002009, METHOD C.
  A-POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
  B-POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
10-MARK REF. DESIGNATIONS 1/8 INCH HIGH IN ACCORDANCE WITH ND-1002019.
11-ITEM NO. 5 (RESOLVER) ROTOR & STATOR TO BE KEPT AS A MATCHED PAIR. REFER TO DWG NO. 1011906 FOR STATOR ASSEMBLY.

WIRING LEGEND (B8)

COND NO.	COLOR	ITEM NO	FROM	TO	SEE NOTE 3
B1	RED (S1)		B3-RED	J3-A	8
B2	BLACK (S3)		B3-BLACK	J3-B	
B3	BLUE (S4)		B3-BLUE	J3-C	8
B4	YELLOW (S2)		B3-YELLOW	J3-D	

REVISIONS 0262

	SYM	ZONE	DESCRIPTION	DATE	APPROVAL
(A)	A		REVISED PER TDRR NO. 03363	9/25/63	
(B)	B_8		REVISED PER TDRR NO. 07517	4-7-64	
	C		REVISED PER TDRR NO. 12850	9/23/66	



SECTION A-A

	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
(B6)	10	4	*	1010490-060			INSULATION SLEEVING, HEAT SHRINKABLE			
	9	1	*	1011741	68502017001		CONNECTOR, ELECTRICAL (J3)			
	8	AR	*	1011753	60035142001		TAPE, LACING & TYING			
(B7)	7	1		1011632	25386900010		INSERT, CONDUIT, RESOLVER WIRE			
	6	1		1011311	57386900730		NUT, LOCKING, ROTOR			
(SEE NOTE 11)	5	1	*	1000160			RESOLVER, 16 SPEED TRANSMITTER (ROTOR)			
	4	3	NAS	1081C02A3L			SCREW, SELF LOCKING, SET			
	3	3		1011584	25386900060		ROD, ILLUMINATING			
	2	3		1011633	57386901050		SLEEVE, SPLIT, ILLUMINATING ROD			
	1	1		1011893	85386900750		TELESCOPE TUBE ASSY OF			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM :- SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

NEXT ASSY	USED ON
1011704	011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/8; DECIMALS ±.005; ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900650

DRAWN R. BRUNELLE DATE 6-12-63
CHECKED Paul Pappachristos
APPROVAL 8-5-63
APPROVAL 8-13-63
NASA APPROVAL W J 8-7-63
MIT APPROVAL W Ruffa 16 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
TELESCOPE TUBE ASSY

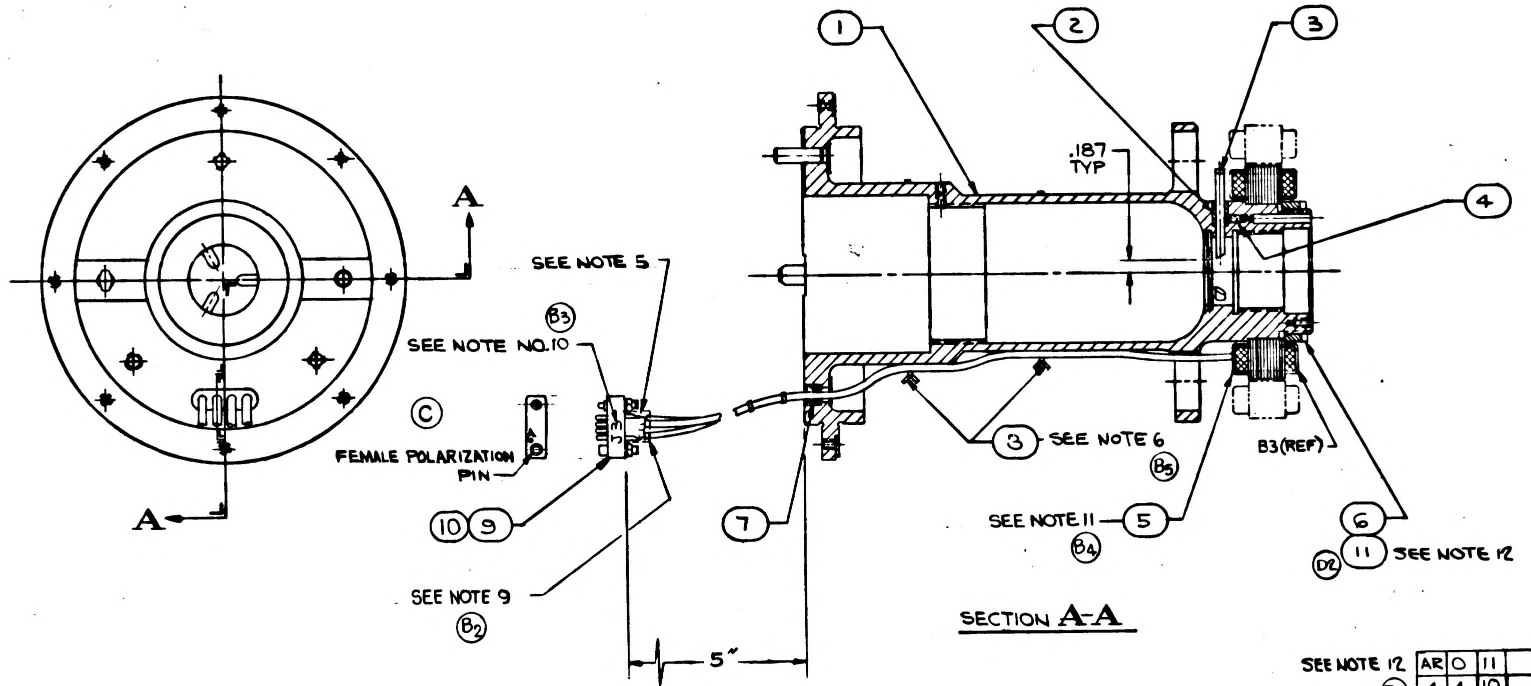
CODE IDENT NO.
SIZE D
NASA NUMBER 1011797
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011797 C

NOTES:
1-INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2-REFER TO WIRING SCHEMATIC, NASA DRAWING NO. 1015122.
3-TWIST CONDUCTORS IN ACCORDANCE WITH ND-1002032.
4-SLIDE ITEM 10 OVER WIRES BEYOND STRIPPED ENDS.
5 SOLDER CONDUCTORS, PER WIRING LEGEND, WITH Sn60WRP2 PER QQ-S-571, PER MSFC-PROC-158. (B1)
6 LACE CONDUCTORS, USING ITEM 8, IN ACCORDANCE WITH ND-1002032, THEN TIE TO ITEM 1.
7-PERFORM CONTINUITY CHECK.
8-SLIDE ITEM 10 OVER SOLDERED JOINTS AND SHRINK.
9-POT IN ACCORDANCE WITH ND-1002009, METHOD C.
A-POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
B-POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
10-MARK REF. DESIGNATIONS 1/8 INCH HIGH IN ACCORDANCE WITH ND-1002019.
11-ITEM NO. 5 (RESOLVER) ROTOR & STATOR TO BE KEPT AS A MATCHED PAIR. REFER TO DWG NO. 1011906 FOR STATOR ASSEMBLY.
12-APPLY SEALING COMPOUND GRADE "HV" OF MIL-S-22473 TO 1/2 OF THE LAST THREAD TO ENTER ITEM 1 PER ND1002211 (DOES NOT APPLY TO 1011797-000) (D1)

WIRING LEGEND					
COND NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 3 (B8)
B1	RED (S1)		B3-RED	J3-A	8
B2	BLACK (S3)		B3-BLACK	J3-B	
B3	BLUE (S4)		B3-BLUE	J3-C	8
B4	YELLOW (S2)		B3-YELLOW	J3-D	

REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR NO. 03363	9/25/63	9/26
B8		REVISED PER TDRR NO. 07517	6-7-64	
C		REVISED PER TDRR NO. 12850	9/23/64	
D3		REVISED PER TDRR NO. 15422	4/7/65	



QTY REQ 001	QTY REQ 000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
AR	0	11						SEALING COMPOUND, RETAINING COMP. ANAEROBIC			
4	4	10		*	1010490-060			INSULATION SLEEVING, HEAT SHRINKABLE			
1	1	9		*	1011741	68502017001		CONNECTOR, ELECTRICAL (J3)			
AR	AR	8		*	1011753	60035142001		TAPE, LACING & TYING			
1	1	7			1011632	25386900010		INSERT, CONDUIT, RESOLVER WIRE			
1	1	6			1011311	57386900730		NUT, LOCKING, ROTOR			
1	1	5		*	1000160			RESOLVER, 16 SPEED TRANSMITTER (ROTOR)			
3	3	4		NAS	1081C02A3L			SCREW, SELF LOCKING, SET			
3	3	3			1011584	25386900060		ROD, ILLUMINATING			
3	3	2			1011633	57386901050		SLEEVE, SPLIT, ILLUMINATING ROD			
1	1	1			1011893	85386900750		TELESCOPE TUBE ASSY OF			

SEE NOTE 12 (item 11); (B6) (item 10); (B7) (item 7); SEE NOTE 11 (item 5); (D3)

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM :- SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

NEXT ASSY	USED ON
1011704	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± 1/8 DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900650
DRAWN R. BRUNELLE DATE 6-12-63
CHECKED Paul Pappachristou
APPROVAL 8-15-63
APPROVAL 8-1-63
NASA APPROVAL W. J. 8-14-63
MIT APPROVAL W. Ruff 16 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
TELESCOPE TUBE ASSY

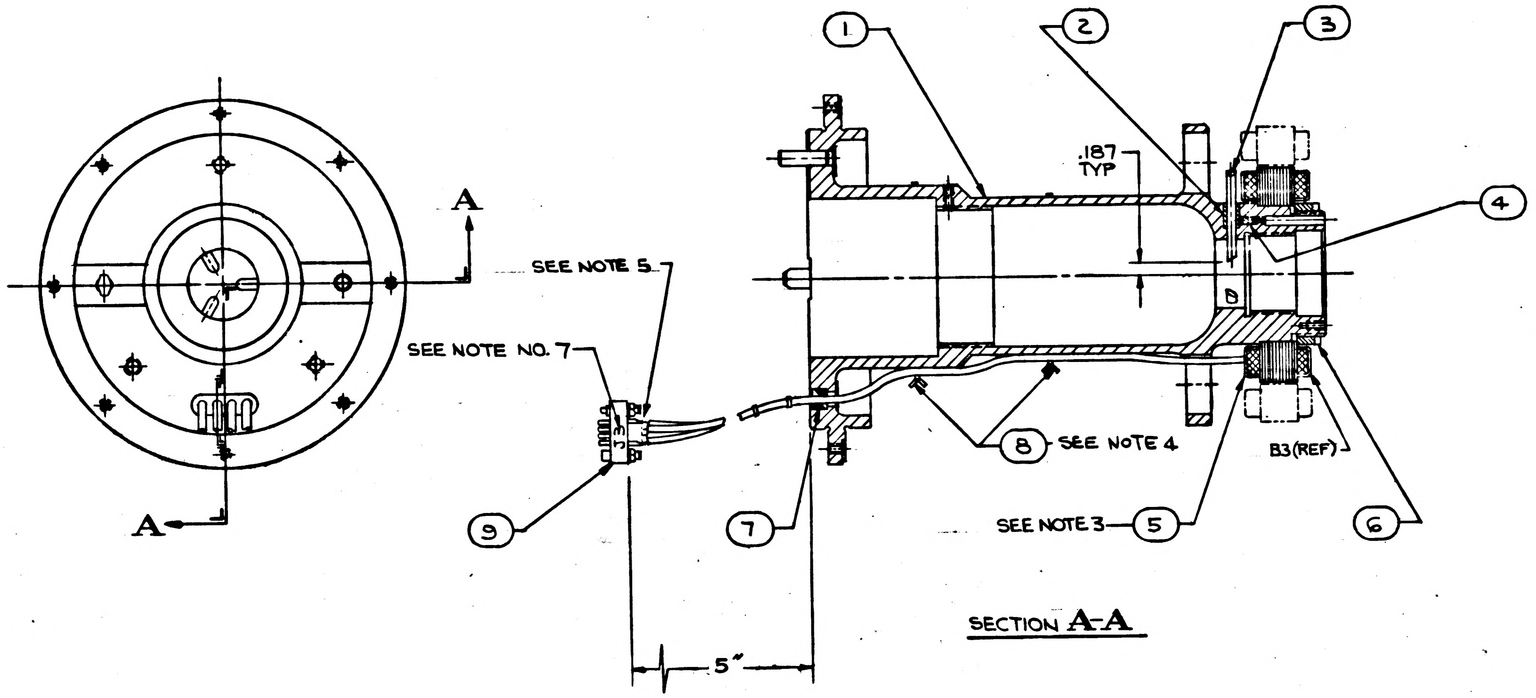
CODE IDENT NO. | SIZE D | NASA NUMBER 1011797
SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

1011797

REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. SEE WIRING SCHEMATIC 1015122. (REF.)
3. ITEM NO. 5 (RESOLVER) ROTOR & STATOR, TO BE KEPT AS A MATCHED PAIR, REFER TO DRAWING NO. 1011906 FOR STATOR ASSEMBLY
4. LACE WIRES IN ACCORDANCE WITH ND1002032 USING 1011753 (ITEM 8) THEN TIE TO ITEM 1.
5. SOLDER WIRES TO CONNECTOR IN ACCORDANCE WITH MSFC-PROC-158 PROTECTING ASSEMBLY PER KES-15 W. 1C (3.1).
6. TWISTED CONDUCTORS TO CONSIST OF FOUR (4) FULL TURNS PER INCH MINIMUM.
7. MARK CHARACTERS 1/8 HIGH IN APPROX LOCATION SHOWN PER ND1002019

WIRING LEGEND					
COND NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTES
B1	RED (S1)		B3-RED	J3-A	8
B2	BLACK (S3)		B3-BLACK	J3-B	
B3	BLUE (S4)		B3-BLUE	J3-C	8
B4	YELLOW (S2)		B3-YELLOW	J3-D	



SECTION A-A

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
9	1	*	1011741	68502017001		CONNECTOR, ELECTRICAL (J3)			
8	AR	*	1011753	60035142001		TAPE, LACING & TYING			
7	1		1011632	25386900010		INSERT, CONDUIT, RESOLVER WIRE			
6	1		1011311	57386900730		NUT, LOCKING, ROTOR			
(SEE NOTE 3) 5	1	*	1000160			RESOLVER, 16 SPEED TRANSMITTER (ROTOR) (B3)			
4	3	NAS	1081C02A3L			SCREW, SELF LOCKING, SET			
3	3		1011584	25386900060		ROD, ILLUMINATING			
2	3		1011633	57386901050		SLEEVE, SPLIT, ILLUMINATING ROD			
1	1		1011893	85386900750		TELESCOPE TUBE ASSY OF			

LIST OF PARTS AND MATERIALS

1011704	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/8; DECIMALS ± .005; ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900650
DRAWN R. BRUNELLE DATE 6-12-63
CHECKED Paul Pappachristos
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL W. J. 8-16-63
MIT APPROVAL W. Ruppe 16 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
TELESCOPE TUBE ASSY

CODE IDENT NO.
SIZE D
NASA NUMBER 1011797
SCALE 1/1
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

* PURCHASE ITEM :- SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

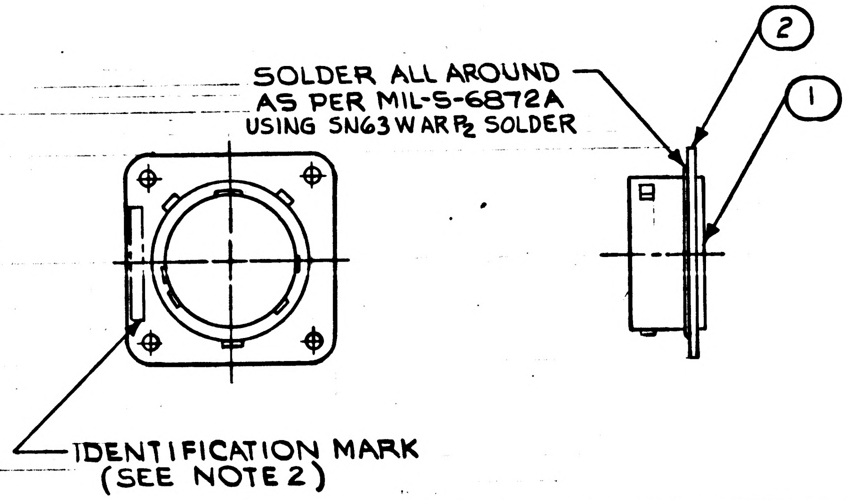
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011798

REVISIONS 02625 8-16-63

SYM	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019.


SOLDER ALL AROUND AS PER MIL-S-6872A USING SN63WARP2 SOLDER
②
①
IDENTIFICATION MARK (SEE NOTE 2)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	1		1011869-1	52386900900		PLATE, CONNECTOR			
1	1		MS3113H20-41P			CONNECTOR, ELECTRICAL			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011713	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900740
DRAWN E. DRAPALA DATE 7-15-63
CHECKED Vincent Amato 8-14-63
APPROVAL F. Ruschmann 8-15-63
APPROVAL F. J. Siviaco 8-15-63
NASA APPROVAL W J Rhine 8-16-63
MIT APPROVAL W Kupfer Kley C3

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PLATE AND CONNECTOR
ASSY OF,

CODE IDENT NO.
SIZE B
NASA NUMBER 1011798
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

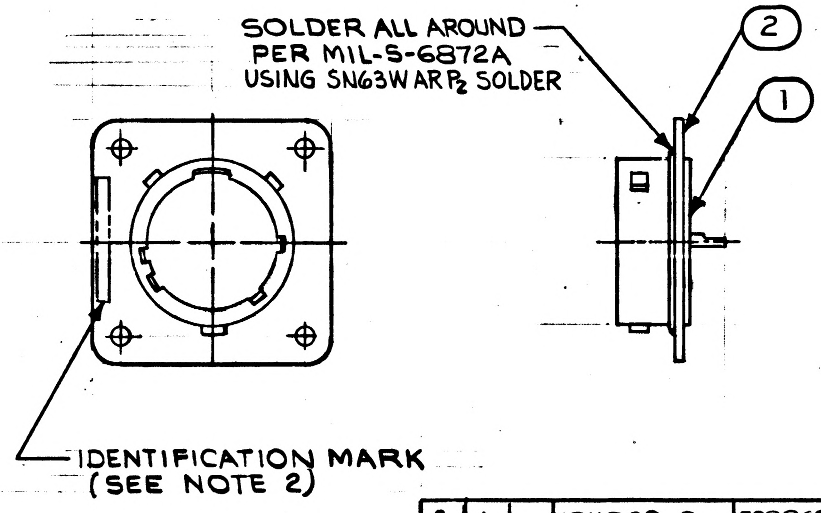
E-153

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011799

REVISIONS 02625		8-16-63	
SYM	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019.


SOLDER ALL AROUND PER MIL-S-6872A USING SN63WARP2 SOLDER
2
1
IDENTIFICATION MARK (SEE NOTE 2)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	1		1011869-2	52386900910		PLATE, CONNECTOR			
1	1		MS3113H22-55P			CONNECTOR, ELECTRICAL			

LIST OF PARTS AND MATERIALS

1011896	1011000
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± —	± —

DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900670

DRAWN E. DRAPALA DATE 6-15-63
CHECKED Vincent Amato 8-14-63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PLATE AND CONNECTOR
ASSY OF

CODE IDENT NO.	SIZE	NASA NUMBER
	B	1011799

SCALE 1/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

E-153

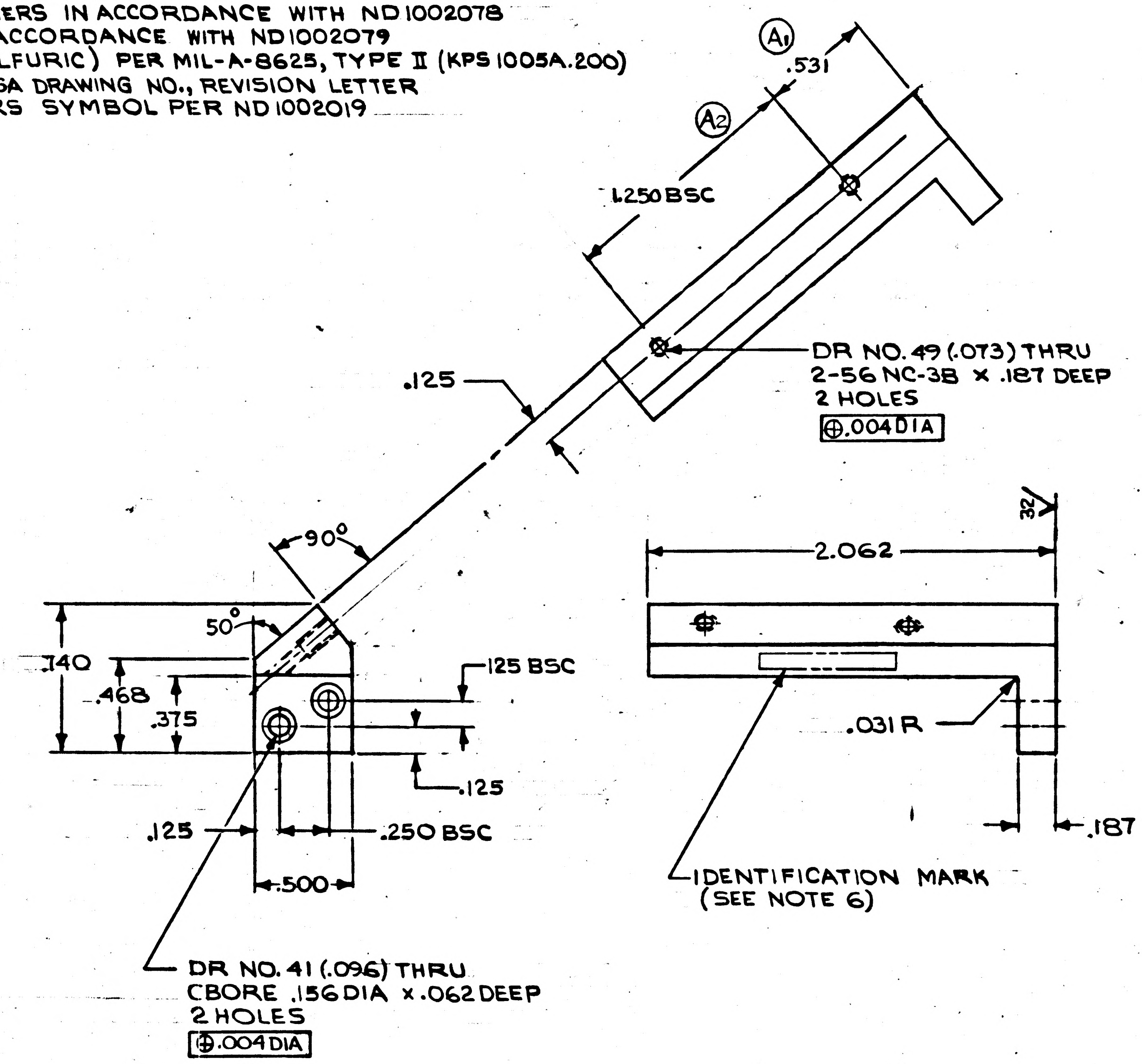
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

A 1011800

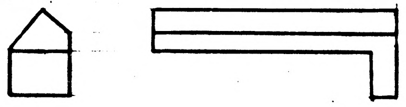
NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. FINISH: ANODIZE (SULFURIC) PER MIL-A-8625, TYPE II (KPS 1005A.200)
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019

REVISIONS TDRR 01018

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A2	D3 D3	1) .531 WAS .750 2) 1.250 WAS 1.031 TDRR 02017	7-15-63 7/17/63	



(A1)
.531
(A2)
1.250 BSC
DR NO. 49 (.073) THRU
2-56 NC-3B × .187 DEEP
2 HOLES
⊕ .004 DIA
.125
90°
50°
.140
.468
.375
.125 BSC
.125
.125
.250 BSC
.500
DR NO. 41 (.096) THRU
CBORE .156 DIA × .062 DEEP
2 HOLES
⊕ .004 DIA
32√
2.062
.031 R
.187
IDENTIFICATION MARK
(SEE NOTE 6)



ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011703	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 6061-T6
FED. SPEC QQ-A-325
TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900860

DRAWN E. DRAPALA DATE 4-24-63
CHECKED
APPROVAL 4-26-63
APPROVAL 4-26-63
NASA APPROVAL W J Rhine 5-1-63
MIT APPROVAL 1 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BRACKET,
HEAT CONDUCTOR

CODE IDENT NO.
SIZE C
NASA NUMBER 1011800
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011800 A

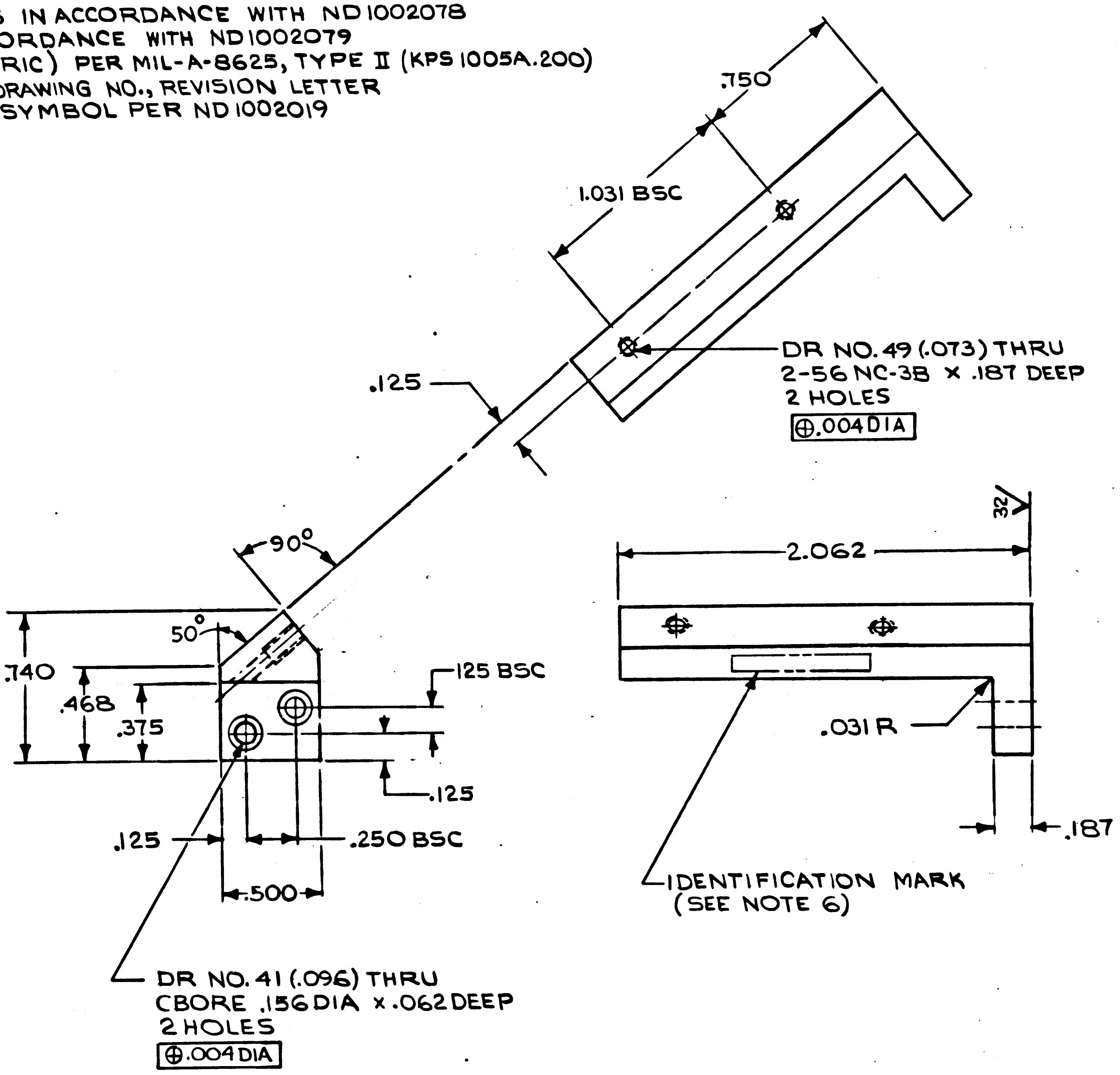
E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

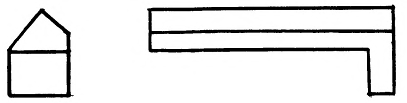
0081101

REVISIONS TDRR 01018				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. FINISH: ANODIZE (SULFURIC) PER MIL-A-8625, TYPE II (KPS 1005A.200)
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019



.750
1.031 BSC
DR NO. 49 (.073) THRU
2-56 NC-3B × .187 DEEP
2 HOLES
⊕.004 DIA
.125
90°
50°
.740
.468
.375
-125 BSC
.125
.125
.250 BSC
.500
32√
2.062
.031 R
.187
IDENTIFICATION MARK
(SEE NOTE 6)
DR NO. 41 (.096) THRU
CBORE .156 DIA × .062 DEEP
2 HOLES
⊕.004 DIA



ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011703	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 6061-T6 FED. SPEC QQ-A-325 TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900860

DRAWN E. DRAPALA DATE 4-24-63
CHECKED Paul Pappachristou
APPROVAL Ed. MacDonald 4-26-63
APPROVAL E. Thomp 4-26-63
NASA APPROVAL W.J. Rhine 5-1-63
MIT APPROVAL 1 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BRACKET,
HEAT CONDUCTOR

CODE IDENT NO.
SIZE C
NASA NUMBER 1011800
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011800

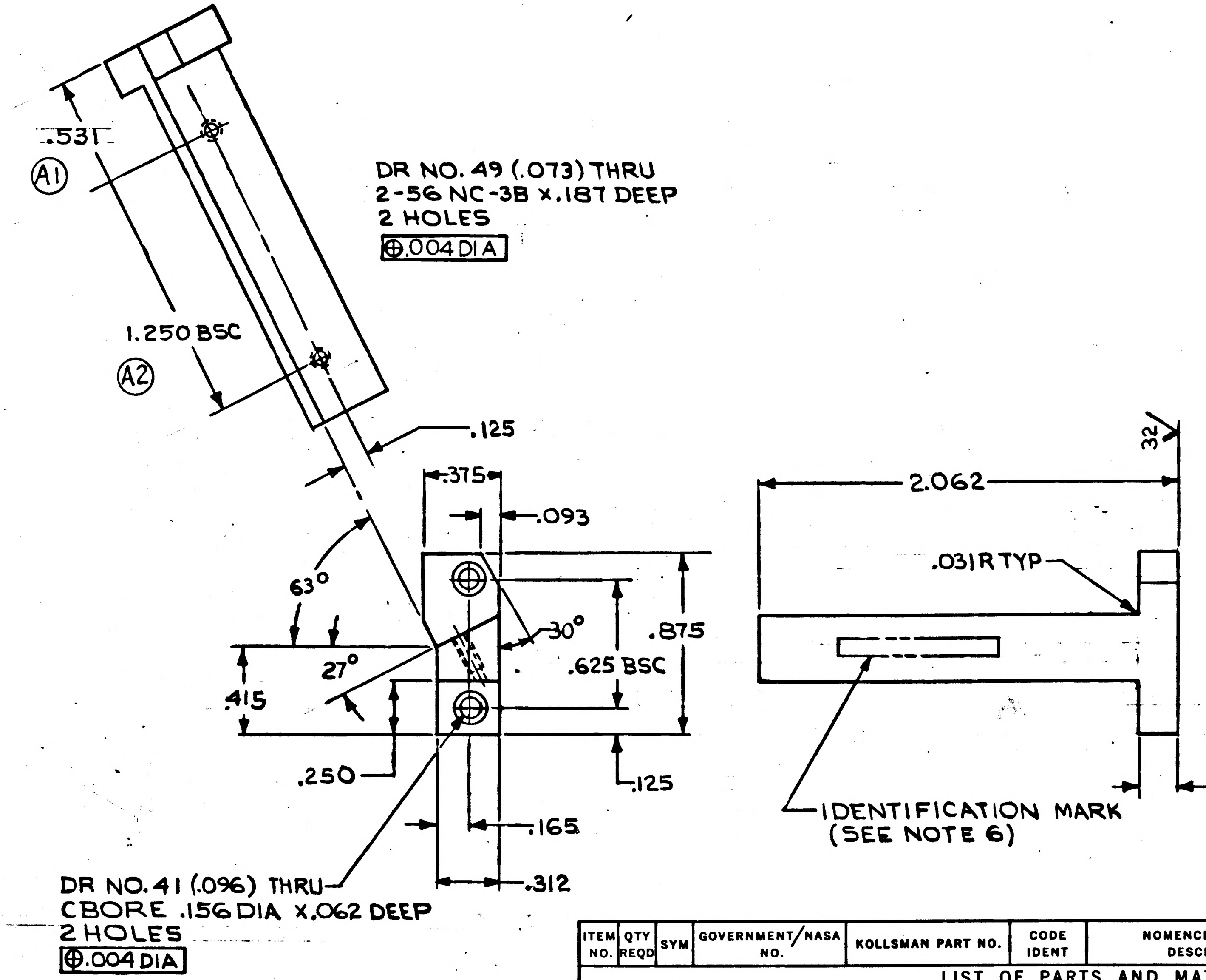
E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

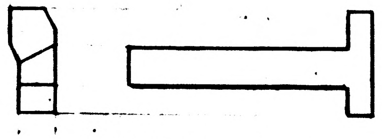
1011801 A

REVISIONS TDRR 01018				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A2	C5 C5	1) .531 WAS .750 2) 1.250 WAS 1.031 TDRR 02016	7-12-63 7/17/63	

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. FINISH: ANODIZE (SULFURIC) PER MIL-A-8625, TYPE II (KPS 1005A.200)
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019


.531
A1
DR NO. 49 (.073) THRU
2-56 NC-3B x .187 DEEP
2 HOLES
⊕ .004 DIA
1.250 BSC
A2
.125
.375
.093
63°
30°
.875
27°
.625 BSC
.415
.250
.125
.165
.312
DR NO. 41 (.096) THRU
CBORE .156 DIA x .062 DEEP
2 HOLES
⊕ .004 DIA
32
2.062
.031 R TYP
IDENTIFICATION MARK
(SEE NOTE 6)
.187

MASTER



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011702	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM
ALLOY 6061-T6
FED. SPEC QQ-A-325
TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900870

DRAWN E. DRAPALA DATE 4-24-63
CHECKED Paul Kapachuston
APPROVAL 4-26-63
APPROVAL E. Dhoruy 4-26-63
NASA APPROVAL W J Rhine 5-1-63
MIT APPROVAL W Coffer 1 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BRACKET
HEAT CONDUCTOR

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011801

SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

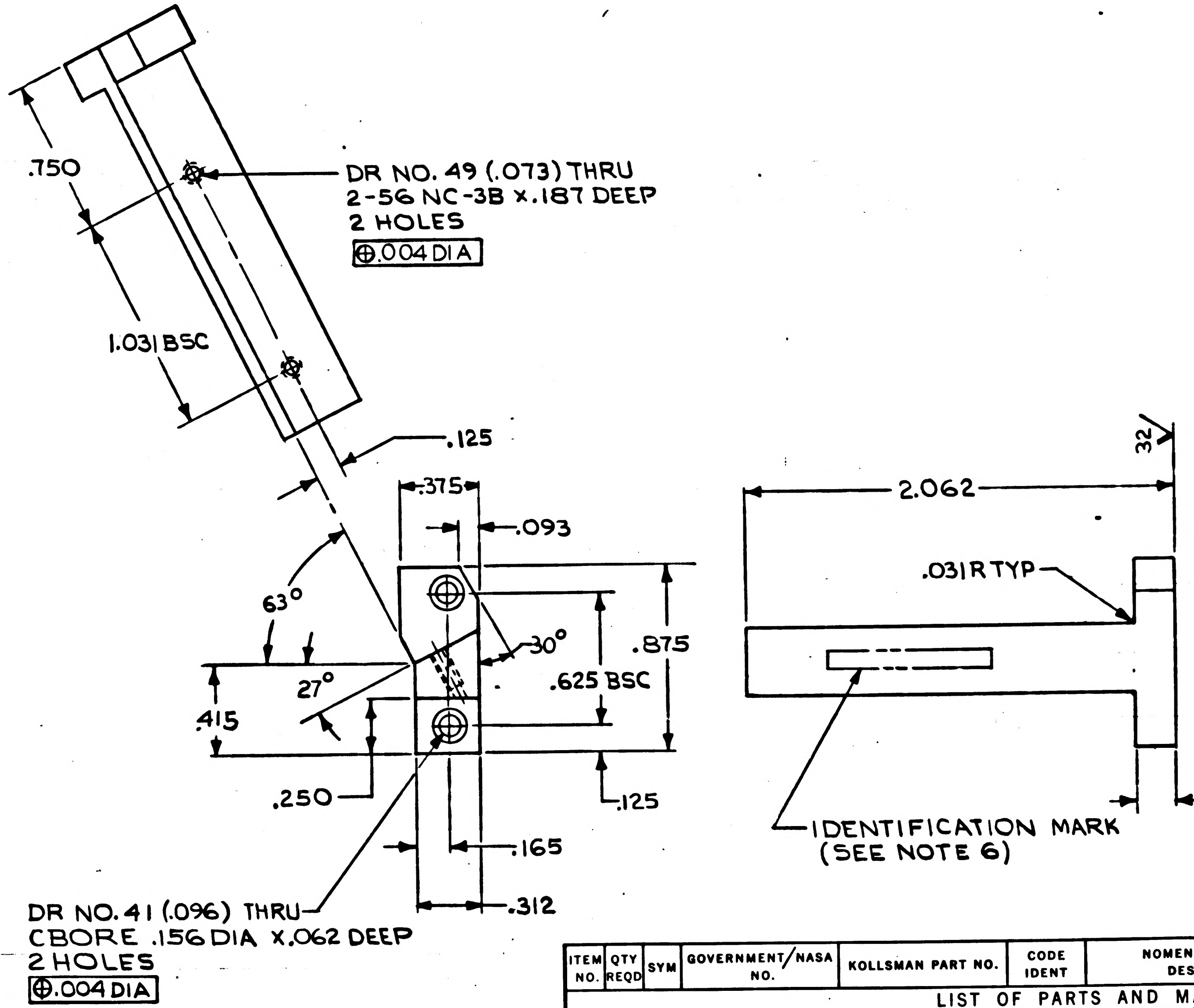
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

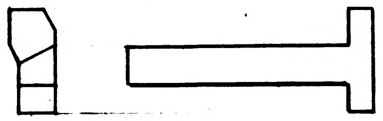
1081101

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REVISIONS TDRR 01018

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. FINISH: ANODIZE (SULFURIC) PER MIL-A-8625, TYPE II (KPS 1005A.200)
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019


.750
1.031 BSC
DR NO. 49 (.073) THRU
2-56 NC-3B x .187 DEEP
2 HOLES
⊕ .004 DIA
.125
.375
.093
63°
30°
27°
.875
.625 BSC
.415
.250
.125
.165
.312
DR NO. 41 (.096) THRU
CBORE .156 DIA x .062 DEEP
2 HOLES
⊕ .004 DIA
2.062
32
.031 R TYP
.187
IDENTIFICATION MARK
(SEE NOTE 6)


ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011702	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 6061-T6 FED. SPEC QQ-A-325 TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900870

DRAWN E. DRAPALA DATE 4-24-63
CHECKED Paul [illegible]
APPROVAL E. [illegible] 4-26-63
APPROVAL E. [illegible] 4-26-63
NASA APPROVAL W J Rhine 5-1-63
MIT APPROVAL W [illegible] 1 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE BRACKET HEAT CONDUCTOR

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011801

SCALE 2/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

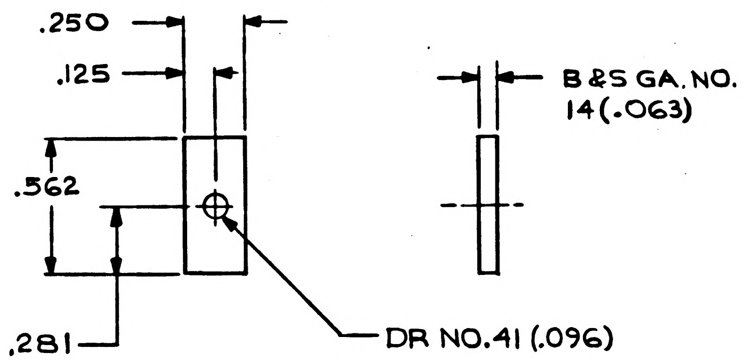
E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

2081101

REVISIONS TDRR 01018			
SYM	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. FINISH: ANODIZE (SULFURIC) PER MIL-A-8625, TYPE II (KPS 1005A.200)



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

MASTER

ACTUAL SIZE

NEXT ASSY	USED ON
1011703	
1011702	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 6061-T4
FED SPEC QQ-A-325
TEMPER T4

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 56386900410

DRAWN E. DRAPALA DATE 4-24-63
CHECKED Paul Pappachristou
APPROVAL 4-26-63
APPROVAL 4-26-63

NASA APPROVAL W J Rhine 5-1-63
MIT APPROVAL 1 May 63

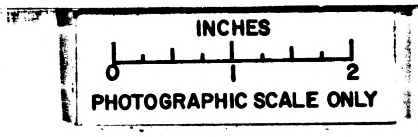
MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PLATE, FLAT

CODE IDENT NO.	SIZE	NASA NUMBER
	B	1011802

SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

E-153



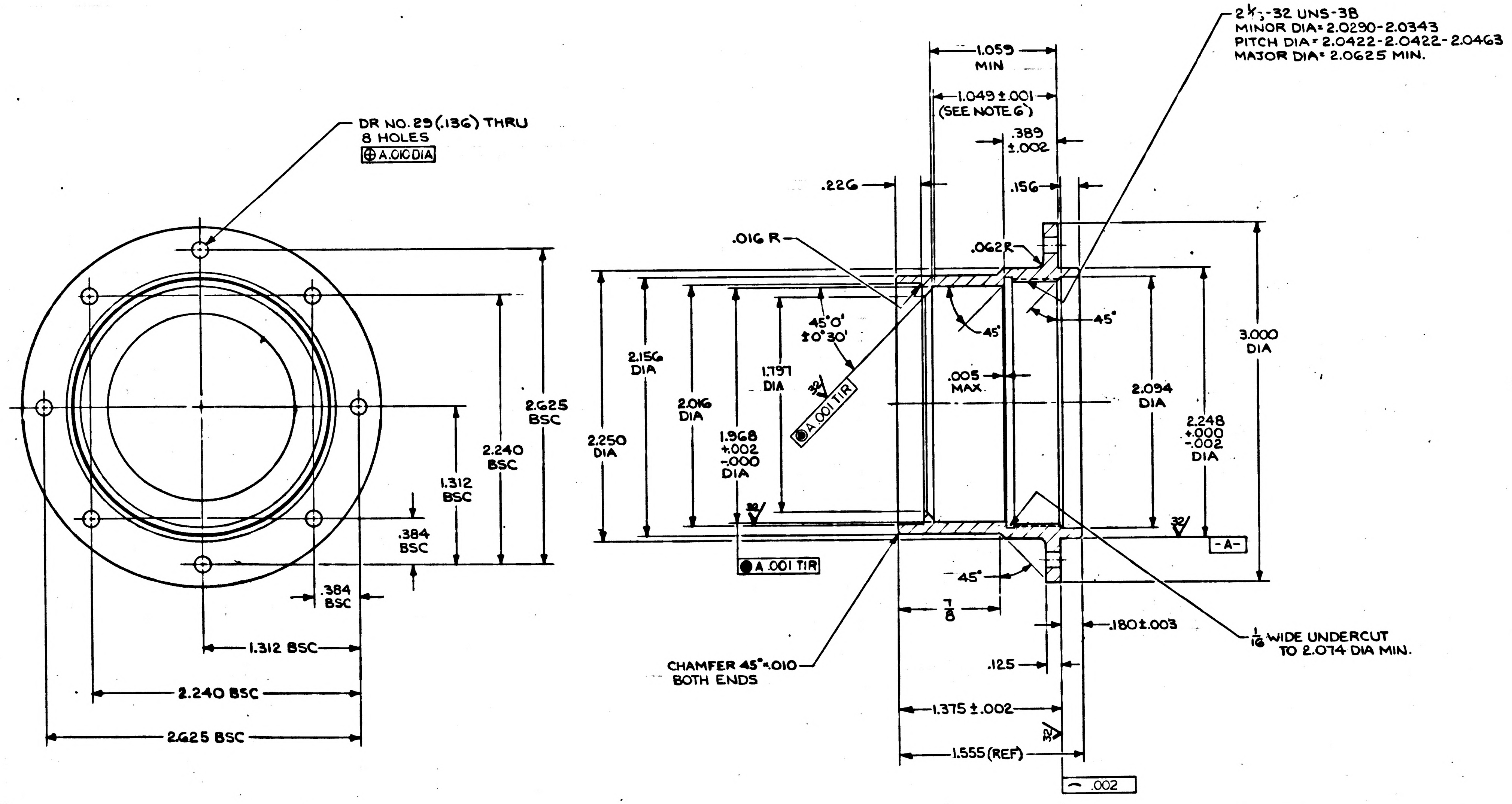
PHOTOGRAPHIC SCALE ONLY

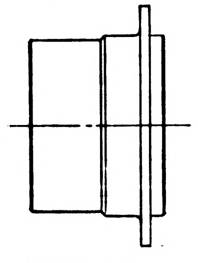
1011803

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REVISIONS C 372

NOTES:
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORD WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63/ FINISH ALL OVER.
   b. ✓ BREAK SHARP CORNERS IN ACCORD WITH ND1002078.
4. REMOVE BURRS IN ACCORD WITH ND1002079.
5. HEAT TREAT (STABILIZE AND STRESS RELIEVE) IN ACCORD WITH ND1002092.
6. DIMENSION IS TO THEORETICAL INTERSECTION OF PLANES.
7. FINISH: BLACK ANODIZE IN ACCORD WITH ND1002127.


DR NO. 29 (.136) THRU
8 HOLES
⊕ A .010 DIA
2.625 BSC
2.240 BSC
1.312 BSC
.384 BSC
.384 BSC
1.312 BSC
2.240 BSC
2.625 BSC
2¼-32 UNS-3B
MINOR DIA = 2.0290-2.0343
PITCH DIA = 2.0422-2.0422-2.0463
MAJOR DIA = 2.0625 MIN.
1.059 MIN
1.049 ±.001 (SEE NOTE 6)
.389 ±.002
.226
.156
.016 R
.062R
45°0' ±0°30'
45°
45°
2.156 DIA
2.016 DIA
1.797 DIA
1.968 +.002 -.000 DIA
2.250 DIA
◉ A .001 TIR
◉ A .001 TIR
.005 MAX
2.094 DIA
2.248 +.000 -.002 DIA
3.000 DIA
-A-
32
32
32
45°
7/8
.180 ±.003
1/16 WIDE UNDERCUT TO 2.074 DIA MIN.
CHAMFER 45° ×.010 BOTH ENDS
.125
1.375 ±.002
1.555 (REF)
⌒ .002



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011732	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
BERYLLIUM
ND1002125
SEE NOTE 5

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901310

DRAWN J. D. Ooo DATE 4-25-63
CHECKED J. SULLIVAN 5-22-63
APPROVAL [illegible] 5-22-63
APPROVAL E. Ohromp 5-22-63
NASA APPROVAL
MIT APPROVAL 24 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING,
TELESCOPE, LENS

CODE IDENT NO.
SIZE D
NASA NUMBER 1011803
SCALE 2/1
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

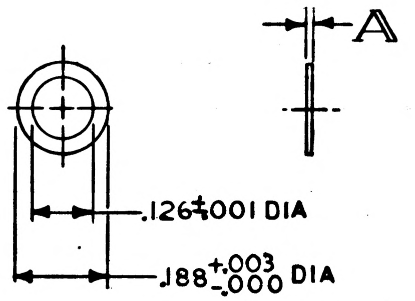
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011804 A

REVISIONS TDRR 01018			
SYM	DESCRIPTION	DATE	APPROVAL
A3	1) CHANGED MAT'L 2) REVISED DIM A 3) REMOVED NOTE 5	7/12/63	
	TDRR NO. 02028	7/17/63	

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARD IN ACCORDANCE WITH ND1002078
3. UNLESS OTHERWISE SPECIFIED:
   a. $\sqrt{}^{63}$ FINISH ALL OVER
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079

(A3)



(A2)

DASH NO.	DIM A	KIC DWG NO
1011804-1	.0060±.0006	79386900301
1011804-2	.0080±.0008	79386900302
1011804-3	.010±.001	79386900303
1011804-4	.012±.001	79386900304

(A1)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

MASTER

ACTUAL SIZE

1011703	—
1011702	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± —	± —

DO NOT SCALE THIS DRAWING

MATERIAL COPPER - BERYLLIUM ALLOY STRIP FED. SPEC QQ-C-533, CONDITION ½ HARD

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK

KIC PN 7938690 SEE CHART

DRAWN E. DRAPALA DATE 4-25-63
CHECKED Paul Pappachristou
APPROVAL E. J. McDonald 4-26-63
APPROVAL E. Thomp 4-26-63

NASA APPROVAL W J Rhine 5-1-63

MIT APPROVAL W Kupfer 1 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
WASHER, FLAT

CODE IDENT NO.
SIZE B
NASA NUMBER 1011804

SCALE 4/1
WEIGHT CALC ACTUAL
SHEET 1 OF

E-183

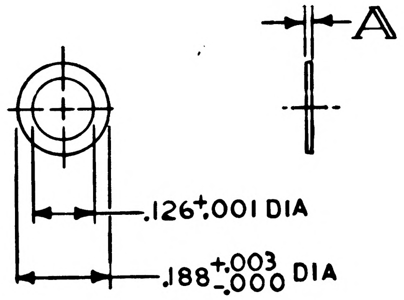
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011804

REVISIONS TDRR 01018

SYM	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARD IN ACCORDANCE WITH ND1002078
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5 FINISH: ALODINE 1200S PER MIL-C-5541 (KPS.1005A 300)



DASH NO.	DIM A	KIC DWG NO
1011804-1	.006±.0005	79386900301
1011804-2	.008±.0005	79386900302
1011804-3	.010 ±.0005	79386900303
1011804-4	.012 ±.0005	79386900304

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

MASTER

ACTUAL SIZE

1011703	
1011702	1011000
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± —	± —

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 6061-T6 FED. SPEC QQ-A-.325 TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK

KIC PN 7938690 SEE CHART

DRAWN E. DRAPALA DATE 4-25-63
CHECKED Paul Pappachristou
APPROVAL Ed. MacDonald 4-26-63
APPROVAL E. Thomp 4-26-63

NASA APPROVAL W.J. Rhine 5-1-63

MIT APPROVAL W Kupfer 1 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
WASHER, FLAT

CODE IDENT NO. | SIZE B | NASA NUMBER 1011804

SCALE 4/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

E-153

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. ELEMENT IN ACCORDANCE WITH SPEC MIL-O-13830.
3. MATL: GLASS - BSC 2 OR EQUIVALENT
FLATNESS - 5 λ AT 5461 Å BOTH SIDES
4. SURFACE QUALITY Ⓐ INNER ZONE = 1.1240 DIA (REF) 10-1, OUTER ZONE 10-5.
5. SURFACE QUALITY Ⓑ INNER ZONE = 1.1240 DIA (REF) 10-1, OUTER ZONE 10-5.
6. FIGURE "A" INSCRIPTION (WHEN VIEWED IN DIRECTION ⟶ A) SHOULD BE CENTRALLY LOCATED.
7. SURFACES MARKED "P" POLISHED.
8. ENGRAVING ON SURFACE Ⓑ.
9. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURER'S SYMBOL PER ND 1002019.

θ	Y±.0002
25	0.0000
20, 30	0.1144
15, 35	0.2282
10, 40	0.3409
5, 45	0.4523
0, 50	0.5620

θ		X±.0002
+2	-2	0.0458
+4	-4	0.0916
+6	-6	0.1372
+8	-8	0.1828
+12	-12	0.2734
+18	-18	0.4080
+24	-24	0.5402

A 1011806

REVISIONS TDRR 01424

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO. 03815	10 Oct 63	

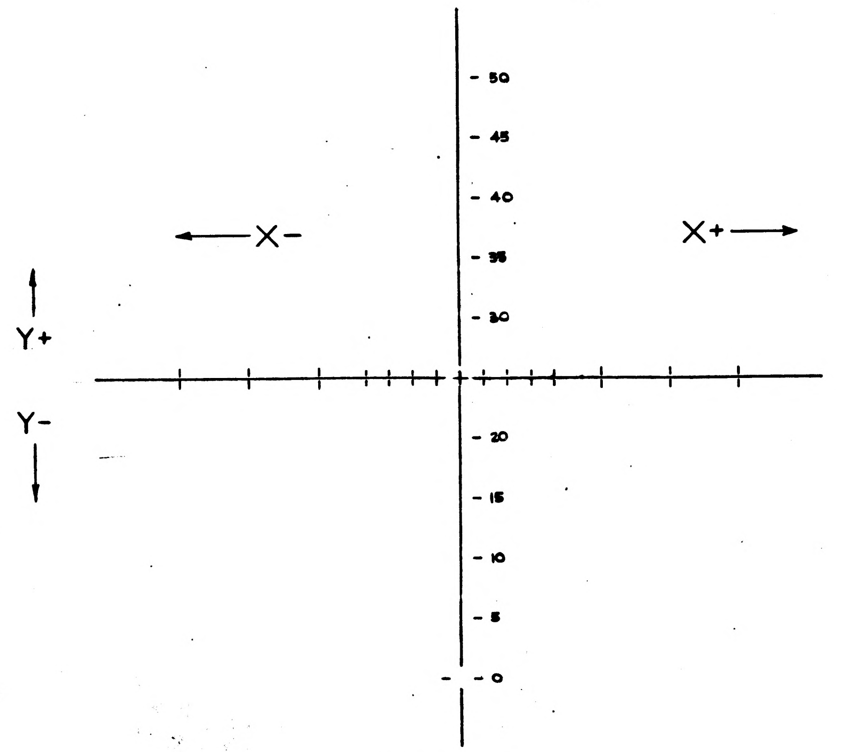
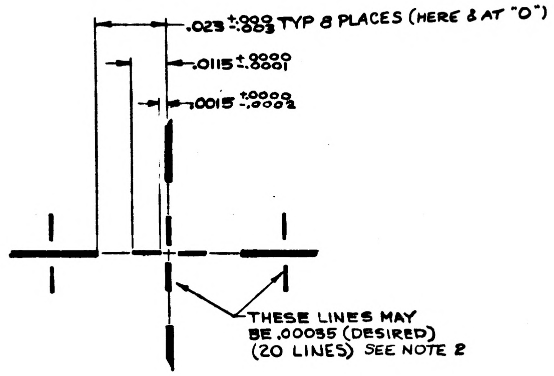


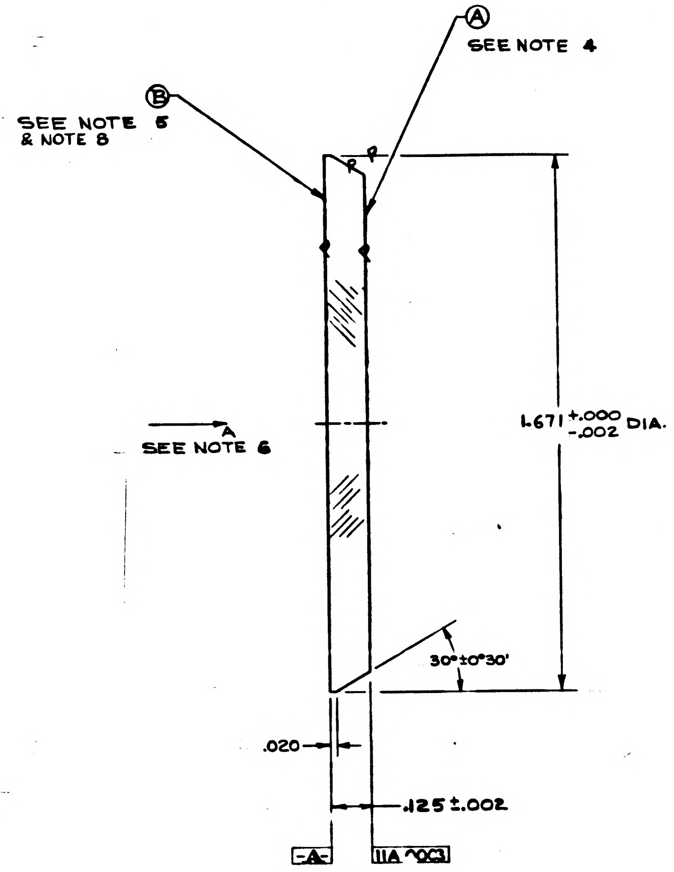
FIGURE A



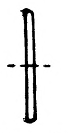
.023 +.000 -.003 TYP 8 PLACES (HERE & AT "0")
.0115 +.0000 -.0001
.0015 +.0000 -.0002
THESE LINES MAY BE .00035 (DESIRED) (20 LINES) SEE NOTE 2

ENLARGED VIEW OF CENTER

ENGRAVING NOTES:
1-ALL LINE WIDTH .0007±.0001 INCLUDING WIDTH OF LINES IN CHARACTERS EXCEPT OPTION IN ENLARGED VIEW
2-LONG LINE LENGTH = .015±.002 (23 LINES)
3-SHORT LINE LENGTH = .010±.001 (20 LINES)
4-DISTANCE FROM END OF NUMBERED LINES TO CENTER OF FIGURE = .023±.001
5-DISTANCE TO BOTH SHORT & LONG LINE ON "X" AXIS = .003 $^{+.001}_{-.000}$
6. WHITE OPAQUE FILLER IN ENGRAVING.
7. DIA = 1.375±.010.
8. DO NOT ENGRAVE "X" & "Y". THEY ARE FOR CHARTED DIMENSIONS LOCATING LINES
9. CHARACTERS TO BE .007±.001 HIGH.



SCALE 5:1



ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011760	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± —

DO NOT SCALE THIS DRAWING
MATERIAL: SEE NOTE 3
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 28386900530
DRAWN ED INSLEY DATE 5-15-63
CHECKED Thornton Stevens 5-27-63
APPROVAL Thornton Stevens 5-27-63
APPROVAL E. Mhong 5-27-63
NASA APPROVAL Jack Bassano
MIT APPROVAL W Kupfer 3 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RETICLE, ELEMENT,
ENGRAVED, SCT

CODE IDENT NO.
SIZE E
NASA NUMBER 1011806
SCALE AS NOTED
WEIGHT
CALC ACTUAL
SHEET OF

INCHES
PHOTOGRAPHIC SCALE ONLY

9081101

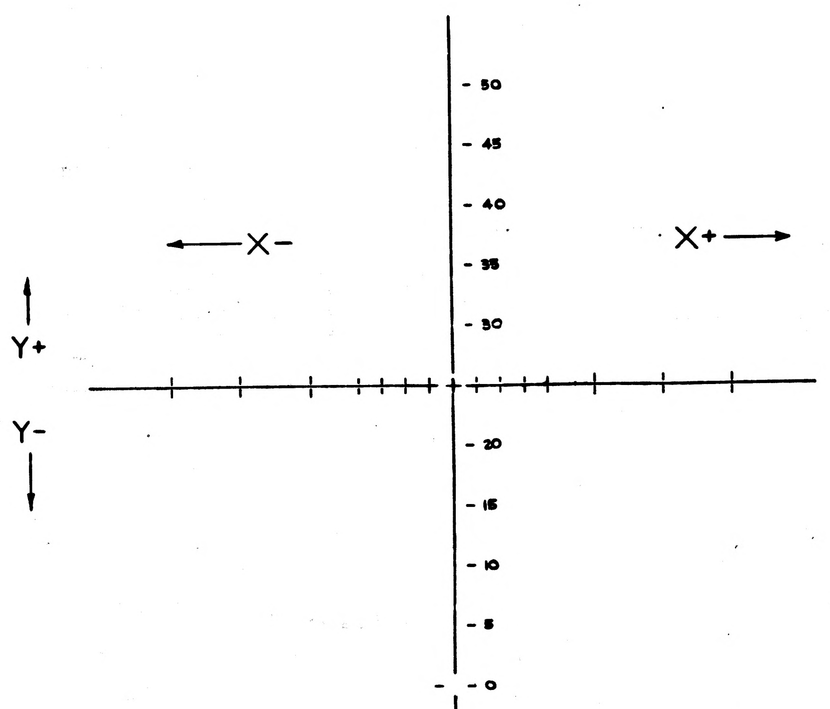
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REVISIONS TR2R C1424

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. ELEMENT IN ACCORDANCE WITH SPEC MIL-O-13830.
3. MATL: GLASS-BSC 2 OR EQUIVALENT
FLATNESS - 5 λ AT 5461 Å BOTH SIDES
4. SURFACE QUALITY Ⓐ INNER ZONE = 1.1240 DIA(REF) 10-1, OUTER ZONE 10-5.
5. SURFACE QUALITY Ⓑ INNER ZONE = 1.1240 DIA(REF) 10-1, OUTER ZONE 10-5.
6. FIGURE "A" INSCRIPTION (WHEN VIEWED IN DIRECTION ⟶ A) SHOULD BE CENTRALLY LOCATED.
7. SURFACES MARKED "P" POLISHED.
8. ENGRAVING ON SURFACE Ⓑ.

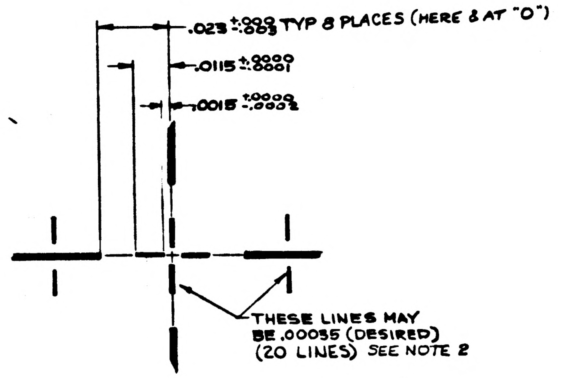
θ	Y±.0002
25	0.0000
20, 30	0.1144
15, 35	0.2282
10, 40	0.3409
5, 45	0.4523
0, 50	0.5620

θ		X±.0002
+2	-2	0.0458
+4	-4	0.0916
+6	-6	0.1372
+8	-8	0.1828
+12	-12	0.2734
+18	-18	0.4080
+24	-24	0.5402



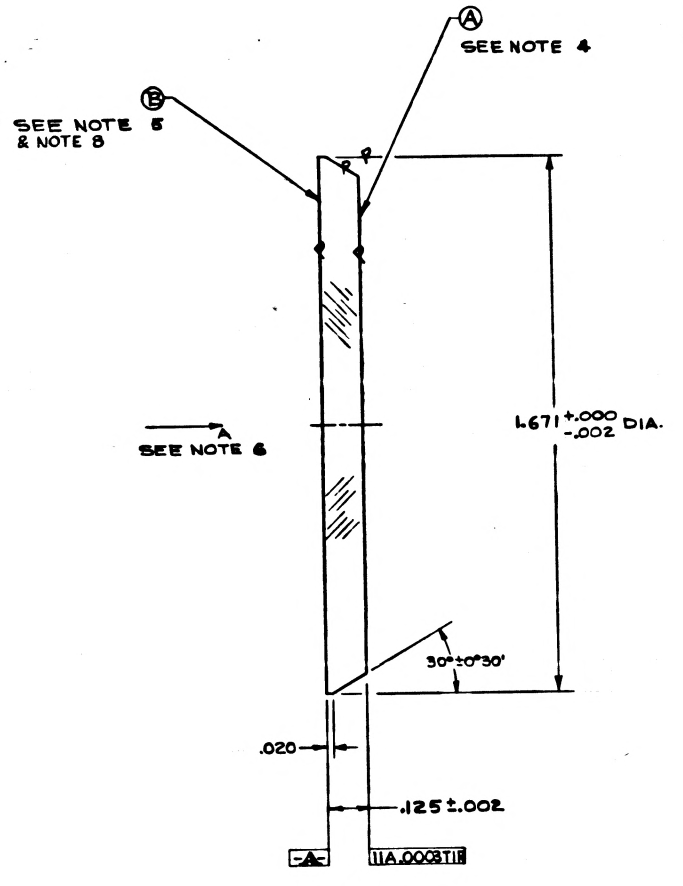
X-
X+
Y+
Y-
50
45
40
35
30
20
15
10
5
0

FIGURE A



.023 +.000 -.003 TYP 8 PLACES (HERE & AT "0")
.0115 +.0000 -.0001
.0015 +.0000 -.0002
THESE LINES MAY BE .00035 (DESIRED) (20 LINES) SEE NOTE 2

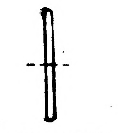
ENLARGED VIEW OF CENTER



Ⓐ
SEE NOTE 4
Ⓑ
SEE NOTE 5 & NOTE 8
P
P
A
SEE NOTE 6
1.671 +.000 -.002 DIA.
30°±0°30'
.020
.125±.002
-A-
// A .0003 TIR

SCALE 5:1

ENGRAVING NOTES:
1-ALL LINE WIDTH .0007±.0001 INCLUDING WIDTH OF LINES IN CHARACTERS EXCEPT OPTION IN ENLARGED VIEW
2-LONG LINE LENGTH = .015±.002 (23 LINES)
3-SHORT LINE LENGTH = .010±.001 (20 LINES)
4-DISTANCE FROM END OF NUMBERED LINES TO CENTER OF FIGURE = .023±.001
5-DISTANCE TO BOTH SHORT & LONG LINE ON "X" AXIS = .003 +.001 -.000
6. WHITE OPAQUE FILLER IN ENGRAVING.
7. DIA = 1.375±.010.
8. DO NOT ENGRAVE "X" & "Y". THEY ARE FOR CHARTED DIMENSIONS LOCATING LINES



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011760	1011000
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL: SEE NOTE 3
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 28386900530
DRAWN ED INSLEY DATE 5-16-63
CHECKED Thornton Harris 5-27-63
APPROVAL Thornton Harris 5-27-63
APPROVAL E. Thomas 5-27-63
NASA APPROVAL
MIT APPROVAL W. Wyffer 31 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RETICLE, ELEMENT,
ENGRAVED, SCT

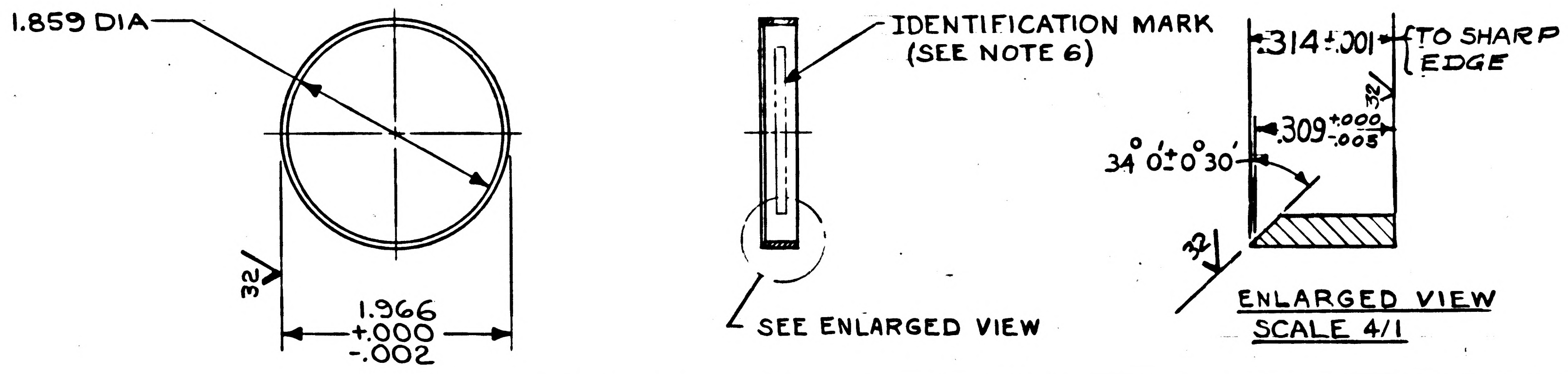
CODE IDENT NO.
SIZE E
NASA NUMBER 1011806
SCALE AS NOTED
WEIGHT
CALC ACTUAL
SHEET OF

1011806

L081101	REVISIONS	01370

SYM	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORD WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63/ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORD WITH ND1002078.
4. REMOVE BURRS IN ACCORD WITH ND1002079.
5. FINISH: BLACK ANODIZE IN ACCORD WITH MIL-A-8625, TYPE II BLACK (KPS.1005A.201)
6. IDENTIFY USING NASA DWG NO., REVISION LETTER, AND MANUFACTURERS SYMBOL IN ACCORD WITH ND1002019.



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011732	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± –	±.005	± –

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 2024-T4
FED. SPEC QQ-A-268
TEMPER T4

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901340

DRAWN J. Sullivan DATE 4-25-63
CHECKED J. SULLIVAN 5-23-63
APPROVAL Thornton Stern 5-23-63
APPROVAL E. Thomp 5-23-63
NASA APPROVAL Jack Barnard
MIT APPROVAL 24 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE SPACER, LENS

CODE IDENT NO.	SIZE	NASA NUMBER
	B	1011807

SCALE 1/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

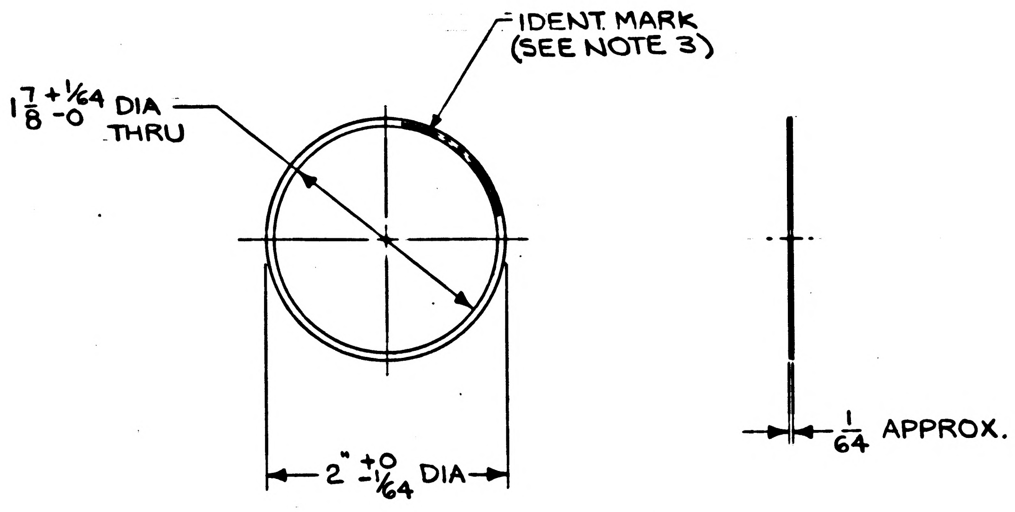
MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

6081101

REVISIONS 01370			
SYM	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. MATERIAL: SILICONE RUBBER IN ACCORD WITH LATEST ISSUE OF MIL-R-5847 CLASS 1b, GRADE 80.
3. IDENTIFY USING NASA DWG NO. REVISION LETTER, AND MANUFACTURERS SYMBOL IN ACCORD WITH ND1002019.



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011784	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ –	+ –	+ –

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 26386900010

DRAWN J. Schiller DATE 4-26-63
CHECKED J. SULLIVAN 5-22-63
APPROVAL E. MacDonald 5-22-63
APPROVAL 5-22-63
NASA APPROVAL
MIT APPROVAL 24 May 63

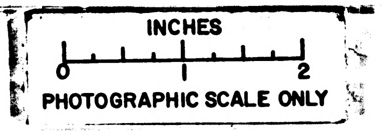
MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
GASKET, WINDOW

CODE IDENT NO.	SIZE	NASA NUMBER
	B	1011809
SCALE 1/1	WEIGHT CALC ACTUAL	SHEET 1 OF 1

MASTER

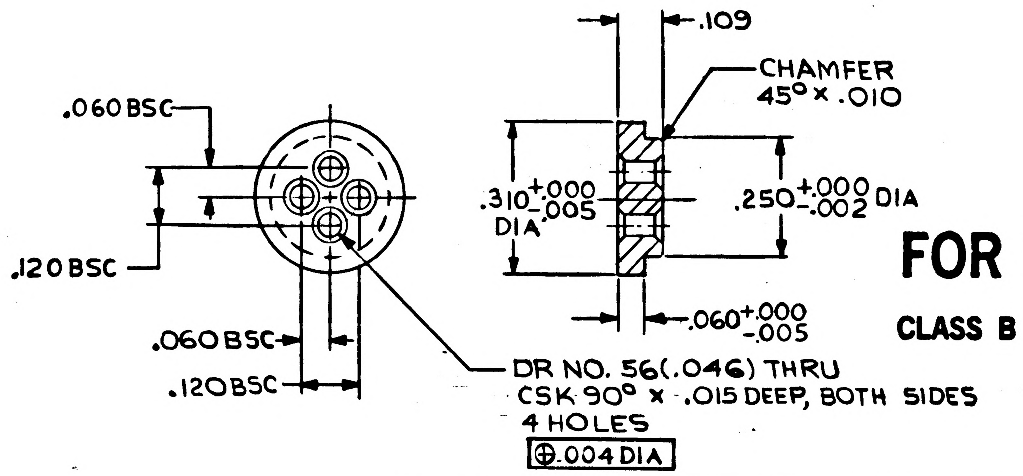
E-153



1011817

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. $\sqrt{}^{63}$ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079


.109
CHAMFER 45° × .010
.060 BSC
.120 BSC
.060 BSC
.120 BSC
.310 +.000 -.005 DIA
.250 +.000 -.002 DIA
.060 +.000 -.005
DR NO. 56 (.046) THRU
CSK 90° × .015 DEEP, BOTH SIDES
4 HOLES
⊕ .004 DIA

FOR INFORMATION ONLY

CLASS B RELEAS. TDR No. 01138 **DATE** [illegible]

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011294	1011000
NEXT ASSY	USED ON

APPLICATION

ACTUAL SIZE

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
NYLON
PER MIL-P-17091
TYPE I

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 24386900010

DRAWN E. DRAPALA DATE 4-29-63
CHECKED E. Rynkiewicz 5-2-63
APPROVAL E. Rynkiewicz 5-2-63
APPROVAL E. Ohanj 5-2-63
NASA APPROVAL W. S. Swmit 5/2/63
MIT APPROVAL W. Rugler 2 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
GROMMET

CODE IDENT NO.	SIZE	NASA NUMBER
	B	1011817

SCALE 4/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

E-153

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

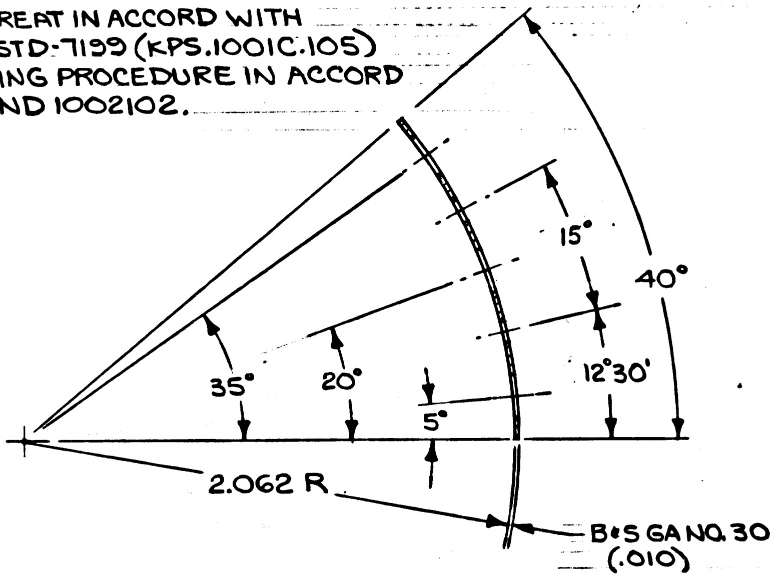
8181101

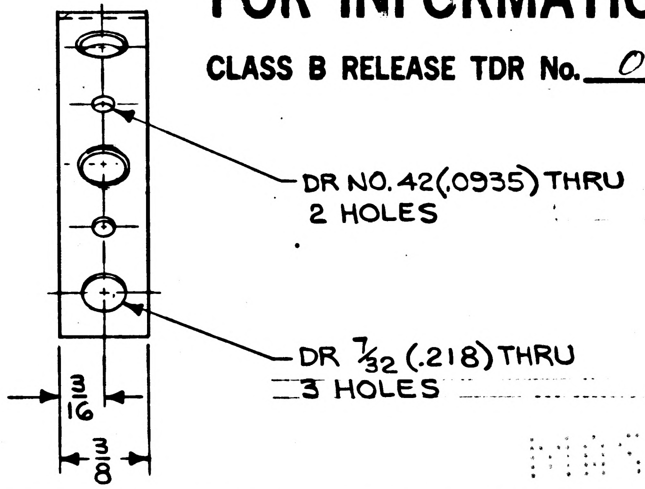
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORD WITH ND1002078.
2. GENERAL MACHINING STANDARDS IN ACCORD WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63/ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORD WITH ND1002078.
4. REMOVE BURRS IN ACCORD WITH ND1002079.
5. HEAT TREAT IN ACCORD WITH MIL-STD-7199 (KPS.1001C.105)
6. CLEANING PROCEDURE IN ACCORD WITH ND 1002102.

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01138 **DATE** 2 May 63





MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

ACTUAL SIZE

1011294	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
BERYLLIUM COPPER
ASTM NO. B194 1/2 H
FED. SPEC: QQ-C-533
COND. 1/2 H

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 58386900090

DRAWN DATE 4-29-63
CHECKED G. Thunhorne 5-2-63
APPROVAL G. Thunhorne 5-2-63
APPROVAL E. Olhamp 5-2-63
NASA APPROVAL 5/2/63
MIT APPROVAL W. Kupfer 2 May '63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PLATE,
GROMMET RETAINING

CODE IDENT NO.	SIZE	NASA NUMBER
	B	1011818

SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

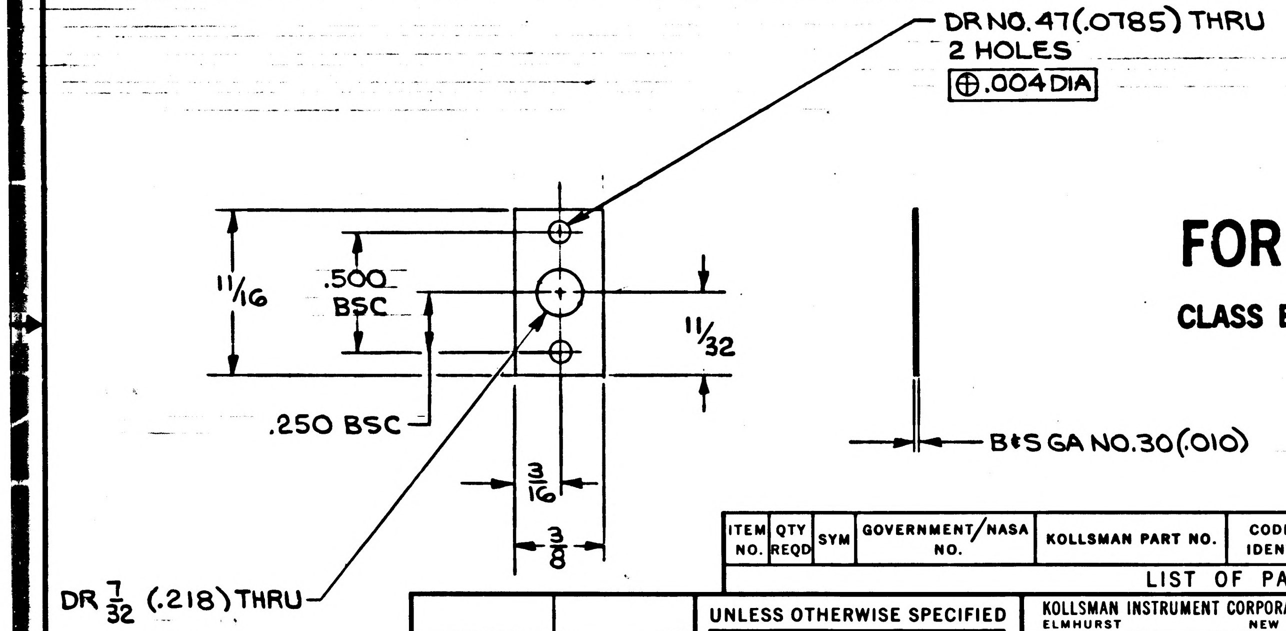
E-153

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

6181101

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORD WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63/ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORD WITH ND1002078.
4. REMOVE BURRS IN ACCORD WITH ND1002079.
5. HEAT TREAT IN ACCORD WITH MIL-STD-7199 (KPS.1001C.105)
6. CLEANING PROCEDURE IN ACCORD WITH ND1002102.



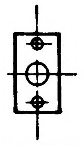
FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01138 **DATE** 2 May 63

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS



ACTUAL SIZE

NEXT ASSY	USED ON
1011294	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	±.005	± ½

DO NOT SCALE THIS DRAWING

MATERIAL
BERYLLIUM COPPER
ASTM NO. B194 ½H
FED. SPEC: QQ-C-533
COND ½H

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 58386900100

DRAWN J. Schuller DATE 4-30-63
CHECKED G. Rumbaum 5-2-63
APPROVAL G. Rumbaum 5-2-63
APPROVAL E. Dhang 5-2-63
NASA APPROVAL 5/2/63
MIT APPROVAL W. Kupfer 2 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PLATE,
GROMMET RETAINING

CODE IDENT NO.	SIZE	NASA NUMBER
	B	1011819

SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

E-153

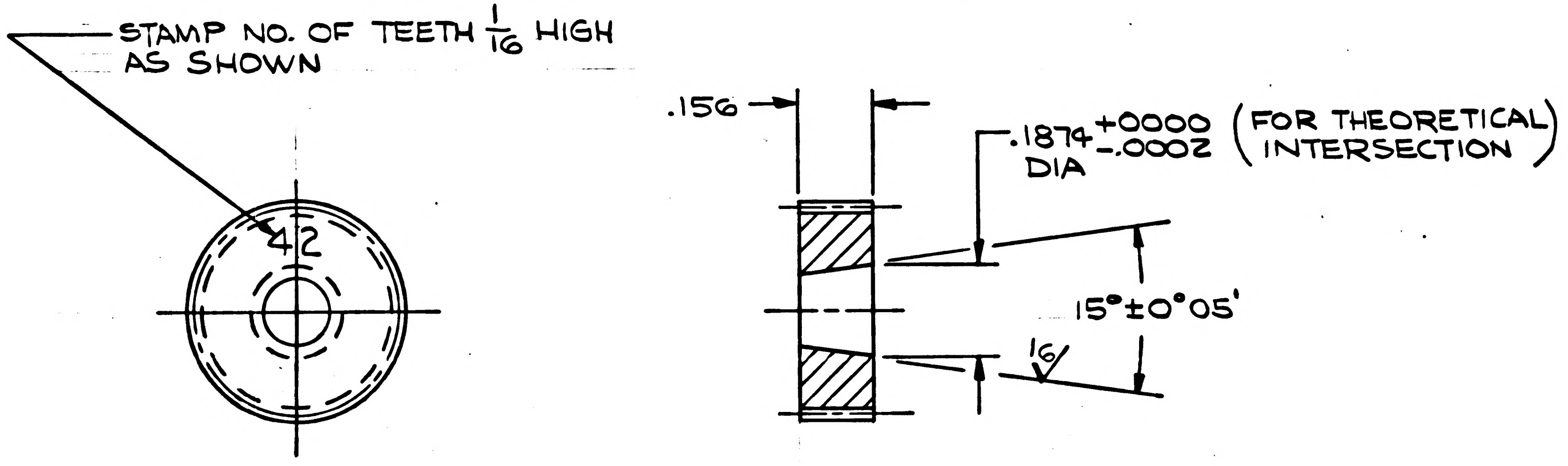
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

S281101

REVISIONS 01370				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

SPUR GEAR DATA

NO. OF TEETH	42
DIAMETRAL PITCH	96
PRESSURE ANGLE	20°
PITCH DIAMETER	.43750
OUTSIDE DIAMETER	$.4583^{+.0000}_{-.0020}$
AGMA CLASS	PREC 2D
GEAR TEETH FINISH	32√


STAMP NO. OF TEETH 1/16 HIGH AS SHOWN
42
.156
.1874 +.0000 -.0002 DIA (FOR THEORETICAL INTERSECTION)
15°±0°05'
16√

5. PASSIVATE PER MIL-STD-171 (KPS-1005I.200)
4. REMOVE BURRS PER ND 1002079
3. UNLESS OTHERWISE SPECIFIED
63√ FINISH ALL OVER
2. GENERAL MACHINING STANDARDS PER ND 1002078
1. INTERPRET DRAWING PER MIL-D-70327

NOTES

ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± —

DO NOT SCALE THIS DRAWING

MATERIAL STAINLESS STEEL AISI 440 FED SPEC QQ-S-763 CLASS 440 COND A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 33386900590

DRAWN R. BRUNELLE DATE 5-2-63
CHECKED Paul Pappashriston
APPROVAL E. MacDonald 5-22-63
APPROVAL E. Thomp 5-23-63
NASA APPROVAL
MIT APPROVAL 24 May 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
GEAR, SPUR
(42T-96P)

CODE IDENT NO. | SIZE C | NASA NUMBER 1011825

SCALE 4/1 | WEIGHT | CALC ACTUAL | SHEET 1 OF 1

1011825

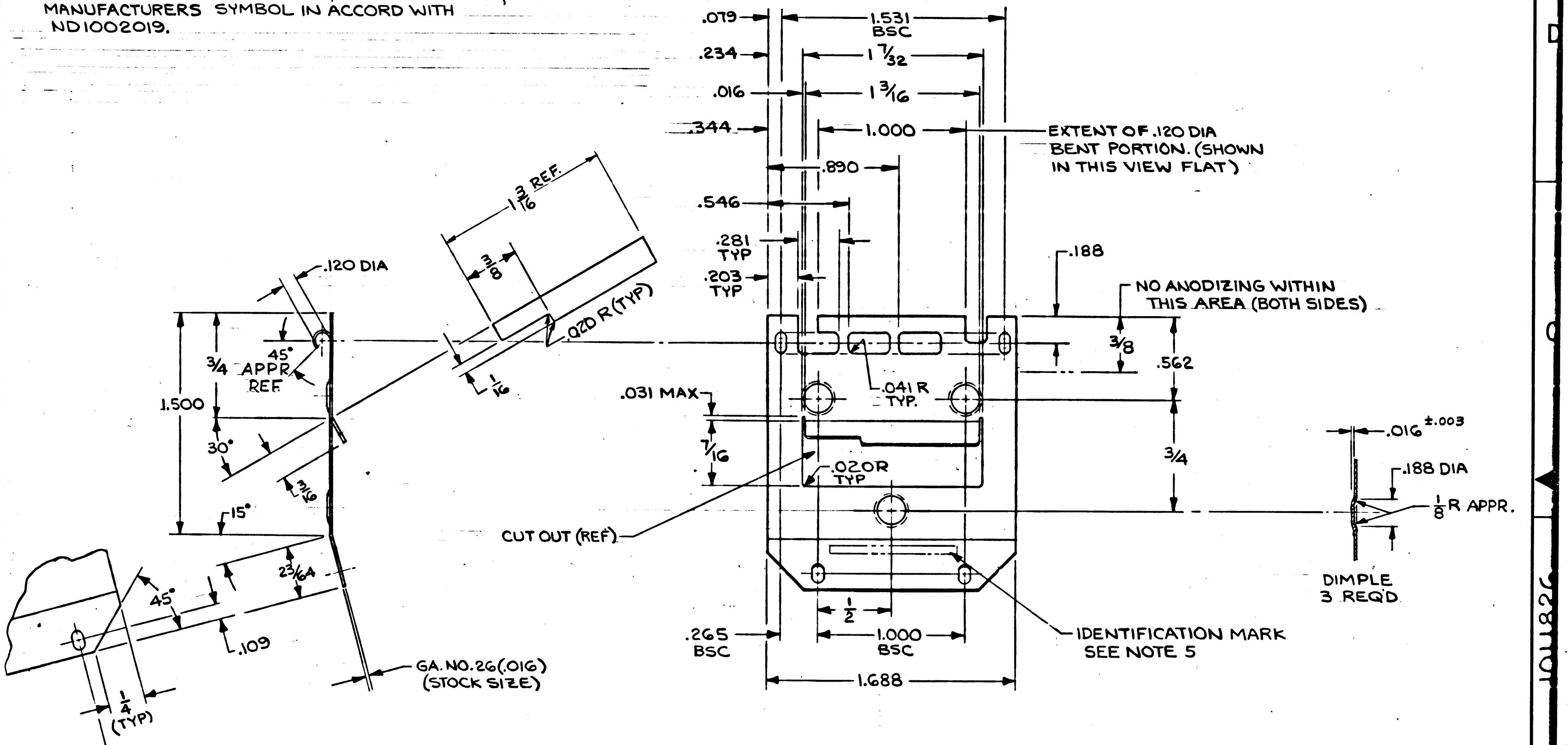
E-184

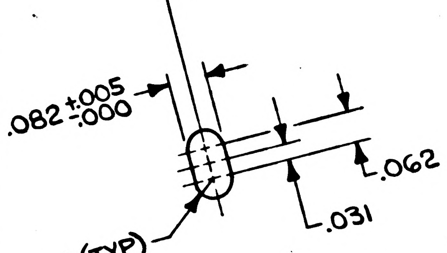
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011826

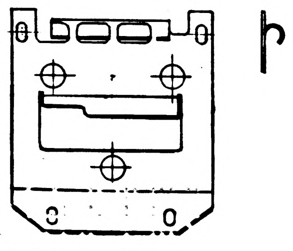
REVISIONS		01489 6-7-63		
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORD WITH ND1002078.
3. REMOVE BURRS IN ACCORD WITH ND1002079.
4. FINISH: ANODIZE PER MIL-A-8625 TYPE II BLACK (KPS-1005A.201) EXCEPT AS NOTED.
5. IDENTIFY USING NASA DWG NO., REVISION LETTER, AND MANUFACTURERS SYMBOL IN ACCORD WITH ND1002019.


.079
.234
.016
.344
.546
.281 TYP
.203 TYP
1.531 BSC
1 7/32
1 3/16
1.000
.890
EXTENT OF .120 DIA BENT PORTION. (SHOWN IN THIS VIEW FLAT)
.188
NO ANODIZING WITHIN THIS AREA (BOTH SIDES)
3/8
.562
.041 R TYP.
.031 MAX
7/16
.020 R TYP
3/4
CUT OUT (REF)
.016 ±.003
.188 DIA
1/8 R APPR.
DIMPLE 3 REQ'D
1/2
.265 BSC
1.000 BSC
1.688
IDENTIFICATION MARK SEE NOTE 5
1 3/16 REF.
3/8
.020 R (TYP)
1/16
.120 DIA
45° APPR. REF
3/4
1.500
30°
3/16
15°
23/64
45°
.109
GA. NO. 26 (.016) (STOCK SIZE)
1/4 (TYP)


.082 +.005 -.000
.062
.031
R (TYP)

SLOT ENLARGED
SCALE 4/1
(4 REQD)
⊕ .008 DIA



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011784	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 3003-H14 FED. SPEC QQ-A-359 TEMPER H14

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 56386900430

DRAWN J. Schuller DATE 5-2-63
CHECKED Thornton Stearns 5-29-63
APPROVAL Thornton Stearns 5-29-63
APPROVAL E. Dhenup 6-5-63
NASA APPROVAL W J Rhine 6-7-63
MIT APPROVAL W Coyle 7 Jun 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PLATE, MASK

CODE IDENT NO.
SIZE C
NASA NUMBER 1011826
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

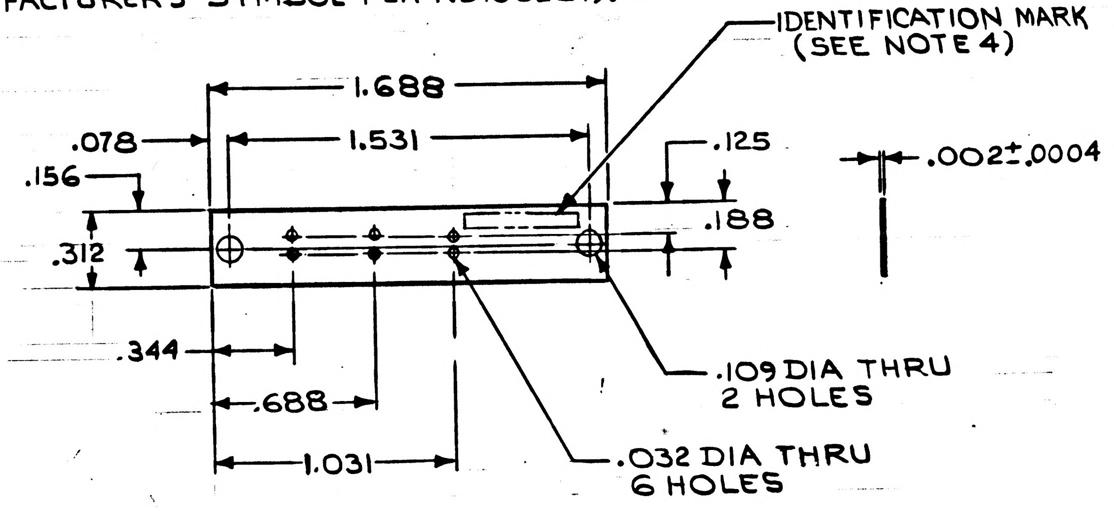
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011826

1011833

REVISIONS TDRR 01724			
SYM	DESCRIPTION	DATE	APPROVAL

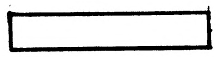
NOTES:
1. INTERRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. MATERIAL: INSULATION, ELECTRICAL, (MYLAR) SYNTHETIC-RESIN COMPOSITION, NONRIGID PER MIL-I-631 TYPE G, FILM TAPE, CLASS I
4. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019.



MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS


ACTUAL SIZE

1011900	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± —

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 3

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 25386900030

DRAWN E. DRAPALA DATE 5-6-63
CHECKED T. SULLIVAN 6-21-63
APPROVAL Thornton Sterns 6-21-63
APPROVAL E. Thomp 6-25-63
NASA APPROVAL W.J. Rhine 6-26-63
MIT APPROVAL W. Kupfer 26 June 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SHIM, INSULATING

CODE IDENT NO.	SIZE	NASA NUMBER
	B	1011833

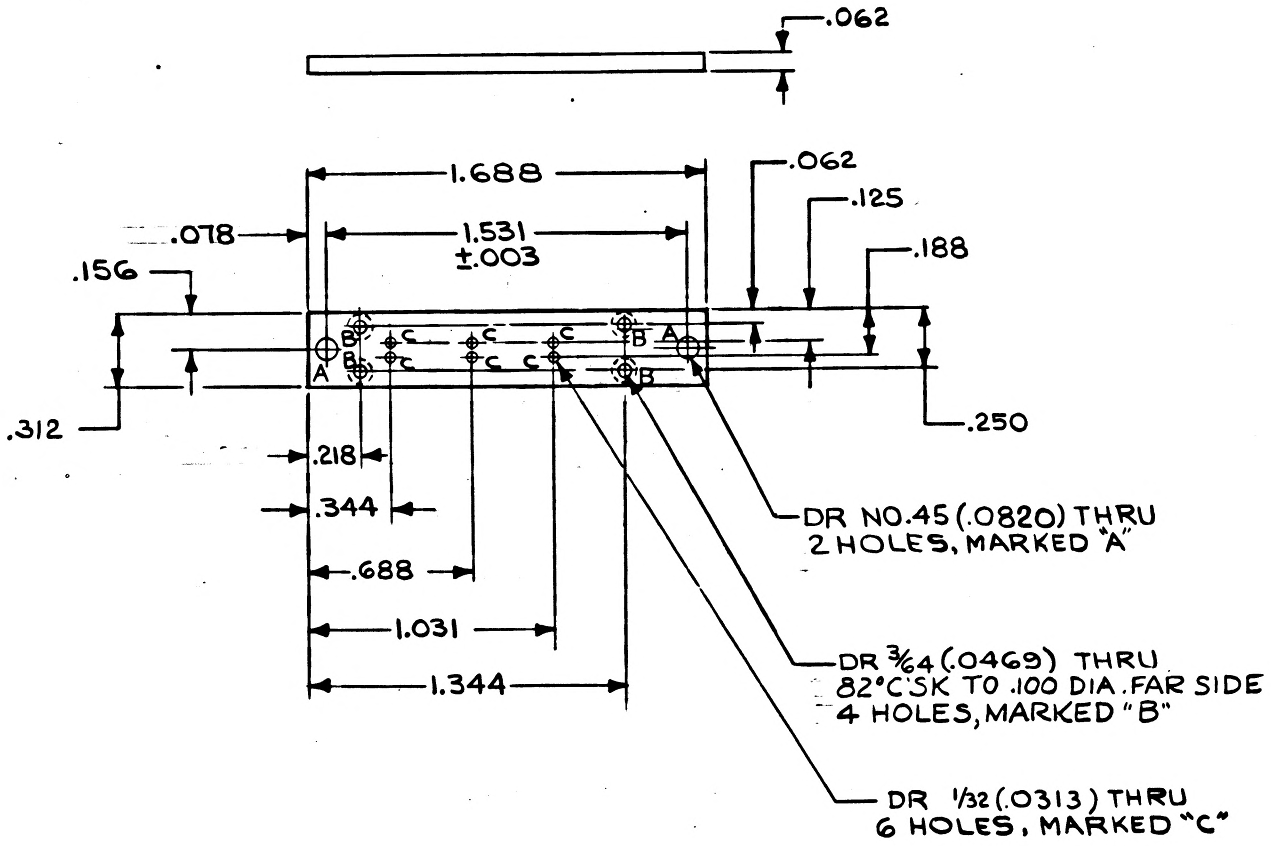
SCALE 2/1 WEIGHT CALC ACTUAL SHEET OF

E-153

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011836	REVISIONS T DRR 01489				
	SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. MATERIAL: PLASTIC SHEET, LAMINATED THERMOSETTING GLASS FIBER BASE, EPOXY RESIN HIGH TEMPERATURE TYPE IN COMPLETE CONFORMANCE WITH THE LATEST ISSUE OF MIL-P-18177 TYPE GEB



.062
1.688
1.531
±.003
.078
.156
.062
.125
.188
A
B
C
A
B
C
.312
.250
.218
.344
.688
1.031
1.344
DR NO.45 (.0820) THRU
2 HOLES, MARKED "A"
DR 3/64 (.0469) THRU
82° C'SK TO .100 DIA. FAR SIDE
4 HOLES, MARKED "B"
DR 1/32 (.0313) THRU
6 HOLES, MARKED "C"

ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011736	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± —

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 3

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 25386900050

DRAWN E. DRAPALA DATE 5-6-63
CHECKED Thornton Stearns 5-29-63
APPROVAL Thornton Stearns 5-29-63
APPROVAL E. [illegible] 6-3-63
NASA APPROVAL [illegible] 6-7-63
MIT APPROVAL [illegible] 7 Jun 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BOARD, TERMINAL

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011836
SCALE 2/1	WEIGHT CALC ACTUAL	SHEET 1 OF 1

1011836

E-154

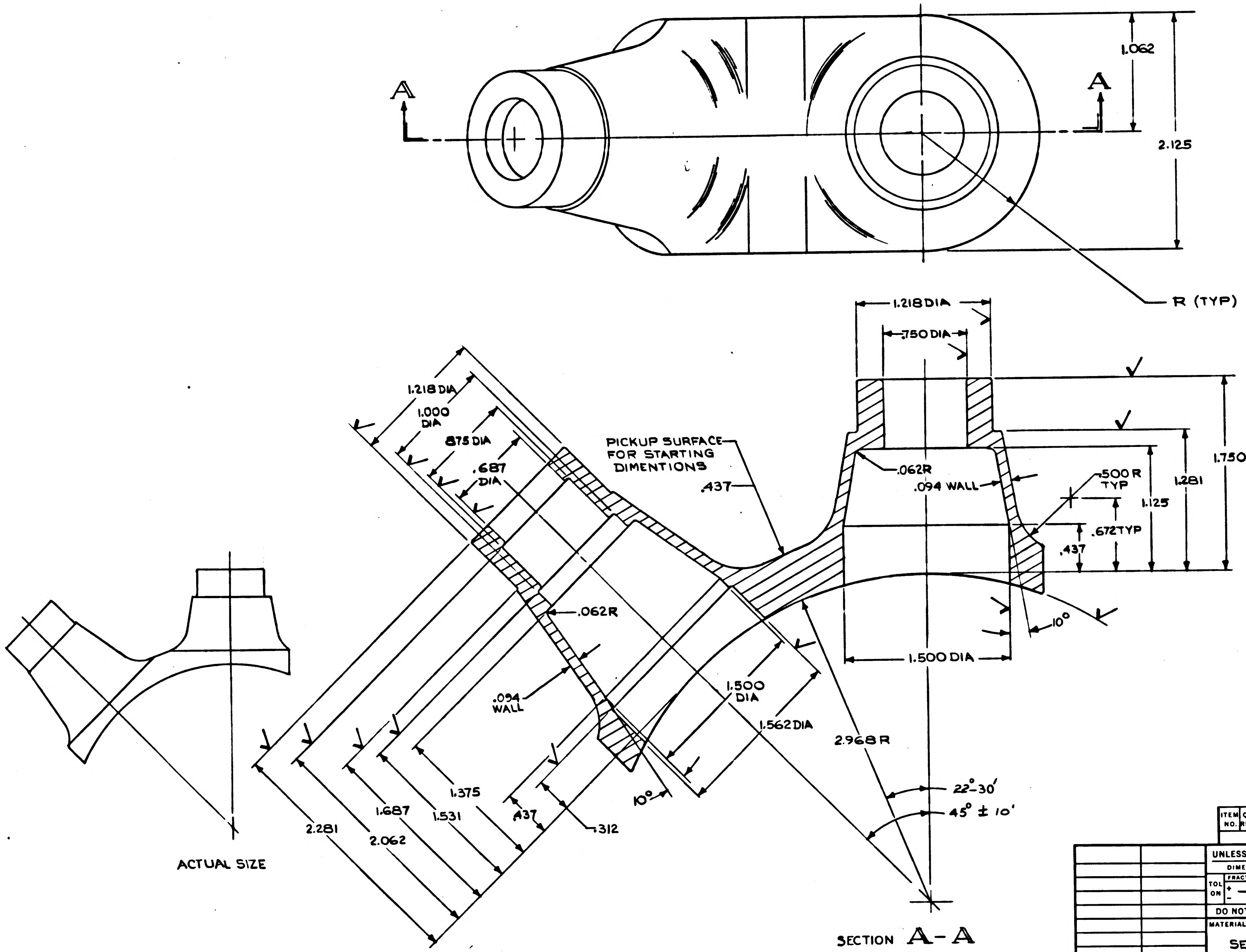
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011839

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REVISIONS TDRR 0149-

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. MATERIAL: INVESTMENT CASTING ALUMINUM ALLOY 356-T6
   FED. SPEC MIL-C-11866 (Ord) ALLOY NO. 356, COND. T6.
3. CORNER RADII AND FILLETS .031R UNLESS OTHERWISE SPECIFIED
4. SURFACES MARKED ✓ WILL BE MACHINED. DIM'S INCLUDE MACH. ALLOWANCE.
5. CASTING TOLERANCE ±.005 INCH / INCH
6. DIA'S AND SURFACES SUBSEQUENTLY NOT MACHINED, TO HAVE A CAST FINISH OF 80 RMS (MAX.)


A
A
1.062
2.125
R (TYP)
1.218 DIA
.750 DIA
1.750
1.281
1.125
.062R
.094 WALL
.500 R TYP
.672 TYP
.437
1.500 DIA
10°
1.218 DIA
1.000 DIA
.875 DIA
.687 DIA
PICKUP SURFACE FOR STARTING DIMENTIONS
.437
.062R
.094 WALL
1.500 DIA
1.562 DIA
2.968 R
22°-30'
45° ± 10'
10°
1.375
1.687
1.531
.437
.312
2.281
2.062
ACTUAL SIZE
SECTION A-A

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011840	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± —	± 1°

DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE 2
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 21368900030
DRAWN E. DRAPALA DATE 5-10-63
CHECKED 5-29-63
APPROVAL 5-29-63
APPROVAL E. Thomp 6-6-63
NASA APPROVAL W. J. Rhine 6-7-63
MIT APPROVAL 7 Jun 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, DUAL EYEPIECE
(CASTING)

CODE IDENT NO.
SIZE D
NASA NUMBER 1011839
SCALE 2/1
WEIGHT
CALC ACTUAL
SHEET
OF 1

1011839

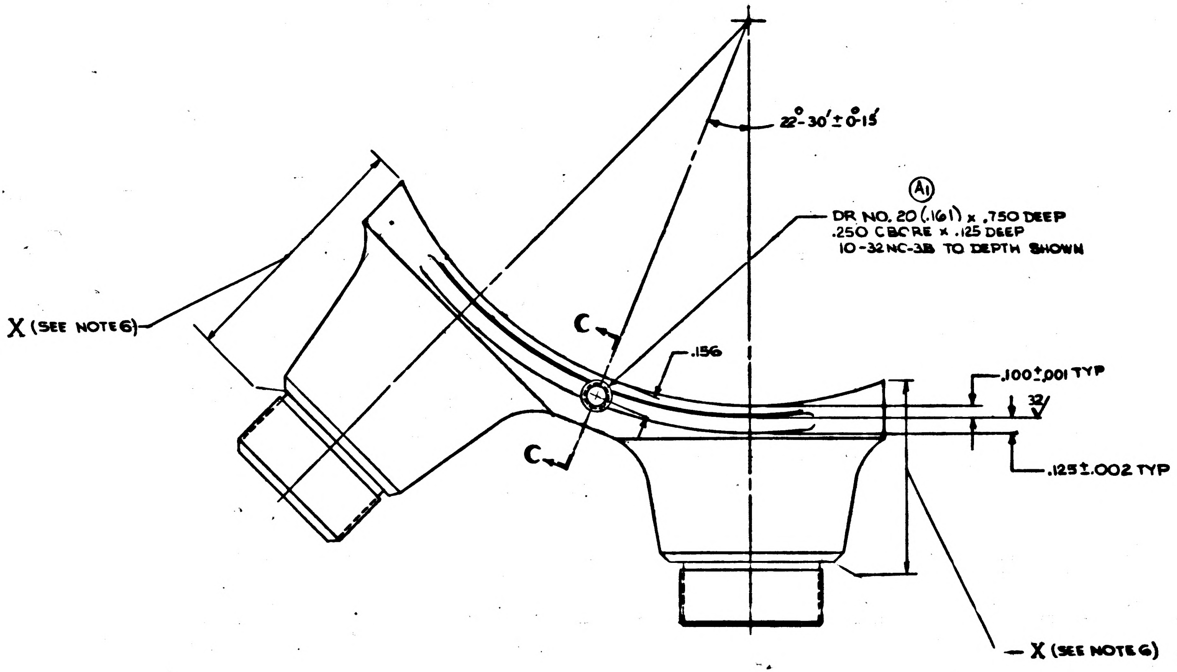
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ON ALL MACHINED SURFACES.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5 FINISH: BLACK ANODIZE PER MIL-8625, TYPE II BLACK (KPS.1005A.201)
6. IDENTIFY USING NASA DRAWING NO, REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.
Ⓐ3

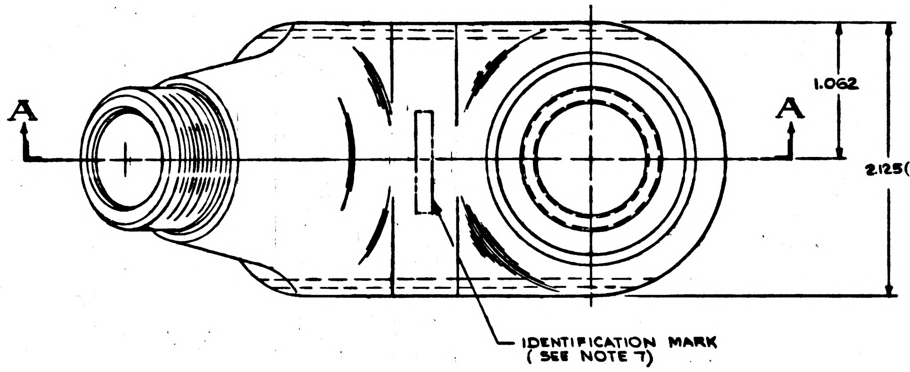
A	1011840

REVISIONS TDRR 01490

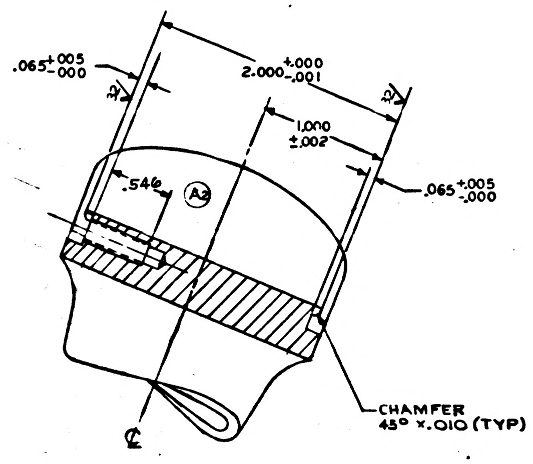
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3	C5 F3 H-10	1) DR NO. 20 (.161) WAS NO. 3 (.213) 2) .546 WAS .515 3) PAINT SPECS (NOTE 6) REMOVED. NOTE 6 WAS NOTE 7 TDRR 02041	7-16-63 7/17/63	



22°-30′ ± 0°-15′
Ⓐ1
DR NO. 20 (.161) x .750 DEEP
.250 CBORE x .125 DEEP
10-32 NC-3B TO DEPTH SHOWN
X (SEE NOTE 6)
C
C
.156
.100 ± .001 TYP
32√
.125 ± .002 TYP
X (SEE NOTE 6)

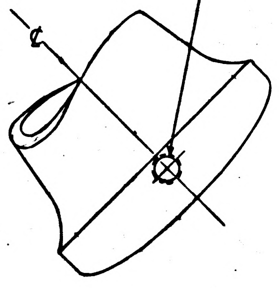


A
A
1.062
2.125 (REF)
IDENTIFICATION MARK
(SEE NOTE 7)



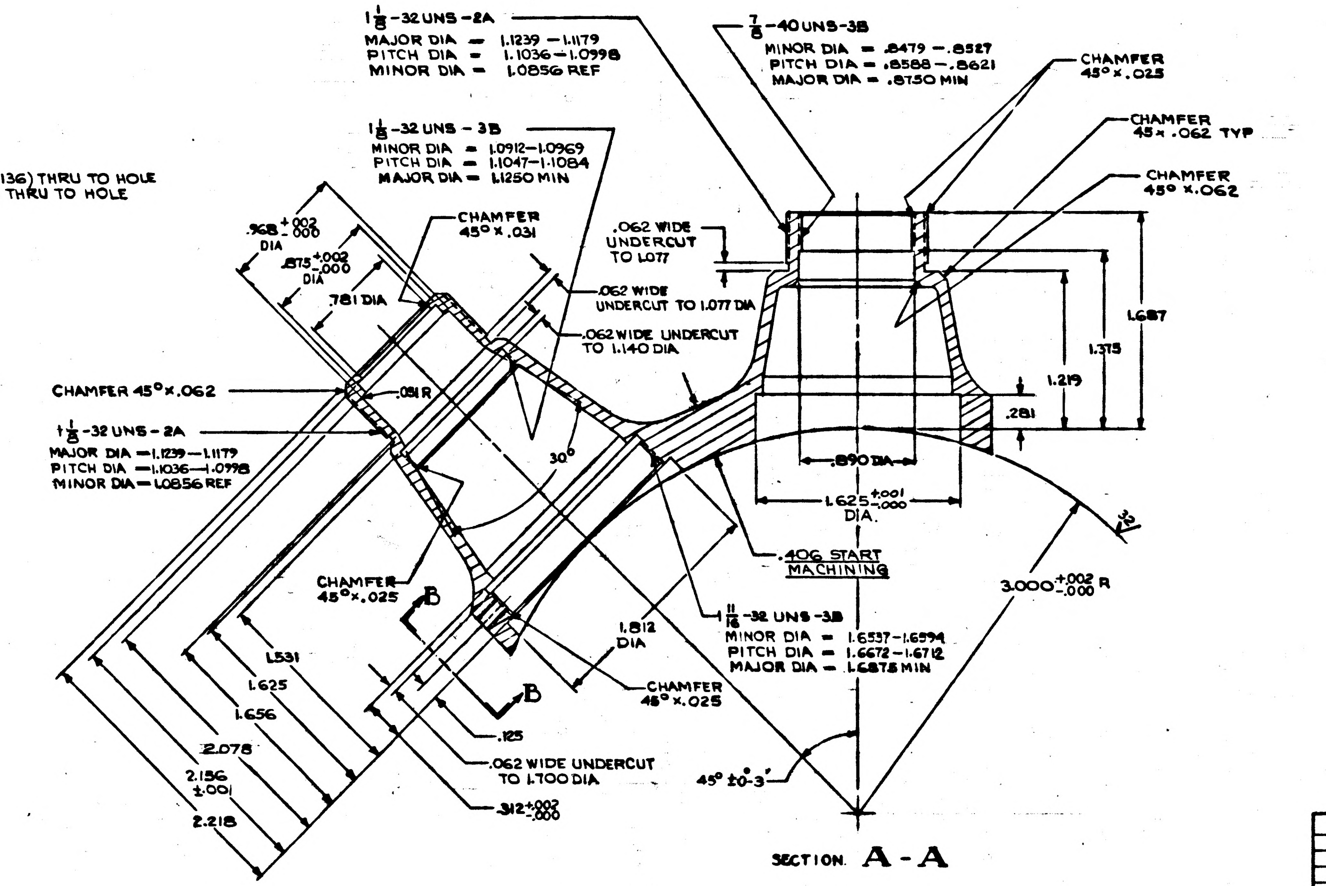
.065 +.005 -.000
32√
2.000 +.000 -.001
32√
1.000 ±.002
.546 Ⓐ2
.065 +.005 -.000
℄
CHAMFER 45° x .010 (TYP)

PARTIAL SECTION C - C



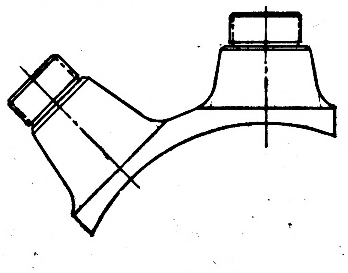
DR NO. 29 (.136) THRU TO HOLE
4-40 NC-3B THRU TO HOLE
℄

PARTIAL VIEW B - B



1 1/8 -32 UNS -2A
MAJOR DIA = 1.1239 - 1.1179
PITCH DIA = 1.1036 - 1.0998
MINOR DIA = 1.0856 REF
1 1/8 -32 UNS - 3B
MINOR DIA = 1.0912-1.0969
PITCH DIA = 1.1047-1.1084
MAJOR DIA = 1.1250 MIN
7/8 -40 UNS-3B
MINOR DIA = .8479 - .8527
PITCH DIA = .8588 - .8621
MAJOR DIA = .8750 MIN
CHAMFER 45° x .025
CHAMFER 45 x .062 TYP
CHAMFER 45° x .062
.968 +.002 -.000 DIA
.875 +.002 -.000 DIA
.781 DIA
CHAMFER 45° x .031
.062 WIDE UNDERCUT TO 1.077
.062 WIDE UNDERCUT TO 1.077 DIA
.062 WIDE UNDERCUT TO 1.140 DIA
1.687
1.375
1.219
.281
CHAMFER 45° x .062
.031 R
1 1/8 -32 UNS - 2A
MAJOR DIA = 1.1239 - 1.1179
PITCH DIA = 1.1036 - 1.0998
MINOR DIA = 1.0856 REF
30°
.890 DIA
1.625 +.001 -.000 DIA.
.406 START MACHINING
32√
3.000 +.002 -.000 R
CHAMFER 45° x .025
B
B
1.531
1.625
1.656
2.078
2.156 ±.001
2.218
1.812 DIA
1 11/16 -32 UNS -3B
MINOR DIA = 1.6537-1.6594
PITCH DIA = 1.6672-1.6712
MAJOR DIA = 1.6875 MIN
CHAMFER 45° x .025
.125
.062 WIDE UNDERCUT TO 1.700 DIA
.312 +.002 -.000
45° ± 0°-3′

SECTION A - A


ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011737	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING
MATERIAL 1011839
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57368901380
DRAWN E. DeABALLA DATE 5-13-63
CHECKED E. MacDonald 5-29-63
APPROVAL E. MacDonald 5-29-63
APPROVAL E. Dhoney 6-5-63
NASA APPROVAL W. J. Robin 6-7-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, DUAL EYEPIECE

CODE IDENT NO.
SIZE E
NASA NUMBER 1011840
SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

1011840

INCHES
PHOTOGRAPHIC SCALE ONLY

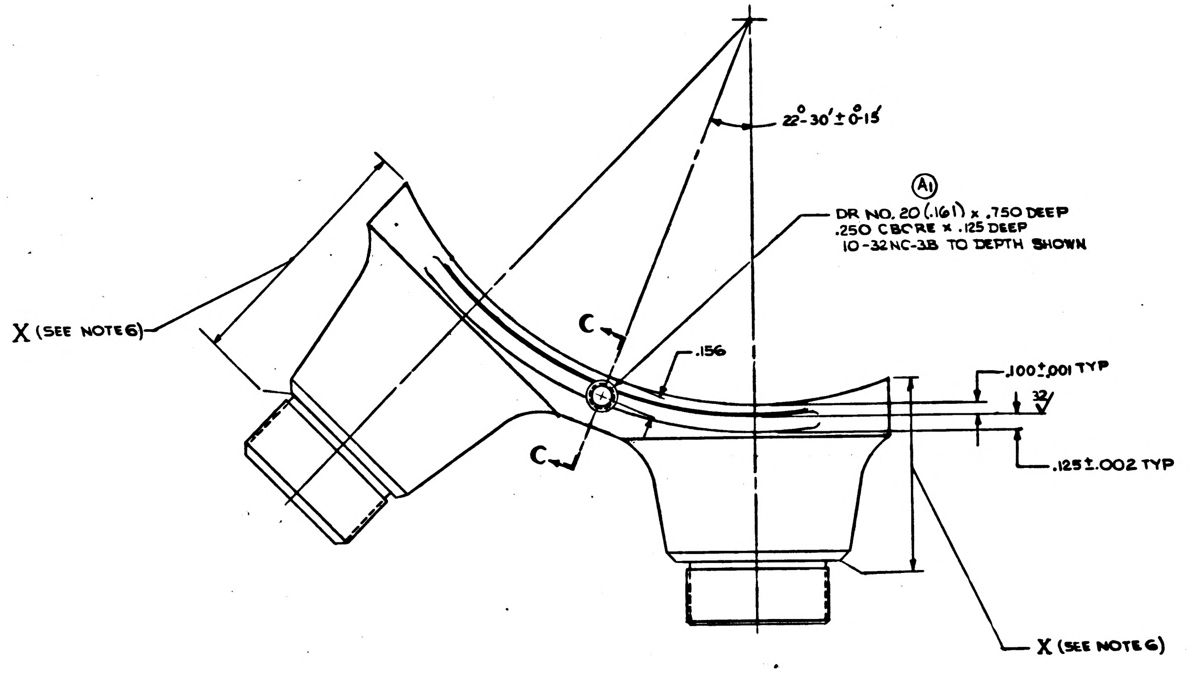
1011840 B

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ON ALL MACHINED SURFACES.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5 FINISH: BLACK ANODIZE PER MIL-8625, TYPE II BLACK (KPS.1005A.201)
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.

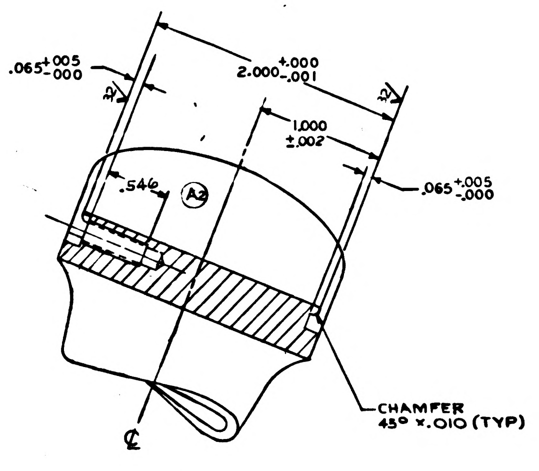
(A3)

REVISIONS TDRR 01490

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A_3	G-5 F-3 H-10	1) DR NO. 20 (.161) WAS NO 3 (.213) 2) .546 WAS .515 3) PAINT SPECS (NOTE 6) REMOVED. NOTE 6 WAS NOTE 7 TDRR 02041	7-16-63 7/17/63	
B	A2	K.I.C. P/N 57386901380 WAS 57368901380 PER TDRR NO. C2691	7-26-63 8/21/63	

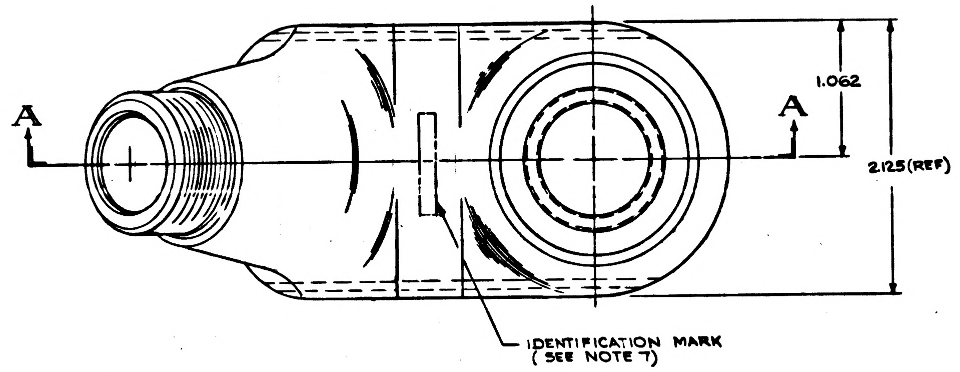


22°-30' ± 0°-15'
(A1)
DR NO. 20 (.161) x .750 DEEP
.250 CBORE x .125 DEEP
10-32NC-3B TO DEPTH SHOWN
X (SEE NOTE 6)
C
C
.156
.100 ± .001 TYP
32
.125 ± .002 TYP
X (SEE NOTE 6)

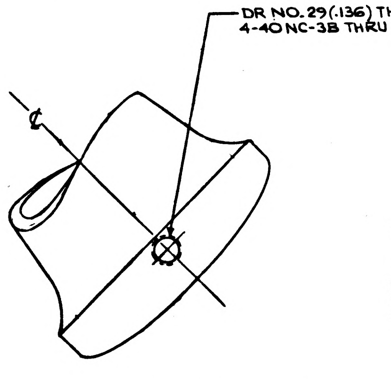


.065 +.005 -.000
2.000 +.000 -.001
32
32
1.000 ±.002
.546
(A2)
.065 +.005 -.000
CHAMFER 45° x .010 (TYP)
℄

PARTIAL SECTION C-C

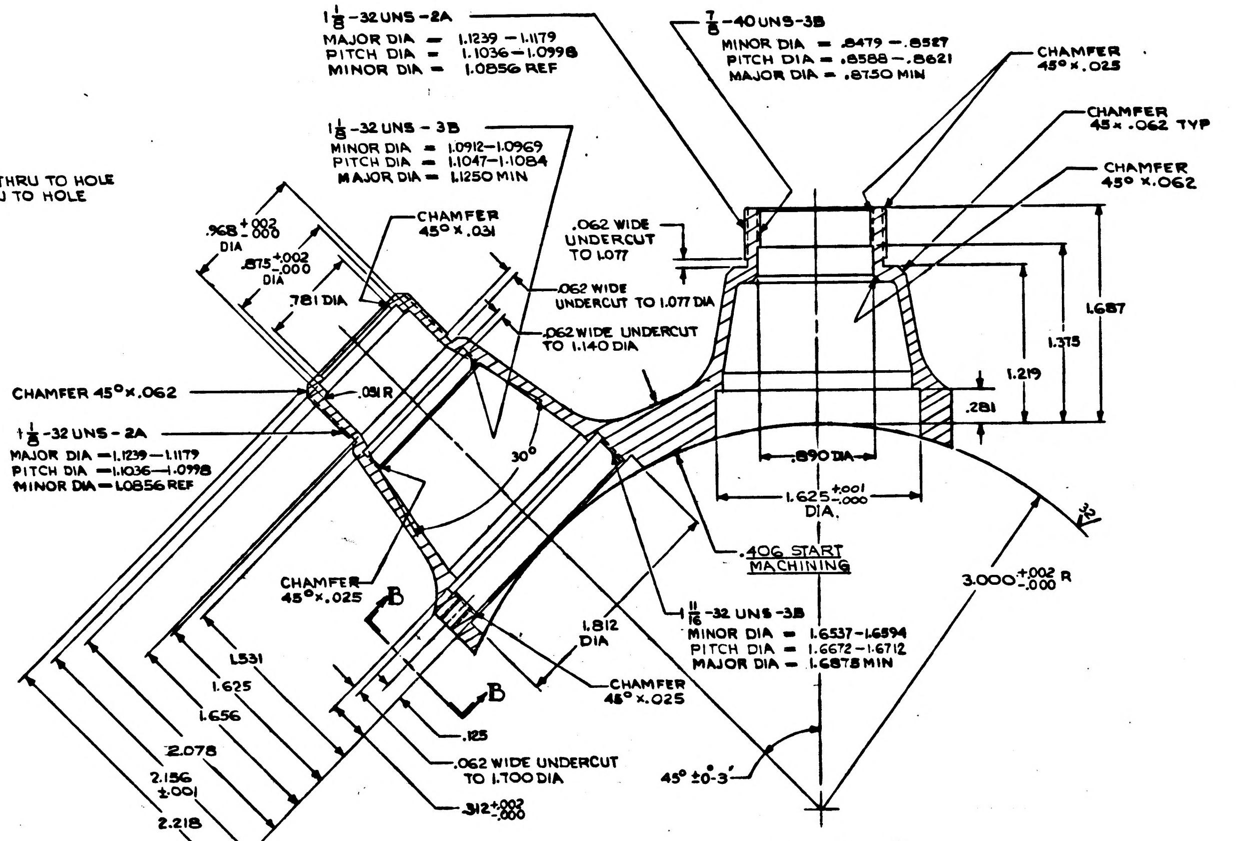


A
A
1.062
2.125 (REF)
IDENTIFICATION MARK (SEE NOTE 7)



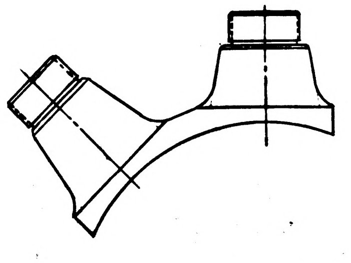
DR NO. 29 (.136) THRU TO HOLE
4-40NC-3B THRU TO HOLE
℄

PARTIAL VIEW B-B



1 1/8-32UNS-2A
MAJOR DIA = 1.1239 - 1.1179
PITCH DIA = 1.1036 - 1.0998
MINOR DIA = 1.0856 REF
1 1/8-32 UNS-3B
MINOR DIA = 1.0912-1.0969
PITCH DIA = 1.1047-1.1084
MAJOR DIA = 1.1250 MIN
7/8-40UNS-3B
MINOR DIA = .8479 - .8527
PITCH DIA = .8588 - .8621
MAJOR DIA = .8750 MIN
CHAMFER 45° x .025
CHAMFER 45 x .062 TYP
CHAMFER 45° x .062
.968 +.002 -.000 DIA
.875 +.002 -.000 DIA
.781 DIA
CHAMFER 45° x .031
.062 WIDE UNDERCUT TO 1.077
.062 WIDE UNDERCUT TO 1.077 DIA
.062 WIDE UNDERCUT TO 1.140 DIA
CHAMFER 45° x .062
.051 R
1 1/8-32UNS-2A
MAJOR DIA = 1.1239 - 1.1179
PITCH DIA = 1.1036 - 1.0998
MINOR DIA = 1.0856 REF
30°
1.687
1.375
1.219
.281
.890 DIA
1.625 +.001 -.000 DIA.
.406 START MACHINING
32
3.000 +.002 -.000 R
CHAMFER 45° x .025
B
B
1.531
1.625
1.656
2.078
2.156 ±.001
2.218
1.812 DIA
1 11/16-32 UNS-3B
MINOR DIA = 1.6537-1.6594
PITCH DIA = 1.6672-1.6712
MAJOR DIA = 1.6875 MIN
CHAMFER 45° x .025
.125
.062 WIDE UNDERCUT TO 1.700 DIA
.312 +.002 -.000
45° ±0°-3'

SECTION A-A



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — ; DECIMALS ± .005 ; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL 1011839
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901380 (B)
DRAWN E. DRABALA DATE 5-13-63
CHECKED [illegible] 5-29-63
APPROVAL [illegible] 5-29-63
APPROVAL [illegible] 6-5-63
NASA APPROVAL W.J. R[illegible] 6-7-63
MIT APPROVAL [illegible]

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, DUAL EYEPIECE

CODE IDENT NO.
SIZE E
NASA NUMBER 1011840
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

NEXT ASSY	USED ON
1011737	1011000

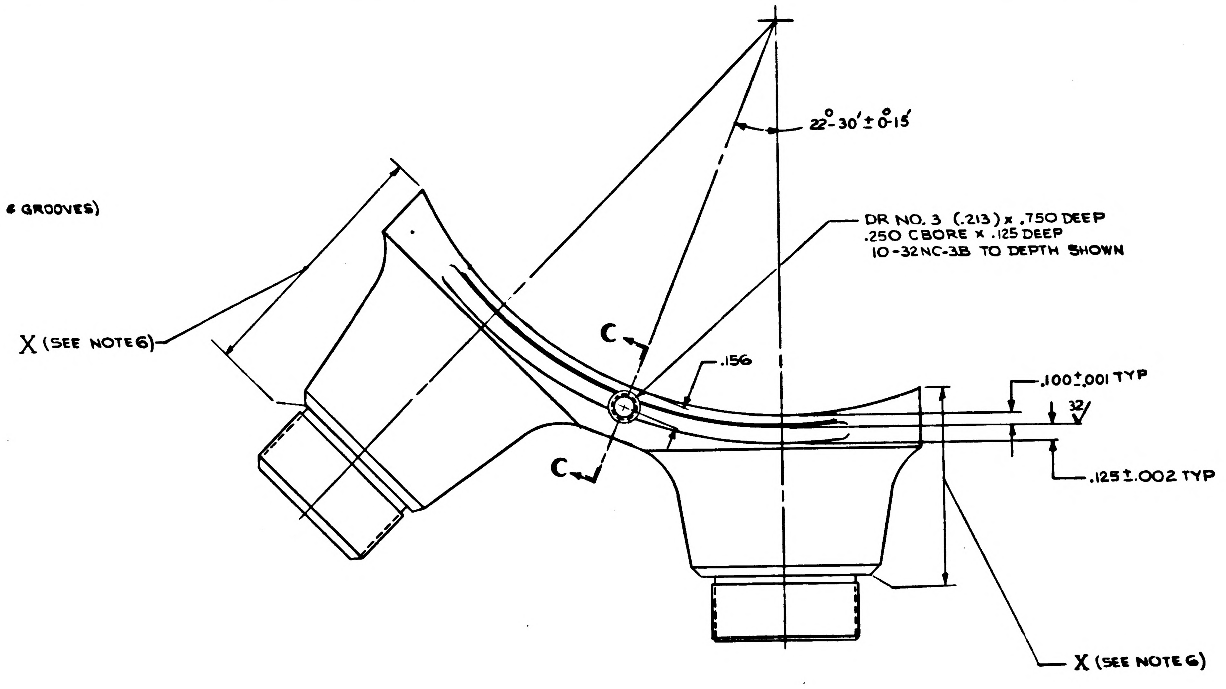
APPLICATION

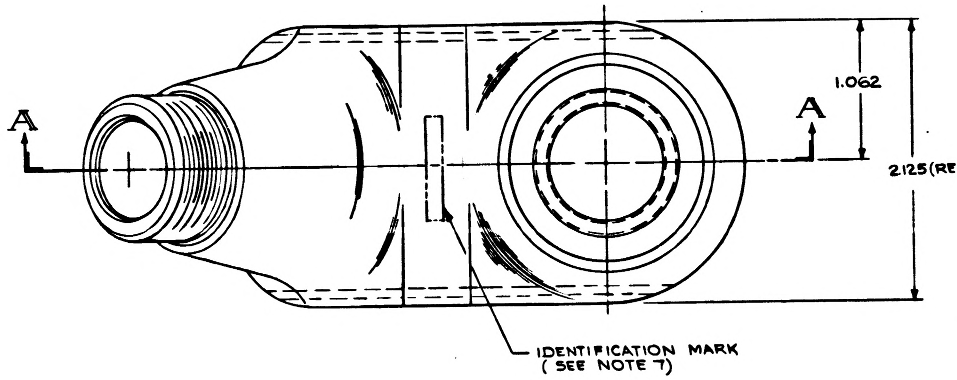
INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

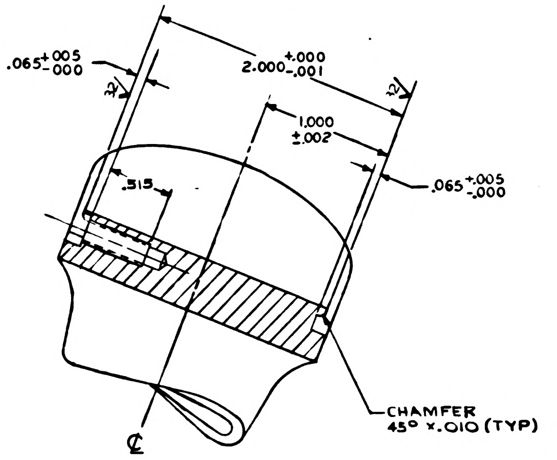
1011840

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

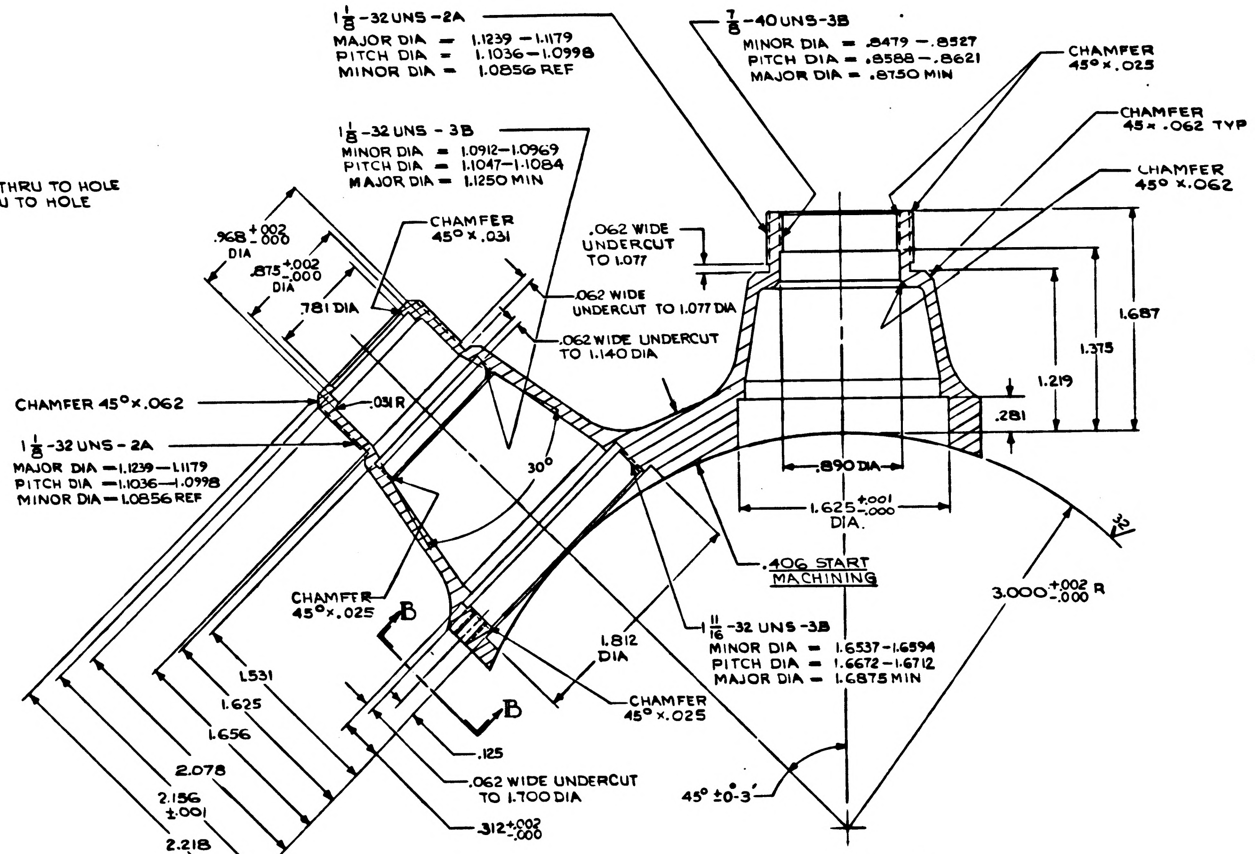
NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ON ALL MACHINED SURFACES.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. FINISH: BLACK ANODIZE PER MIL-8625, TYPE II BLACK (KPS.1005A.201)
6. APPLY CHROMATE PRIMER IN ACCORDANCE WITH SPEC MIL-C-5541 PLUS TWO (2) COATS OF LUSTRELESS GRAY ALKYD ENAMEL PER SPEC ND 1002113, ON SURFACES MARKED X. (MASK ALL HOLES & GROOVES)
7. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019.


X (SEE NOTE 6)
22°-30' ± 0°-15'
DR NO. 3 (.213) x .750 DEEP
.250 CBORE x .125 DEEP
10-32NC-3B TO DEPTH SHOWN
C
C
.156
.100±.001 TYP
32√
.125±.002 TYP
X (SEE NOTE 6)

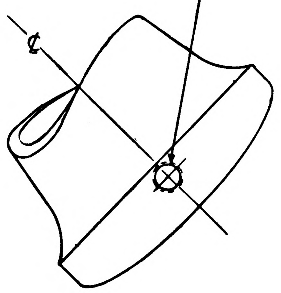

A
A
1.062
2.125 (REF)
IDENTIFICATION MARK
(SEE NOTE 7)


.065 +.005 -.000
32√
2.000 +.000 -.001
32√
1.000 ±.002
.515
.065 +.005 -.000
CHAMFER 45° x .010 (TYP)
℄

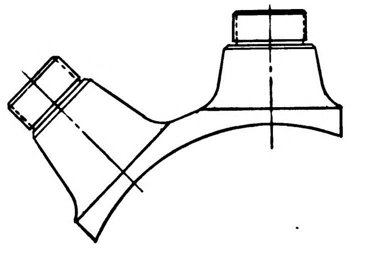
PARTIAL SECTION C-C


1 1/8-32 UNS-2A
MAJOR DIA = 1.1239 — 1.1179
PITCH DIA = 1.1036 — 1.0998
MINOR DIA = 1.0856 REF
7/8-40 UNS-3B
MINOR DIA = .8479 — .8527
PITCH DIA = .8588 — .8621
MAJOR DIA = .8750 MIN
CHAMFER 45° x .025
CHAMFER 45 x .062 TYP
CHAMFER 45° x .062
1 1/8-32 UNS-3B
MINOR DIA = 1.0912—1.0969
PITCH DIA = 1.1047—1.1084
MAJOR DIA = 1.1250 MIN
.968 +.002 -.000 DIA
.875 +.002 -.000 DIA
.781 DIA
CHAMFER 45° x .031
.062 WIDE UNDERCUT TO 1.077
.062 WIDE UNDERCUT TO 1.077 DIA
.062 WIDE UNDERCUT TO 1.140 DIA
1.687
1.375
1.219
.281
CHAMFER 45° x .062
.031 R
1 1/8-32 UNS-2A
MAJOR DIA = 1.1239 — 1.1179
PITCH DIA = 1.1036 — 1.0998
MINOR DIA = 1.0856 REF
30°
.890 DIA
1.625 +.001 -.000 DIA.
32√
.406 START MACHINING
3.000 +.002 -.000 R
CHAMFER 45° x .025
B
1.812 DIA
1 11/16-32 UNS-3B
MINOR DIA = 1.6537-1.6594
PITCH DIA = 1.6672-1.6712
MAJOR DIA = 1.6875 MIN
1.531
1.625
1.656
B
CHAMFER 45° x .025
.125
2.078
2.156 ±.001
2.218
.062 WIDE UNDERCUT TO 1.700 DIA
.312 +.002 -.000
45° ±0°-3'

SECTION A-A


DR NO. 29 (.136) THRU TO HOLE
4-40NC-3B THRU TO HOLE
℄

PARTIAL VIEW B-B



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011737	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — ; DECIMALS ± .005 ; ANGLES ± 10
DO NOT SCALE THIS DRAWING
MATERIAL 1011839
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57368901380
DRAWN E. DRAPALA DATE 5-13-63
CHECKED 5-24-63
APPROVAL 5-24-63
APPROVAL 6-5-63
NASA APPROVAL W. G. R. 6-7-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, DUAL EYEPIECE

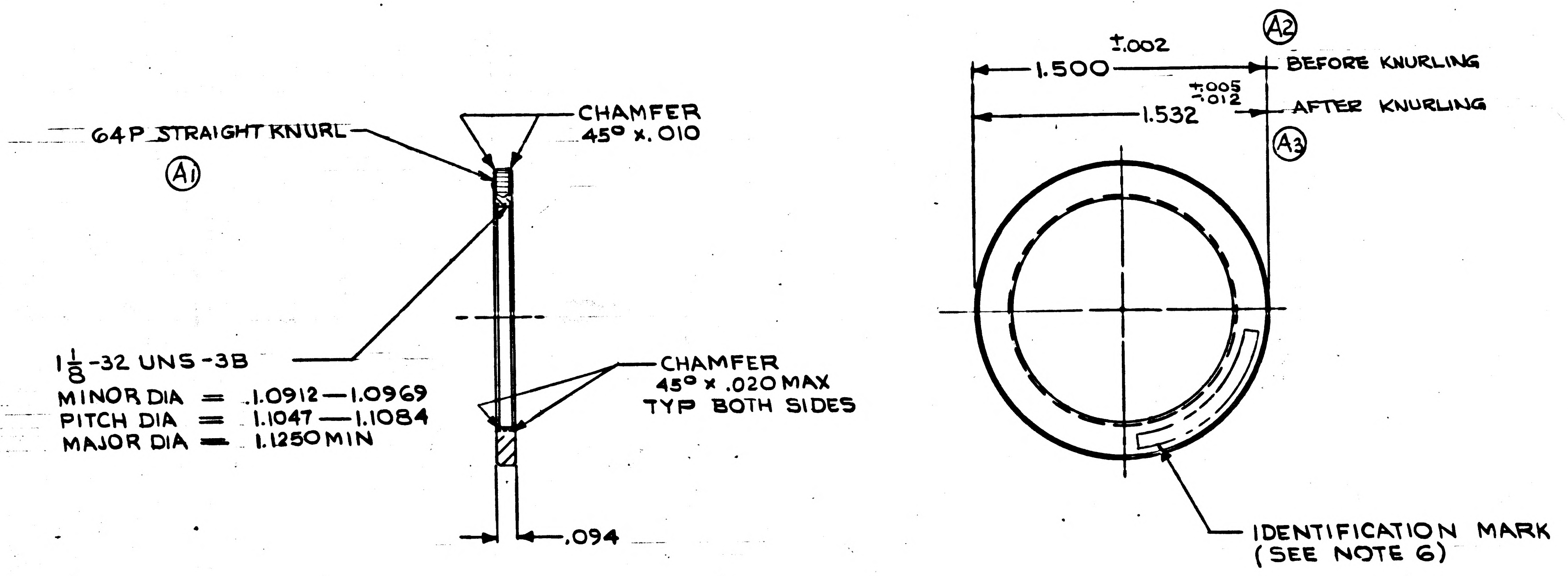
CODE IDENT NO.
SIZE E
NASA NUMBER 1011840
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011840

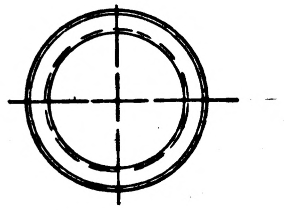
1011843 A

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS 01490				
A3		REVISED RER TDRR NO. 02444	8-8-63	WK

NOTES
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63 FINISH ALL OVER
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. FINISH: PASSIVATE IN ACCORDANCE WITH MIL-STD-171 (KPS-1005I.200).
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019



64P STRAIGHT KNURL
A1
CHAMFER
45° x .010
1 1/8-32 UNS-3B
MINOR DIA = 1.0912—1.0969
PITCH DIA = 1.1047—1.1084
MAJOR DIA = 1.1250 MIN
CHAMFER
45° x .020 MAX
TYP BOTH SIDES
.094
A2
±.002
1.500
BEFORE KNURLING
+.005 -.012
1.532
AFTER KNURLING
A3
IDENTIFICATION MARK
(SEE NOTE 6)



ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011737	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL STAINLESS STEEL AISI 440 C FED SPEC QQ-S-763 CLASS 440, COND. A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901410

DRAWN E. DRAPALA DATE 5-14-63
CHECKED 5-29-63
APPROVAL 5-29-63
APPROVAL 6-5-63
NASA APPROVAL W J 6-7-63
MIT APPROVAL 7 Jun 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RING, LOCKING

CODE IDENT NO. | SIZE C | NASA NUMBER 1011843
SCALE 2/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

E-154

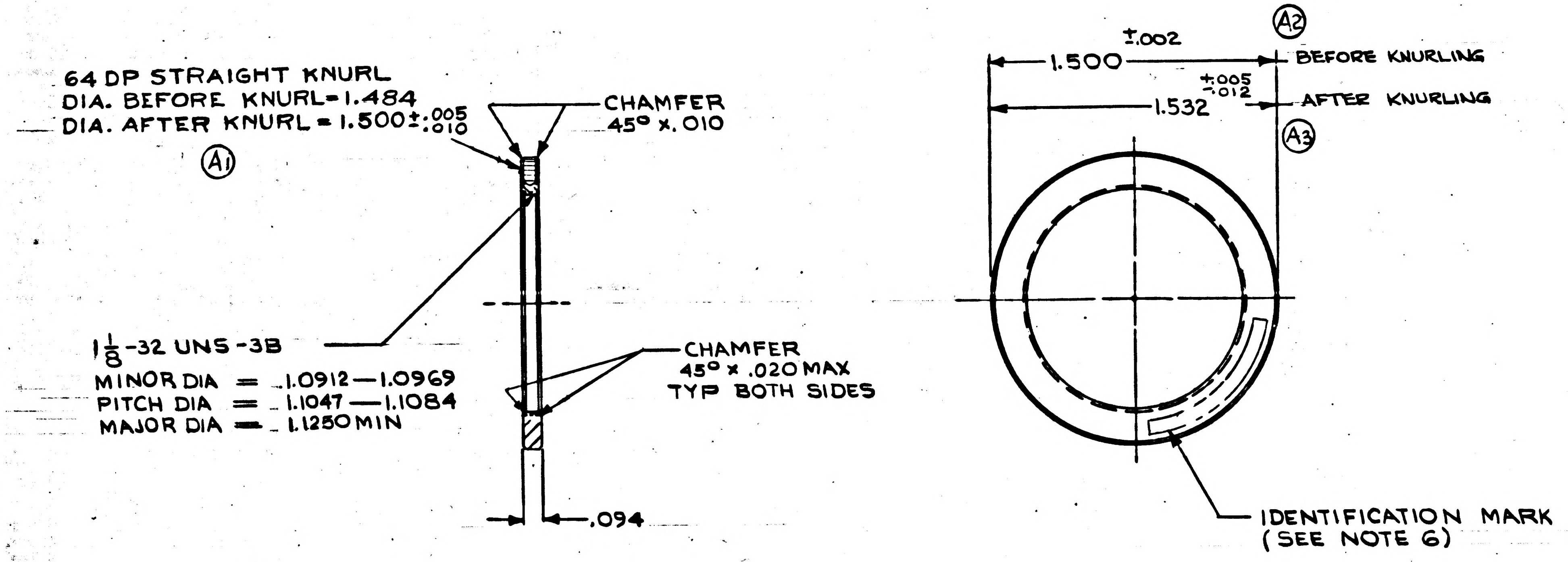
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

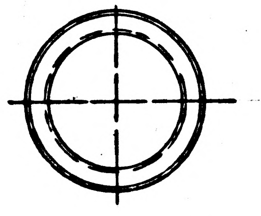
B	1011843

REVISIONS 01490

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	3	REVISED RER TDRR NO.02444	8-8-63	WK
B	3	REVISED PER TDRR NO. 03351	9/23/63	9/26

NOTES
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. FINISH: PASSIVATE IN ACCORDANCE WITH MIL-STD-171 TABLE V-A FINISH NO. 5. 4. 1. (KPS-1005I.200)
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019


64 DP STRAIGHT KNURL
DIA. BEFORE KNURL = 1.484
DIA. AFTER KNURL = 1.500 +.005 -.010
A1
CHAMFER 45° x .010
1 1/8-32 UNS-3B
MINOR DIA = 1.0912—1.0969
PITCH DIA = 1.1047—1.1084
MAJOR DIA = 1.1250 MIN
CHAMFER 45° x .020 MAX TYP BOTH SIDES
.094
1.500 ±.002
BEFORE KNURLING
A2
1.532 +.005 -.012
AFTER KNURLING
A3
IDENTIFICATION MARK (SEE NOTE 6)



ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011737	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL CORROSION RESISTING STEEL FED SPEC QQ-S-763 CLASS 440C, COND-A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901410

DRAWN E. DRAPALA DATE 5-14-63
CHECKED E. McDonald 5-29-63
APPROVAL E. McDonald 5-29-63
APPROVAL E. Thomp 6-5-63
NASA APPROVAL W J 6-7-63
MIT APPROVAL 7 Jun 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RING, LOCKING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011843
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

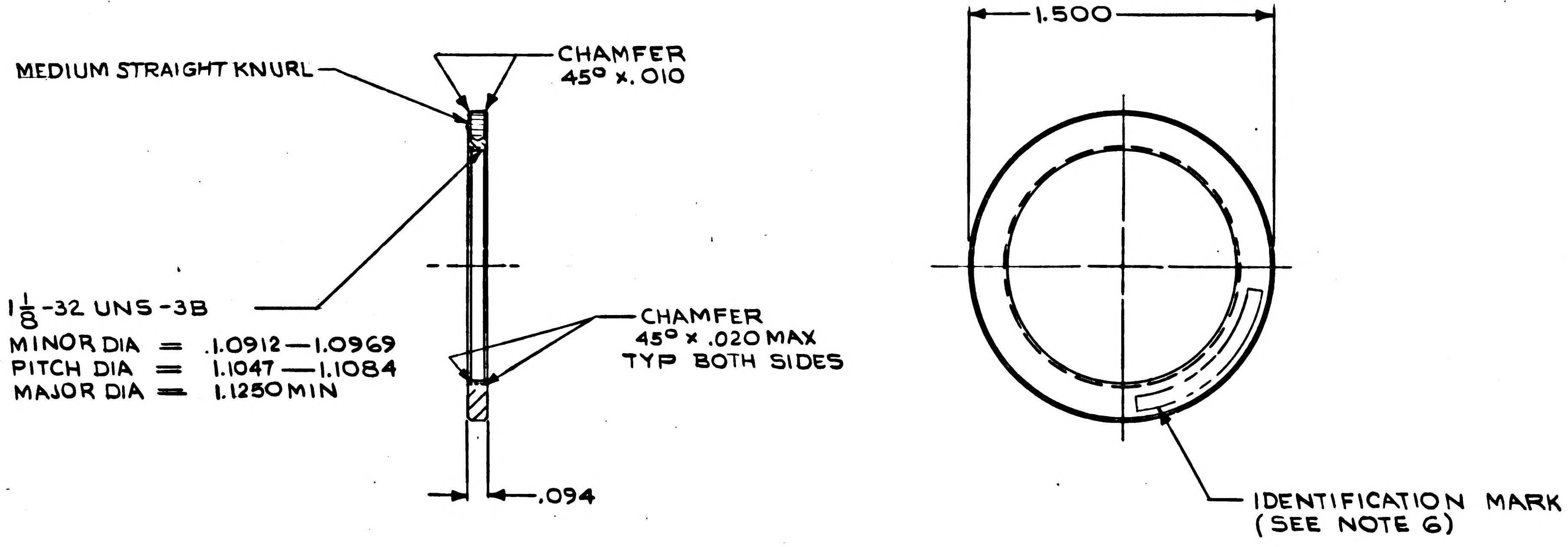
E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

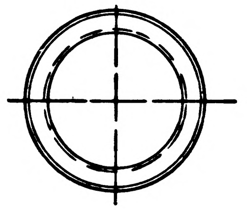
1011843

REVISIONS 01490				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. $\sqrt{63}$ FINISH ALL OVER
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. FINISH: PASSIVATE IN ACCORDANCE WITH MIL-STD-171 (KPS-1005I.200).
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019



MEDIUM STRAIGHT KNURL
CHAMFER 45° x .010
1.500
1 1/8-32 UNS-3B
MINOR DIA = .1.0912—1.0969
PITCH DIA = 1.1047—1.1084
MAJOR DIA = 1.1250 MIN
CHAMFER 45° x .020 MAX TYP BOTH SIDES
.094
IDENTIFICATION MARK (SEE NOTE 6)



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011737	1011000
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL STAINLESS STEEL AISI 440 C FED SPEC QQ-S-763 CLASS 440, COND. A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901410

DRAWN E. DRAPALA DATE 5-14-63
CHECKED E McDonald 5-29-63
APPROVAL E McDonald 5-29-63
APPROVAL E. Thomp 6-5-63
NASA APPROVAL W J Rhine 6-7-63
MIT APPROVAL 7 Jun 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RING, LOCKING

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011843

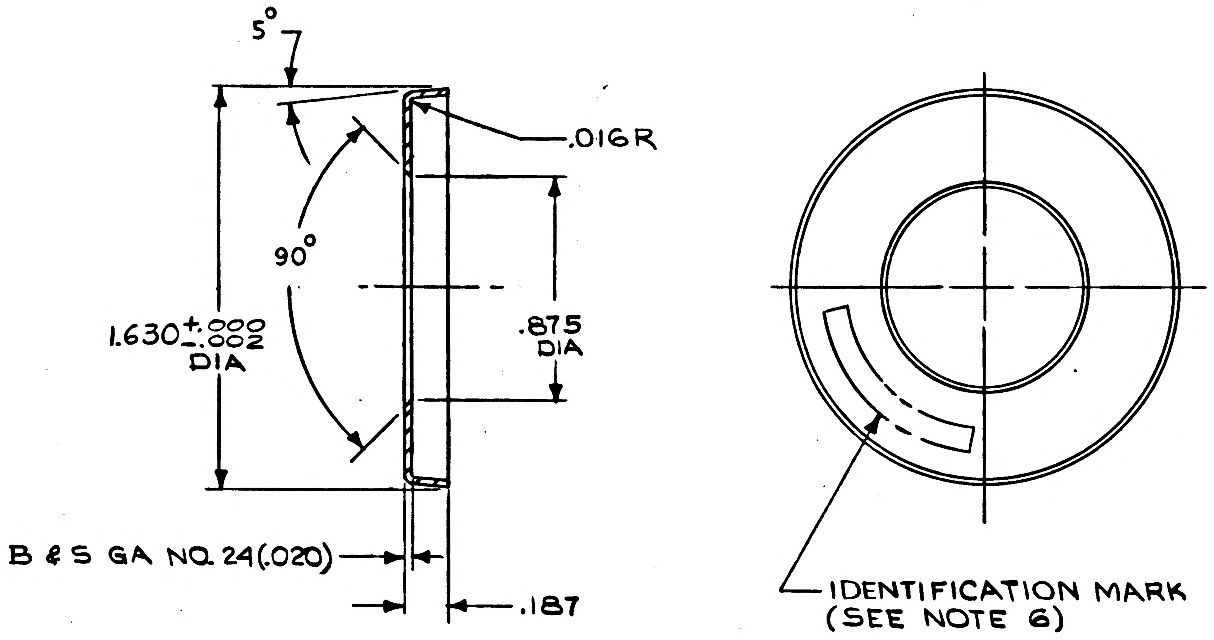
SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

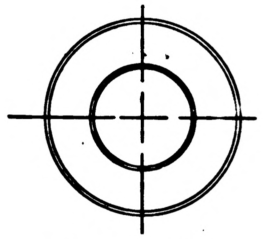
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011847

REVISIONS 01490				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: BLACK ANODIZE IN ACCORDANCE WITH MIL-A-8625 TYPE II BLACK (KPS-1005A.201)
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019





ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011737	1011000
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM
ALLOY 5052-H34
FED. SPEC QQ-A-318
TEMPER H34

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 56368900450

DRAWN E. DRAPALA DATE 5-16-63
CHECKED H. Borenstein 6-6-63
APPROVAL E. MacDonald 6-6-63
APPROVAL E. Thomas 6-6-63
NASA APPROVAL W. J. Rhine 6-7-63
MIT APPROVAL W. Hoffer 7 June 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
DIAPHRAGM

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011847

SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

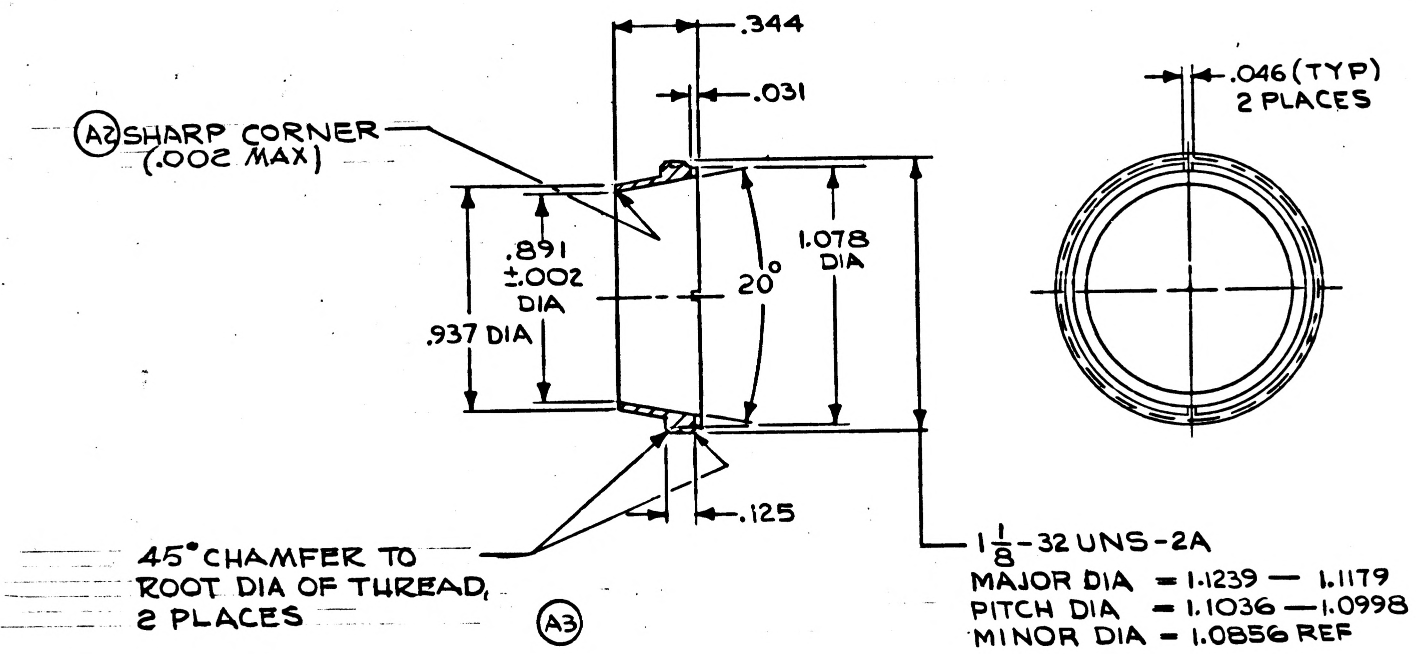
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

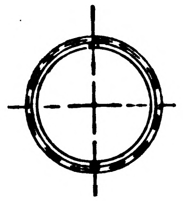
1011847

A	1011849

REVISIONS 01490				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO. 02683	8/21/63	

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER (A1)
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: BLACK ANODIZE IN ACCORDANCE WITH MIL-A-8625, TYPE II BLACK (KPS.1005A.201)
6. IDENTYFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019.


.344
.031
(A2) SHARP CORNER (.002 MAX)
.891 ±.002 DIA
.937 DIA
20°
1.078 DIA
.125
45° CHAMFER TO ROOT DIA OF THREAD, 2 PLACES (A3)
1 1/8-32 UNS-2A
MAJOR DIA = 1.1239 — 1.1179
PITCH DIA = 1.1036 — 1.0998
MINOR DIA = 1.0856 REF
.046 (TYP) 2 PLACES


ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011737	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 6061-T6 FED SPEC QQ-A-325 TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901440

DRAWN E. DRAPALA DATE 5-20-63
CHECKED E. J. MacDonald 5-29-63
APPROVAL E. J. MacDonald 5-29-63
APPROVAL E. Manys 6-5-63
NASA APPROVAL W. J. Rhine 6-7-63
MIT APPROVAL 7 Jun 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RING, LOCKING

CODE IDENT NO. | SIZE C | NASA NUMBER 1011849
SCALE 2/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

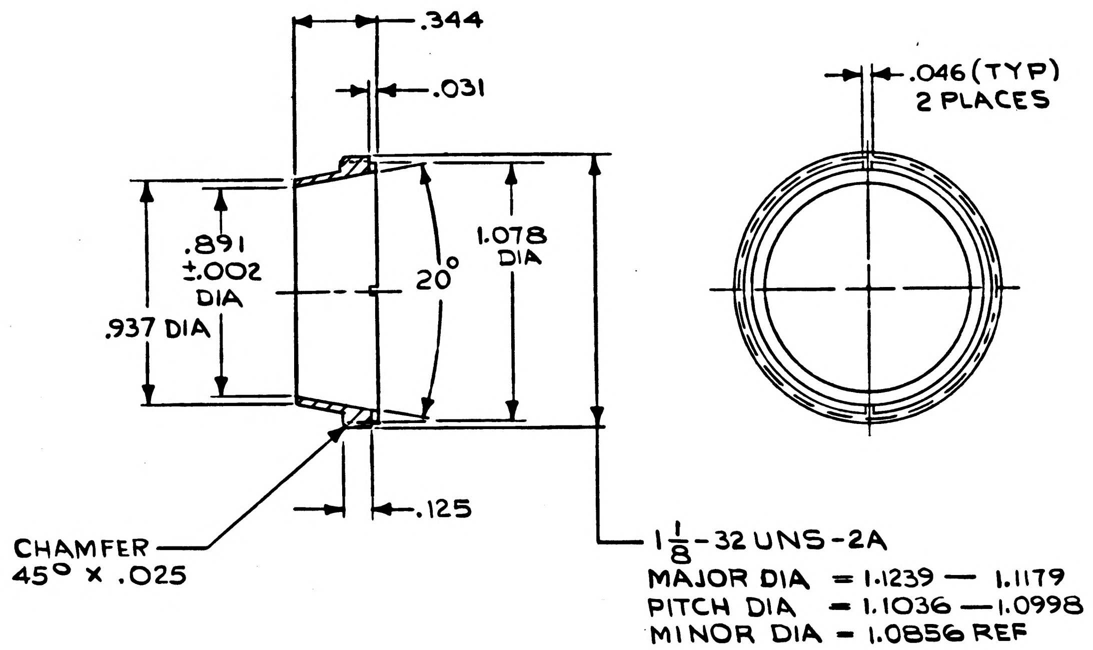
1011849A

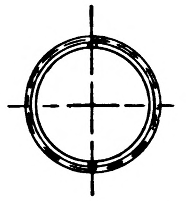
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011849

REVISIONS 01490				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   - a. 63√ FINISH ALL OVER
   - b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: BLACK ANODIZE IN ACCORDANCE WITH MIL-A-8625, TYPE II BLACK (KPS.1005A.201)
6. IDENTYFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019.


.344
.031
.046 (TYP)
2 PLACES
.891
±.002
DIA
.937 DIA
20°
1.078
DIA
.125
CHAMFER
45° X .025
1 1/8-32 UNS-2A
MAJOR DIA = 1.1239 — 1.1179
PITCH DIA = 1.1036 — 1.0998
MINOR DIA = 1.0856 REF


ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011737	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± 10

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 6061-T6 FED SPEC QQ-A-325 TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901440

DRAWN E. DRAPALA DATE 5-20-63
CHECKED E. J. MacDonald 5-29-63
APPROVAL E. J. MacDonald 5-29-63
APPROVAL E. Thomp 6-5-63
NASA APPROVAL W. J. Rhine 6-7-63
MIT APPROVAL 7 June 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RING, LOCKING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011849
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-184

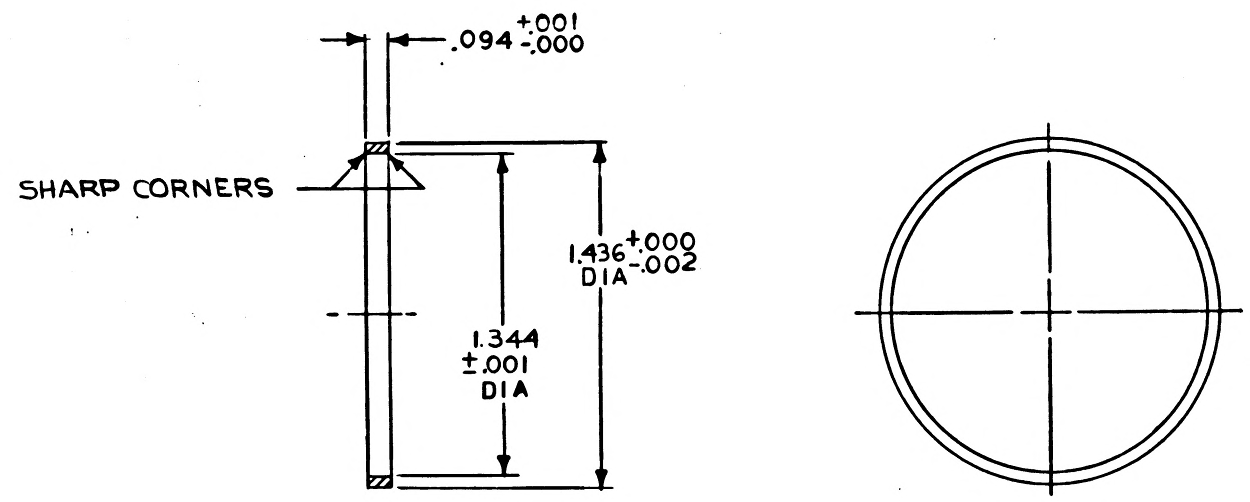
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

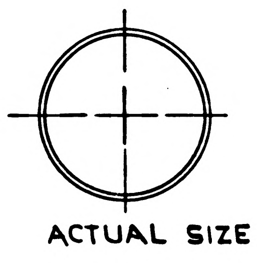
1011849

1011850

REVISIONS 01490				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: BLACK ANODIZE IN ACCORDANCE WITH MIL-A-8625, TYPE II BLACK (KPS.1005A.201)
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019.




ACTUAL SIZE

1011850

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011737	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± —

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 6061 -T6
FED. SPEC QQ-A-325
TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901450

DRAWN E.DRAPALA DATE 5-20-63
CHECKED E. MacDonald 6-5-63
APPROVAL E D MacDonald 6-5-63
APPROVAL E. Thomp 6-5-63
NASA APPROVAL W J Rhine 6-7-63
MIT APPROVAL W Wepfer 7 June 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SPACER, LENS

CODE IDENT NO.
SIZE C
NASA NUMBER 1011850
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

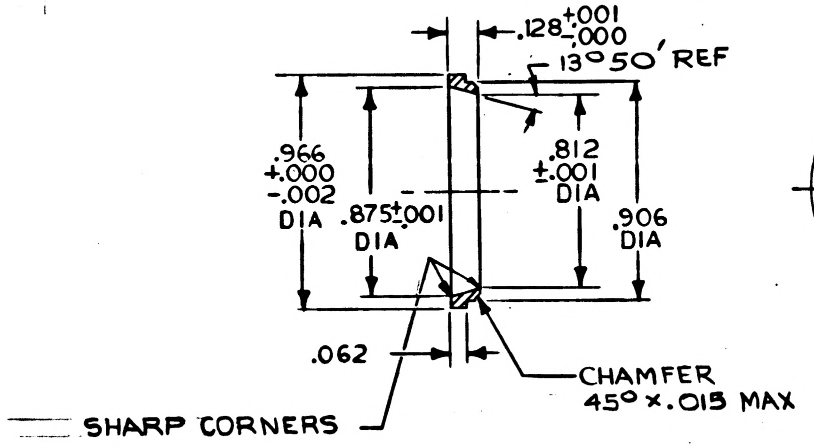
E-184

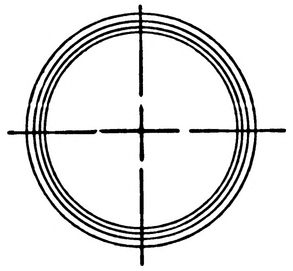
INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

1011851

REVISIONS 01490			
SYM	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: BLACK ANODIZE IN ACCORDANCE WITH MIL-A-8625, TYPE II BLACK (KPS.1005A.201)
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019.

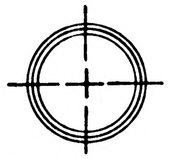




MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS



ACTUAL SIZE

APPLICATION	
NEXT ASSY	USED ON
1011737	1011000

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± —

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 6061-T6 FED SPEC QQ-A-325 TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901460

DRAWN E. DRAPALA DATE 5-17-63
CHECKED E. MacDonald 5-29-63
APPROVAL E. MacDonald 5-29-63
APPROVAL E. Thorup 6-5-63
NASA APPROVAL W. J. Rhine 6-7-63
MIT APPROVAL W Kopfer 7 Jun 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SPACER, LENS

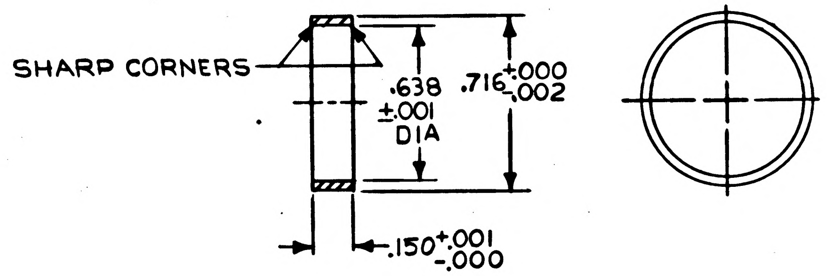
CODE IDENT NO.	SIZE	NASA NUMBER
	B	1011851
SCALE 2/1	WEIGHT CALC ACTUAL	SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

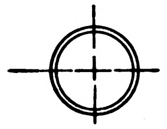
1011852

REVISIONS 01490			
SYM	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG. IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. FINISH: BLACK ANODIZE IN ACCORDANCE WITH MIL-A-8625, TYPE II BLACK (KPS.1005.201)



MASTER


ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011737	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± —

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 6061-T6 FED SPEC QQ-A-325 TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901470

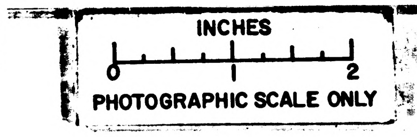
DRAWN E.DRAPALA DATE 5-17-63
CHECKED E Macdonald 5-29-63
APPROVAL E Macdonald 5-29-63
APPROVAL E. [illegible] 6-5-63
NASA APPROVAL W J [illegible] 6-7-63
MIT APPROVAL W [illegible] June 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SPACER, LENS

CODE IDENT NO.	SIZE	NASA NUMBER
	B	1011852
SCALE 2/1	WEIGHT CALC ACTUAL	SHEET 1 OF 1

E-153



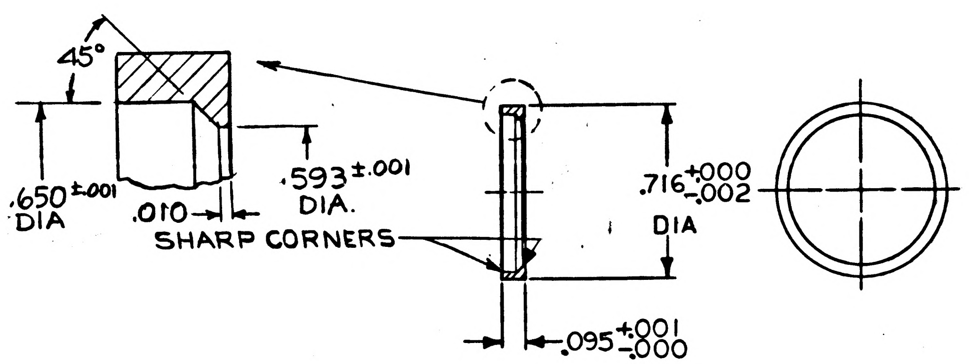
PHOTOGRAPHIC SCALE ONLY

1011853 Ⓜ A

REVISIONS 01490

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR NO. 02460	8-8-63	WR

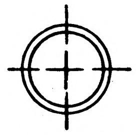
NOTES:
1. INTERPRET DWG. IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. $\sqrt{}^{63}$ FINISH ALL OVER
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: BLACK ANODIZE IN ACCORDANCE WITH MIL-A-8625, TYPE II BLACK (KPS.1005A.201)



MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS



ACTUAL SIZE

NEXT ASSY	USED ON
1011737	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	±1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM
ALLOY 6061-T6
FED SPEC QQ-A-325
TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901480

DRAWN E.DRAPALA DATE 5-17-63
CHECKED E. Macdonald 5-29-63
APPROVAL E. Macdonald 5-29-63
APPROVAL E. Dhorup 6-5-63
NASA APPROVAL W J Rhine 6-7-63
MIT APPROVAL W Kupfer 7 Jun 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SPACER, LENS

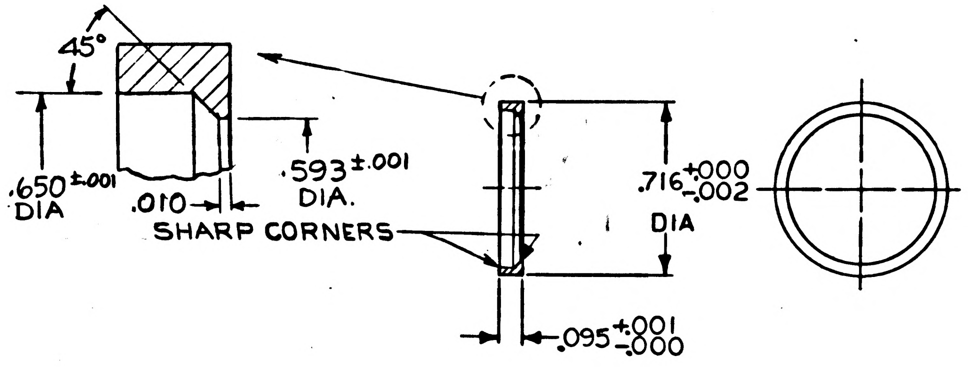
CODE IDENT NO.
SIZE B
NASA NUMBER 1011853
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011853

REVISIONS 01490			
SYM	DESCRIPTION	DATE	APPROVAL

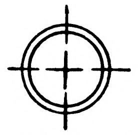
NOTES:
1. INTERPRET DWG. IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: BLACK ANODIZE IN ACCORDANCE WITH MIL-A-8625, TYPE II BLACK (KPS.1005A.201)



MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS



ACTUAL SIZE

1011737	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± —

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM
ALLOY 6061-T6
FED SPEC QQ-A-325
TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST. NEW YORK
KIC PN 57386901480

DRAWN E. DRAPALA DATE 5-17-63
CHECKED E. Macdonald 5-29-63
APPROVAL E. Macdonald 5-29-63
APPROVAL E. Dhoory 6-5-63
NASA APPROVAL W J Rhine 6-7-63
MIT APPROVAL W Kupfer 7 Jun 63

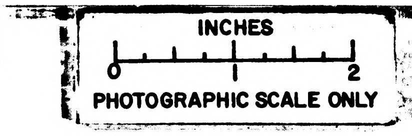
MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SPACER, LENS

CODE IDENT NO.	SIZE	NASA NUMBER
	B	1011853

SCALE 2/1 | WEIGHT | CALC ACTUAL | SHEET 1 OF 1

E-183

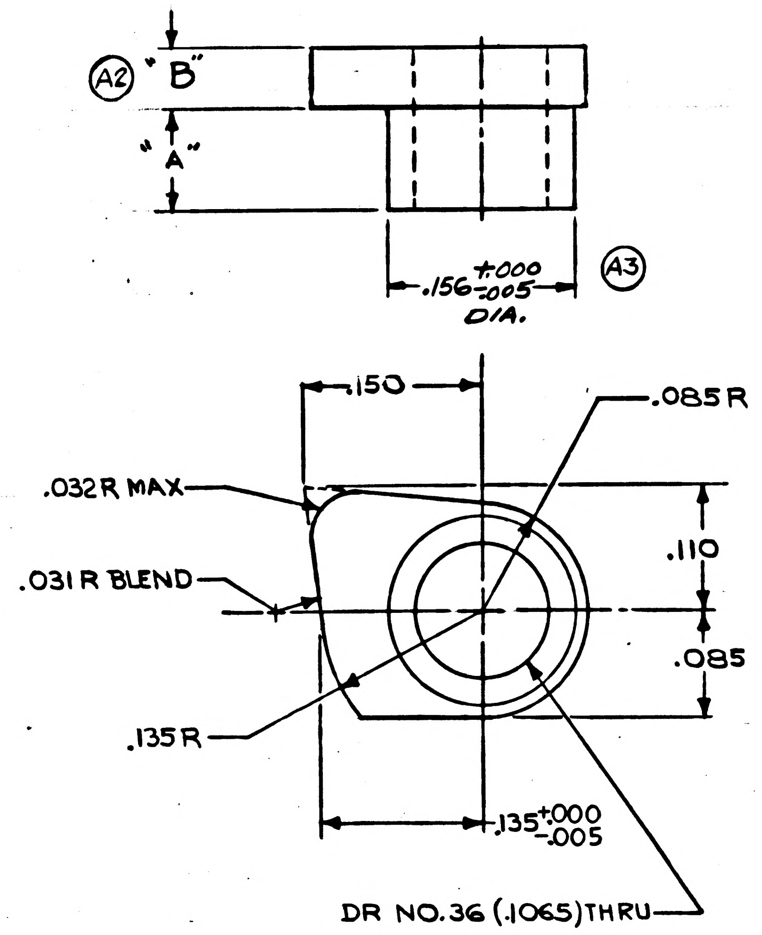


A 1011868

REVISIONS TDRR 01584				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A7		REVISED PER TDRR NO. 02684	8/21/63	

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER (A5)
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. HEAT TREATMENT IN ACCORDANCE WITH MIL-H-7199, Rc 39-43 (A6)
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.



(A4)

(A1)

DASH NO.	DIM "A"	DIM "B"	KIC DWG NO
1011868-1	.083±.002	.040±.003	54386900330
1011868-2	.068±.002	.050±.003	54386900331
1011868-3	0.00	.050±.003	54386900332
1011868-4	.030±.002	.033±.003	54386900333
1011868-5	.052±.002	.050±.003	54386900334

ACTUAL SIZE

MASTER

(A7)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011705	
1011702	
1011703	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± —

DO NOT SCALE THIS DRAWING

MATERIAL BERYLLIUM COPPER
FED. SPEC QQ-C-530
CONDITION ½ HARD

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 5438690 SEE CHART

DRAWN E DRAPALA DATE
CHECKED Paul Pappschristo
APPROVAL 6-7-63
APPROVAL E. Thomp 6-12-63
NASA APPROVAL
MIT APPROVAL 6/18/63

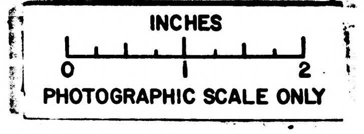
MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
CLAMP, RIM CLENCHING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011868

SCALE 10/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-184

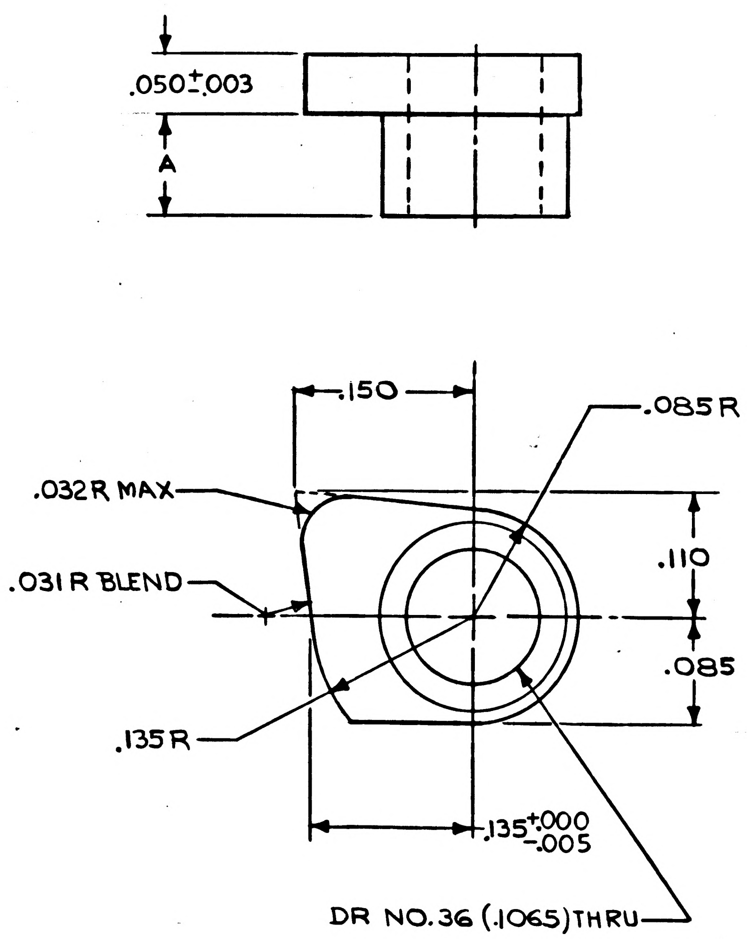


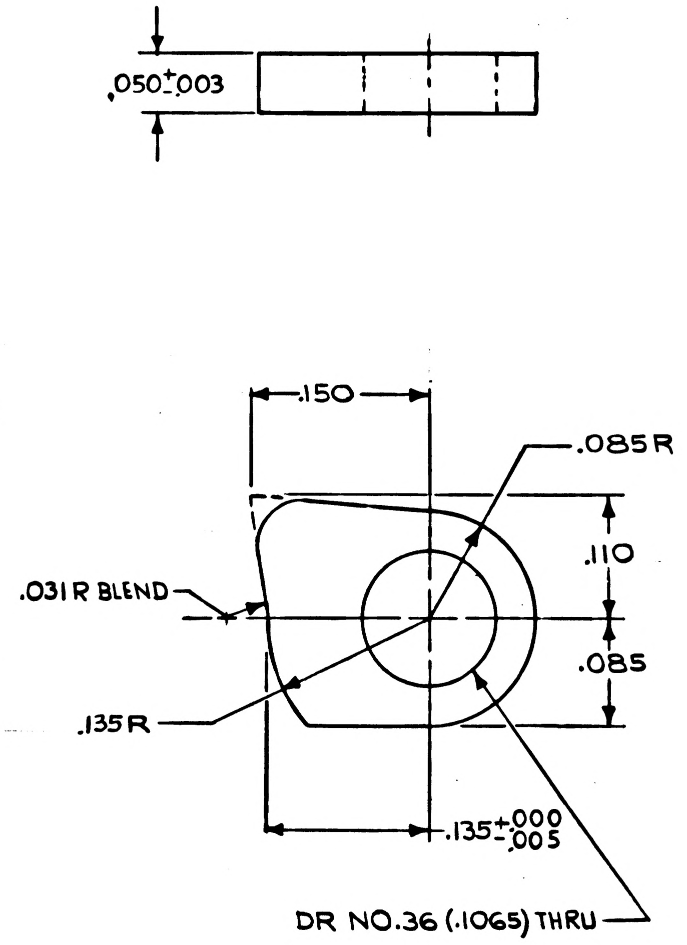
PHOTOGRAPHIC SCALE ONLY

8981101

SYM	ZONE	REVISIONS TDRR 01584 DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. HEAT TREATMENT IN ACCORDANCE WITH MIL-H-7199 (KPS1001C.105)
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.





*FLAT CLAMP

DASH NO	DIM A	KIC DWG NO
1011868-1	.083±.002	54386900330
1011868-2	.068±.002	54386900331
1011868-3	*FLAT	54386900332

ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011705	
1011702	
1011703	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± .005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL BERYLLIUM COPPER ASTM 196; TEMPER 1/2 HARD FED.SPEC QQ-C-530 CONDITION 1/2 HARD
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 5438690 SEE CHART
DRAWN E.DRAPALA DATE
CHECKED Paul Tappachristos
APPROVAL E. Thomas 6-7-63
APPROVAL E. Thomp 6-12-63
NASA APPROVAL
MIT APPROVAL 6/14/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
CLAMP, RIM CLENCHING

CODE IDENT NO. SIZE C NASA NUMBER 1011868
SCALE 10/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

1011868

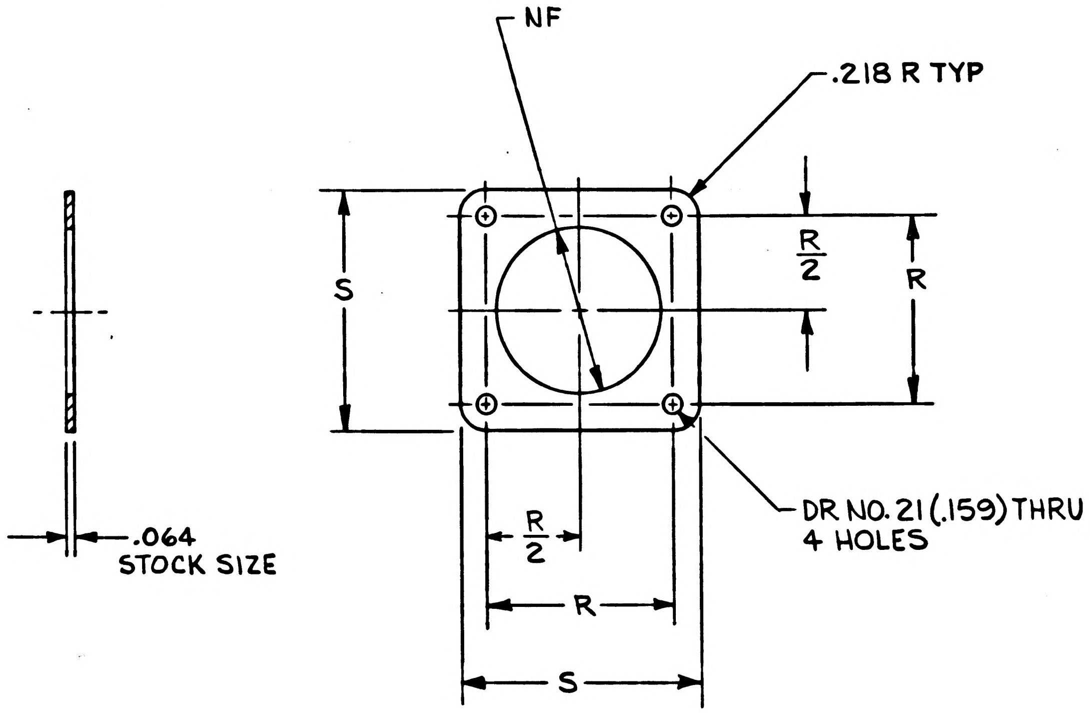
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

	6981101

REVISIONS TDRR 01584

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. PASSIVATE PER MIL-STD-171 (KPS-10051.200).
6. GOLD PLATE OVER SILVER PLATE PER MIL-G-45204, QQ-S-365A.



NASA NO.	KOLLSMAN NO.	NF DIA	R	S±.010
1011869-1	52386900900	1.257	1.375	1.766
1011869-2	52386900910	1.382	1.562	2.016

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011799	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	±.005	± ~

DO NOT SCALE THIS DRAWING

MATERIAL STAINLESS STEEL AISI 304
FED. SPEC: QQ-S-766 CLASS 304, CONDITION A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 5238690 0900-0910

DRAWN V. AMATO DATE 5-27-63
CHECKED 6-13-63
APPROVAL E. Macdonald 6-13-63
APPROVAL 6-13-63
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PLATE, CONNECTOR

CODE IDENT NO. | SIZE C | NASA NUMBER 1011869

SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

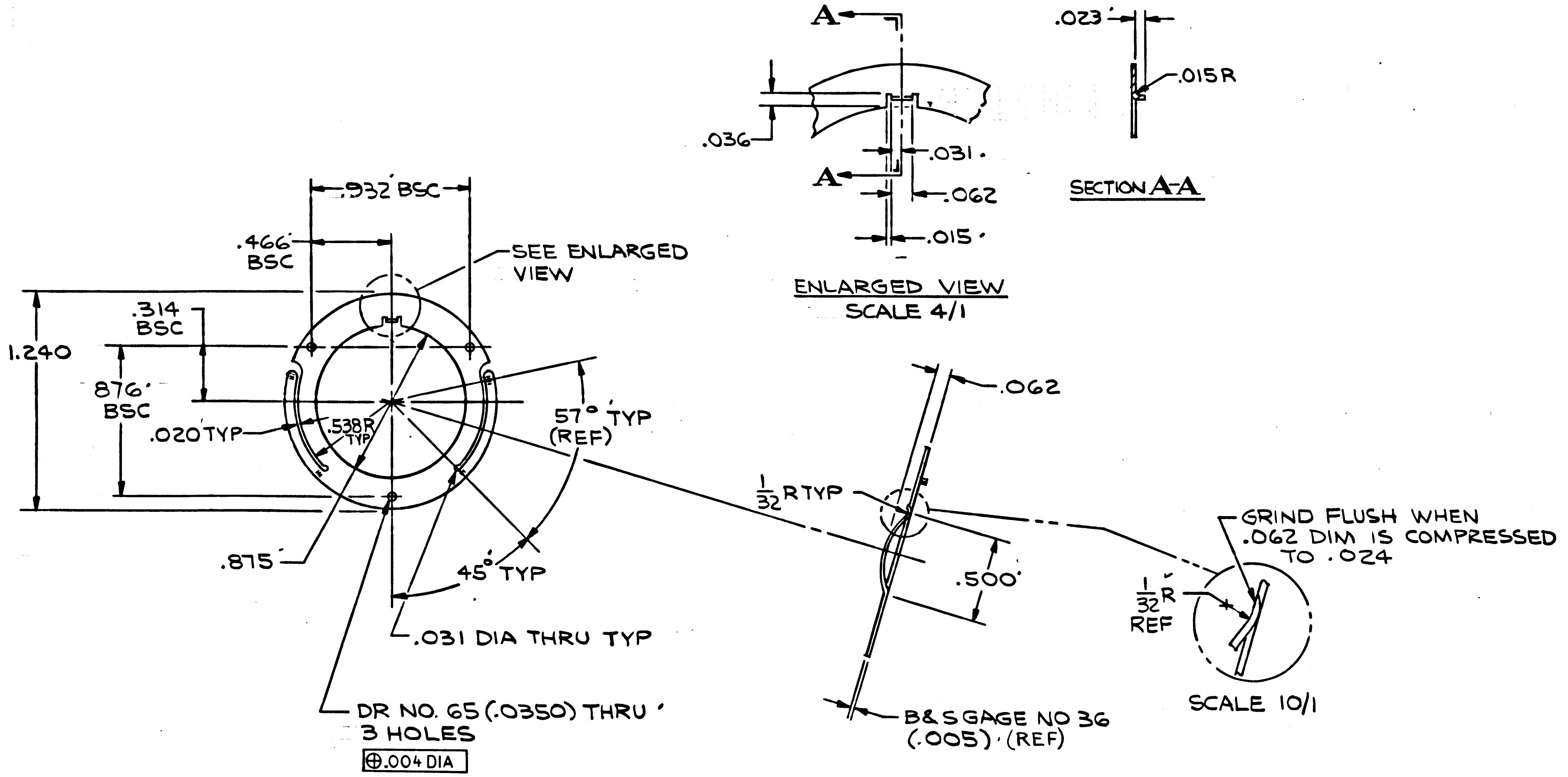
1011869

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

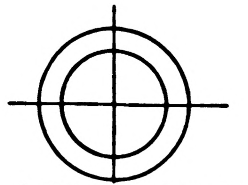
	1011870

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. $\sqrt{}^{125}$ FINISH ON ALL MACHINED SURFACES
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. HEAT TREAT (STABILIZE & STRESS RELIEF) PER MIL-H-7199 (KPS-1001C.105)


A
A
.036
.031
.062
.015
ENLARGED VIEW
SCALE 4/1
.023
.015R
SECTION A-A
.932 BSC
.466 BSC
SEE ENLARGED VIEW
.314 BSC
1.240
.876 BSC
.020 TYP
.538R TYP
57° TYP (REF)
.875
45° TYP
.031 DIA THRU TYP
DR NO. 65 (.0350) THRU 3 HOLES
⊕ .004 DIA
.062
1/32 R TYP
.500
B&S GAGE NO 36 (.005) (REF)
GRIND FLUSH WHEN .062 DIM IS COMPRESSED TO .024
1/32 R REF
SCALE 10/1

SPRING DATA

DEFLECTION AT EACH SPRING SECTION TO BE .030
LOAD AT .030 INCH DEFLECTION = .125 LB ± 10%



ACTUAL SIZE

REVISIONS [illegible]

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011790	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL BERYLLIUM COPPER ASTM B194 FED SPEC QQ-C-533 CONDITION A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 56386900480

DRAWN R. BRUNELLE DATE 5-28-63
CHECKED M Farrell
APPROVAL [illegible] 6-11-63
APPROVAL P [illegible] 6-11-63
NASA APPROVAL [illegible]
MIT APPROVAL Perry K Bryant

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SPRING, POLAROID FILTER

CODE IDENT NO.
SIZE C
NASA NUMBER 1011870
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

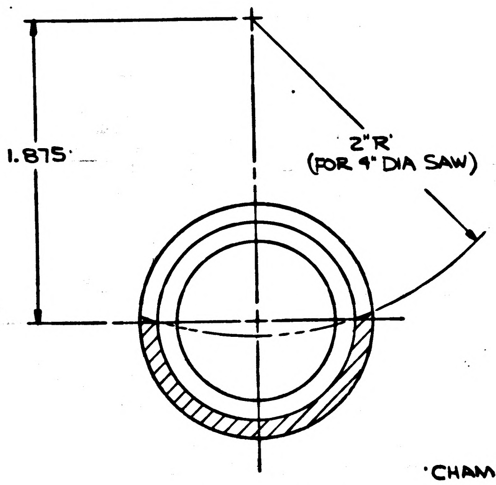
E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011872

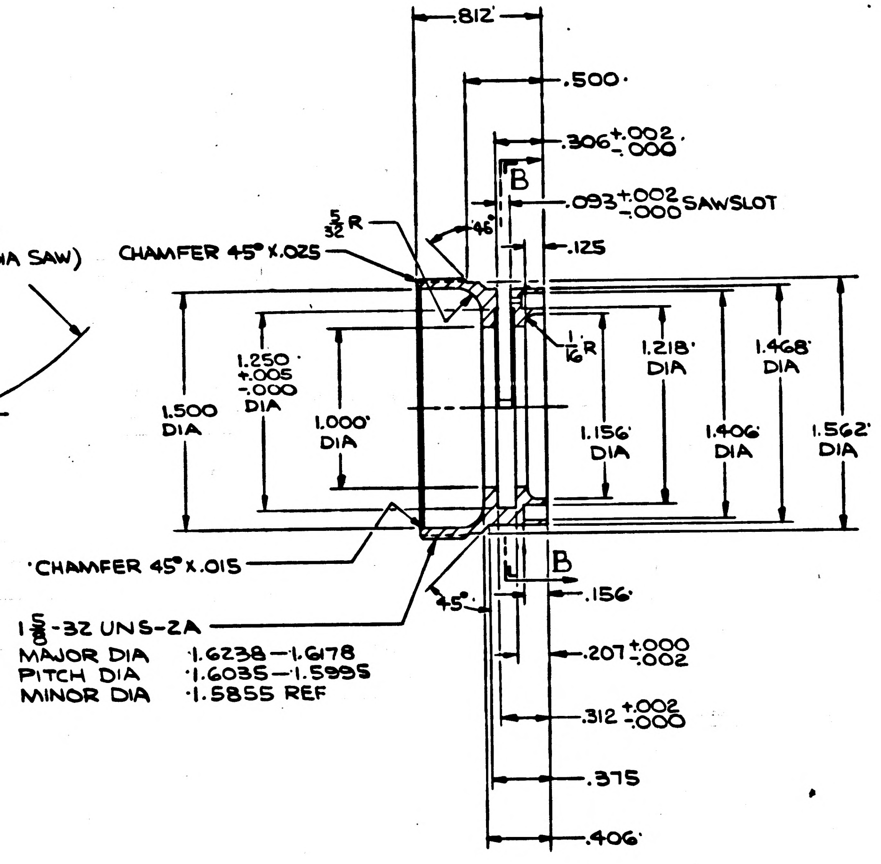
REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:-
   a) 63√ FINISH ALL OVER
   b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. BLACK ANODIZE PER MIL-A-8625 TYPE II BLACK (KPS-1005A.201)



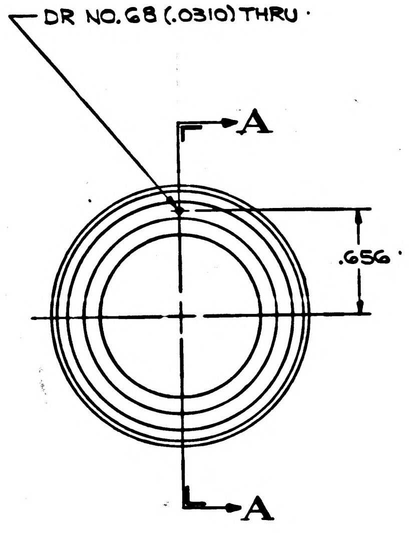
1.875
2"R
(FOR 4" DIA SAW)

SECTION B-B

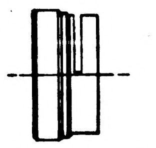


.812
.500
.306 +.002 -.000
B
.093 +.002 -.000 SAWSLOT
5/32 R
45°
CHAMFER 45° X .025
.125
1/16 R
1.250 +.005 -.000 DIA
1.500 DIA
1.000 DIA
1.218 DIA
1.156 DIA
1.468 DIA
1.406 DIA
1.562 DIA
CHAMFER 45° X .015
45°
B
.156
1 5/8 -32 UNS-2A
MAJOR DIA 1.6238—1.6178
PITCH DIA 1.6035—1.5995
MINOR DIA 1.5855 REF
.207 +.000 -.002
.312 +.002 -.000
.375
.406

SECTION A-A



DR NO. 68 (.0310) THRU
A
.656
A



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011789	1011000
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING
MATERIAL ALUMINUM ALLOY 6061-T4 FED SPEC QQ-A-325 TEMPER T4
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901490
DRAWN R. BRUNELLE DATE 5-27-63
CHECKED M. Fauvell
APPROVAL 6-11-63
APPROVAL 6-11-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOLDER,
SEXTANT EYEGUARD & FILTER

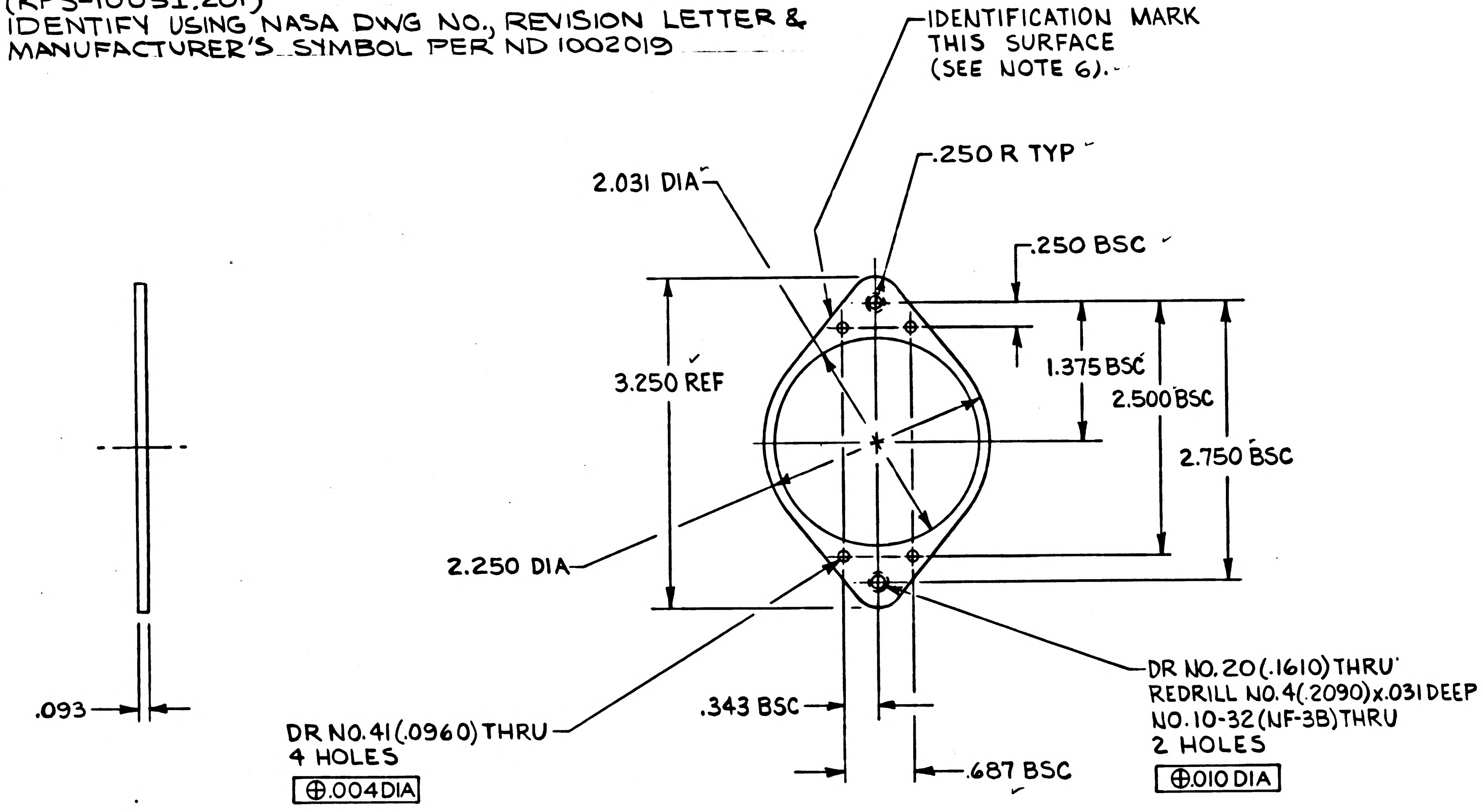
CODE IDENT NO.
SIZE D
NASA NUMBER 1011872
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011874

REVISIONS TDPR 01565				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. $\sqrt{}^{63}$ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. BLACK ANODIZE PER MIL-A-8625 TYPE II BLACK (KPS-1005I.201)
6. IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019


IDENTIFICATION MARK THIS SURFACE (SEE NOTE 6).
.250 R TYP
2.031 DIA
.250 BSC
3.250 REF
1.375 BSC
2.500 BSC
2.750 BSC
2.250 DIA
.093
.343 BSC
.687 BSC
DR NO. 41 (.0960) THRU 4 HOLES
⊕ .004 DIA
DR NO. 20 (.1610) THRU
REDRILL NO. 4 (.2090) x .031 DEEP
NO. 10-32 (NF-3B) THRU
2 HOLES
⊕ .010 DIA

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011786	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	±.005	± ~

DO NOT SCALE THIS DRAWING

MATERIAL
AL ALLOY 6061-T6
FED. SPEC: QQ-A-327
TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900940

DRAWN V. AMATO DATE 5-28-63
CHECKED M Fauvell
APPROVAL Thornton Stone 6-11-63
APPROVAL E. Phorey 6-11-63
NASA APPROVAL Jack Barnes
MIT APPROVAL Perry K Bryant

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RETAINER, ADJUSTMENT NUT

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011874

SCALE 1/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

1011874

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

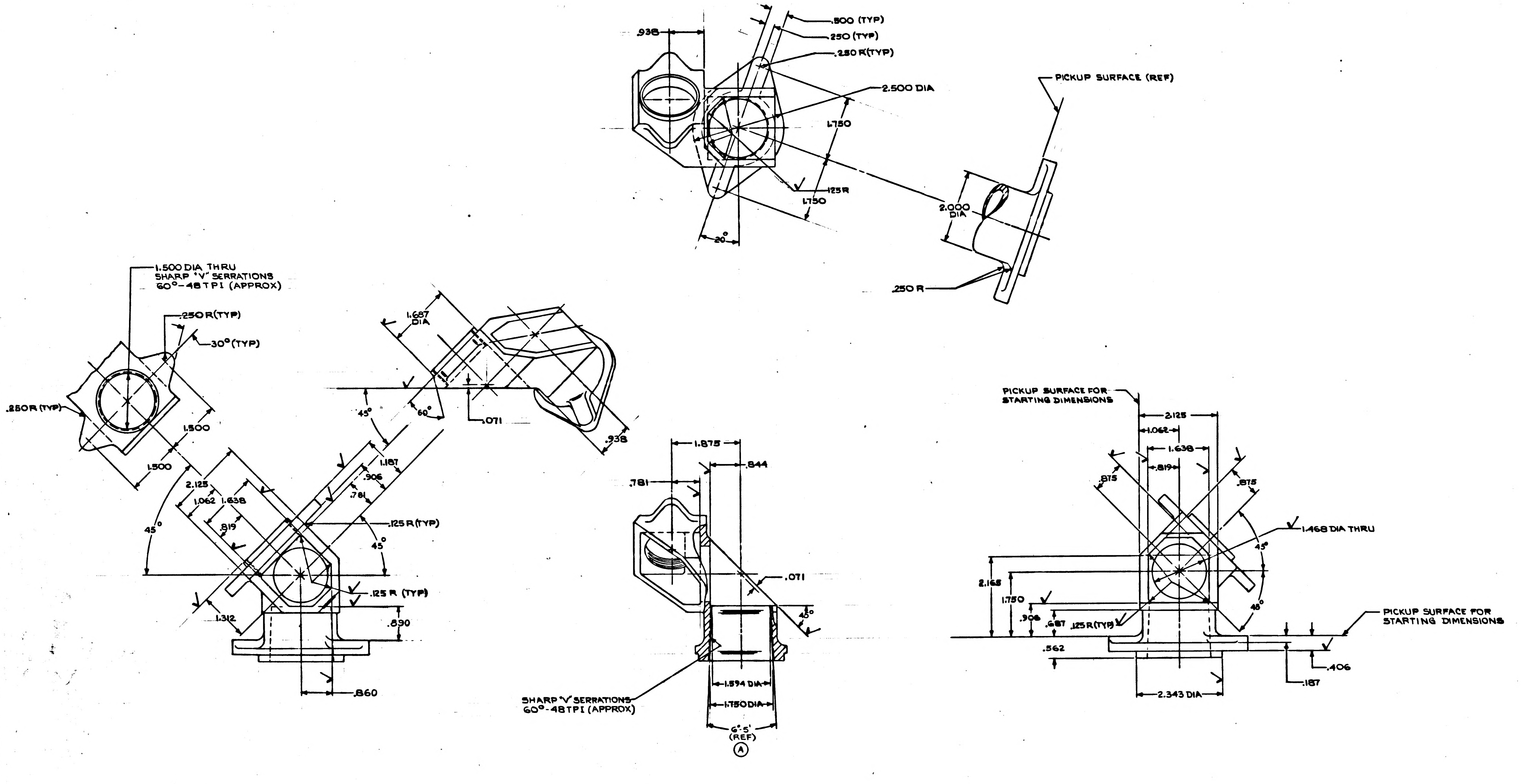
1011875 A

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. MATERIAL: INVESTMENT CASTING ALUMINUM ALLOY 356T6.
FED. SPEC MIL-C-11866 (Ord) ALLOY NO.356, COND T6.

3. CORNER RADII AND FILLETS .031R UNLESS OTHERWISE SPECIFIED:
4. SURFACES MARKED ✓ WILL BE MACHINED.
DIMENSIONS INCLUDE ALLOWANCE FOR MACHINING.
5. CASTING TOLERANCE ±.005 INCH/INCH
6. DIA'S AND SURFACES SUBSEQUENTLY NOT MACHINED. TO HAVE
A CAST FINISH OF 80 RMS (MAX)

REVISIONS TDRR 01564

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	C6	WAS 5° REF TDRR NO. 02039	7/12/63 7/7/63	


.938
.500 (TYP)
.250 (TYP)
.250 R (TYP)
2.500 DIA
1.750
.125 R
1.750
20°
PICKUP SURFACE (REF)
2.000 DIA
.250 R
1.500 DIA THRU
SHARP "V" SERRATIONS
60°-48 TPI (APPROX)
.250 R (TYP)
30° (TYP)
.250 R (TYP)
1.500
1.500
1.687 DIA
45°
60°
.071
.938
1.187
.906
.781
2.125
1.062
1.638
.819
45°
.125 R (TYP)
45°
.125 R (TYP)
1.312
.890
.860
1.875
.844
.781
.071
45°
SHARP "V" SERRATIONS
60°-48 TPI (APPROX)
1.594 DIA
1.750 DIA
6°-5' (REF)
A
PICKUP SURFACE FOR
STARTING DIMENSIONS
2.125
1.062
1.638
.819
.875
.875
1.468 DIA THRU
45°
45°
2.165
1.750
.906
.687
.125 R (TYP)
.562
PICKUP SURFACE FOR
STARTING DIMENSIONS
.406
.187
2.343 DIA

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011257	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — ; DECIMALS ± — ; ANGLES ±0° 15'
DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE 2
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 21386900080
DRAWN E. DRAPALA DATE 5-28-63
CHECKED E. MacDonald 5-29-63
APPROVAL E. MacDonald 5-29-63
APPROVAL E. Mang 6-6-63
NASA APPROVAL Jack Barnard
MIT APPROVAL Remy K Bryant

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING SCT PRISM
(CASTING)

CODE IDENT NO.
SIZE E
NASA NUMBER 1011875
SCALE
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011875 A

INCHES
PHOTOGRAPHIC SCALE ONLY

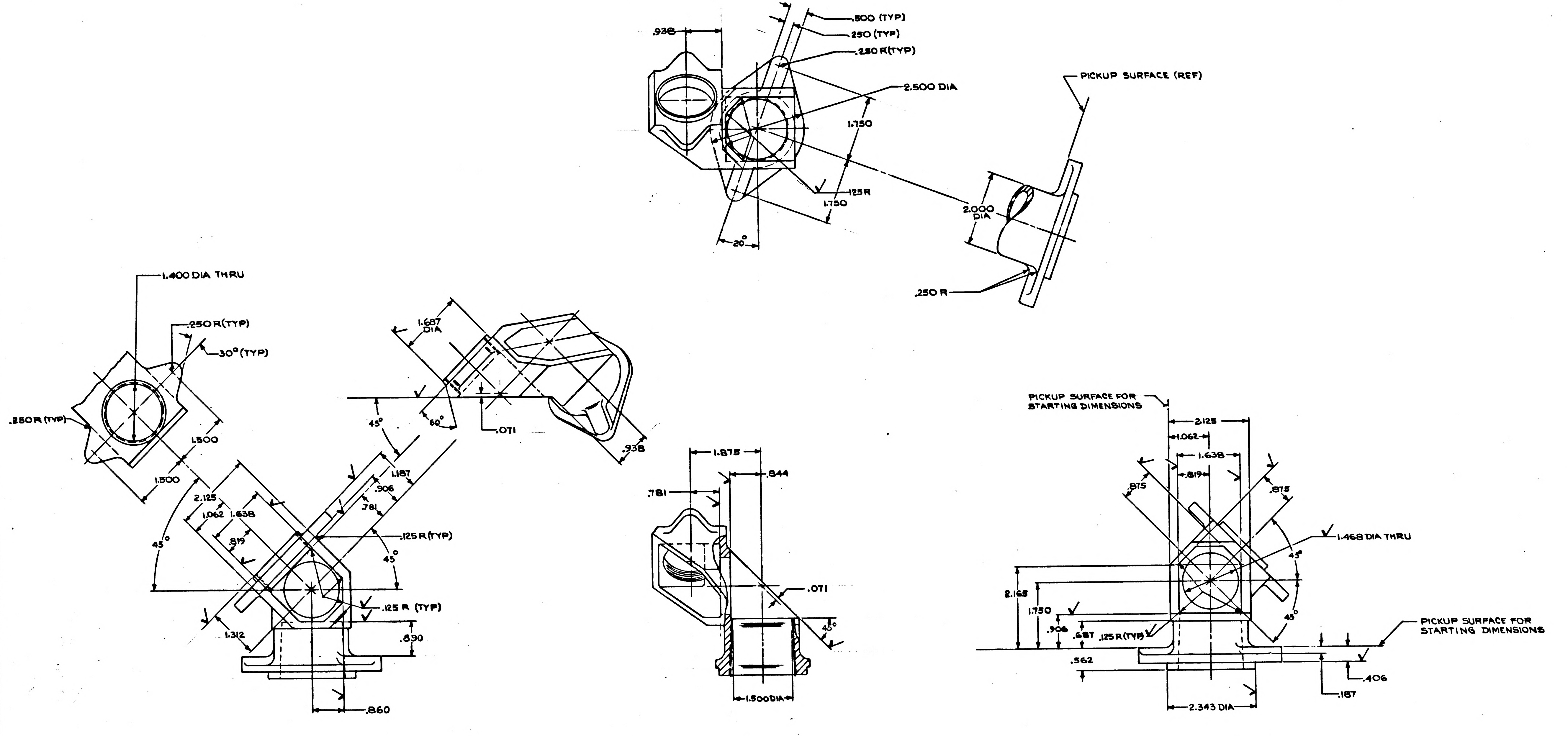
B 1011875

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	C6	WAS 5° REF TDRR NO. 02039	7/12/63 7/17/63	
B6		REVISED PER TDRR NO. 03.55	9/16/63	

REVISIONS TDRR 01564

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. MATERIAL: INVESTMENT CASTING ALUMINUM ALLOY 356 T6.
   FED. SPEC MIL-C-11866 (Ord) ALLOY NO.356, COND T6.
3. CORNER RADII AND FILLETS .031R UNLESS OTHERWISE SPECIFIED:
4. SURFACES MARKED ✓ WILL BE MACHINED.
   DIMENSIONS INCLUDE ALLOWANCE FOR MACHINING.
5. CASTING TOLERANCE ±.005 INCH/INCH
6. DIA'S AND SURFACES SUBSEQUENTLY NOT MACHINED. TO HAVE A CAST FINISH OF 80 RMS (MAX)


.938
.500 (TYP)
.250 (TYP)
.250 R (TYP)
2.500 DIA
1.750
.125 R
1.750
20°
PICKUP SURFACE (REF)
2.000 DIA
.250 R
1.400 DIA THRU
.250 R (TYP)
30° (TYP)
.250 R (TYP)
1.500
1.500
1.687 DIA
45°
60°
.071
.938
1.187
.906
.781
2.125
1.062
1.638
.819
.125 R (TYP)
45°
45°
.125 R (TYP)
1.312
.890
.860
1.875
.844
.781
.071
45°
1.500 DIA
PICKUP SURFACE FOR STARTING DIMENSIONS
2.125
1.062
1.638
.819
.875
.875
1.468 DIA THRU
45°
45°
2.165
1.750
.906
.687
.125 R (TYP)
.562
PICKUP SURFACE FOR STARTING DIMENSIONS
.406
.187
2.343 DIA

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011257	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± — ANGLES ±0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 21386900080
DRAWN E. DRAPALA DATE 5-28-63
CHECKED E. MacDonald 5-29-63
APPROVAL E. MacDonald 5-29-63
APPROVAL E. Moray 6-6-63
NASA APPROVAL Jack Barnard
MIT APPROVAL Henry K Bryant

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING SCT PRISM
(CASTING)

CODE IDENT NO.
SIZE E
NASA NUMBER 1011875
SCALE
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

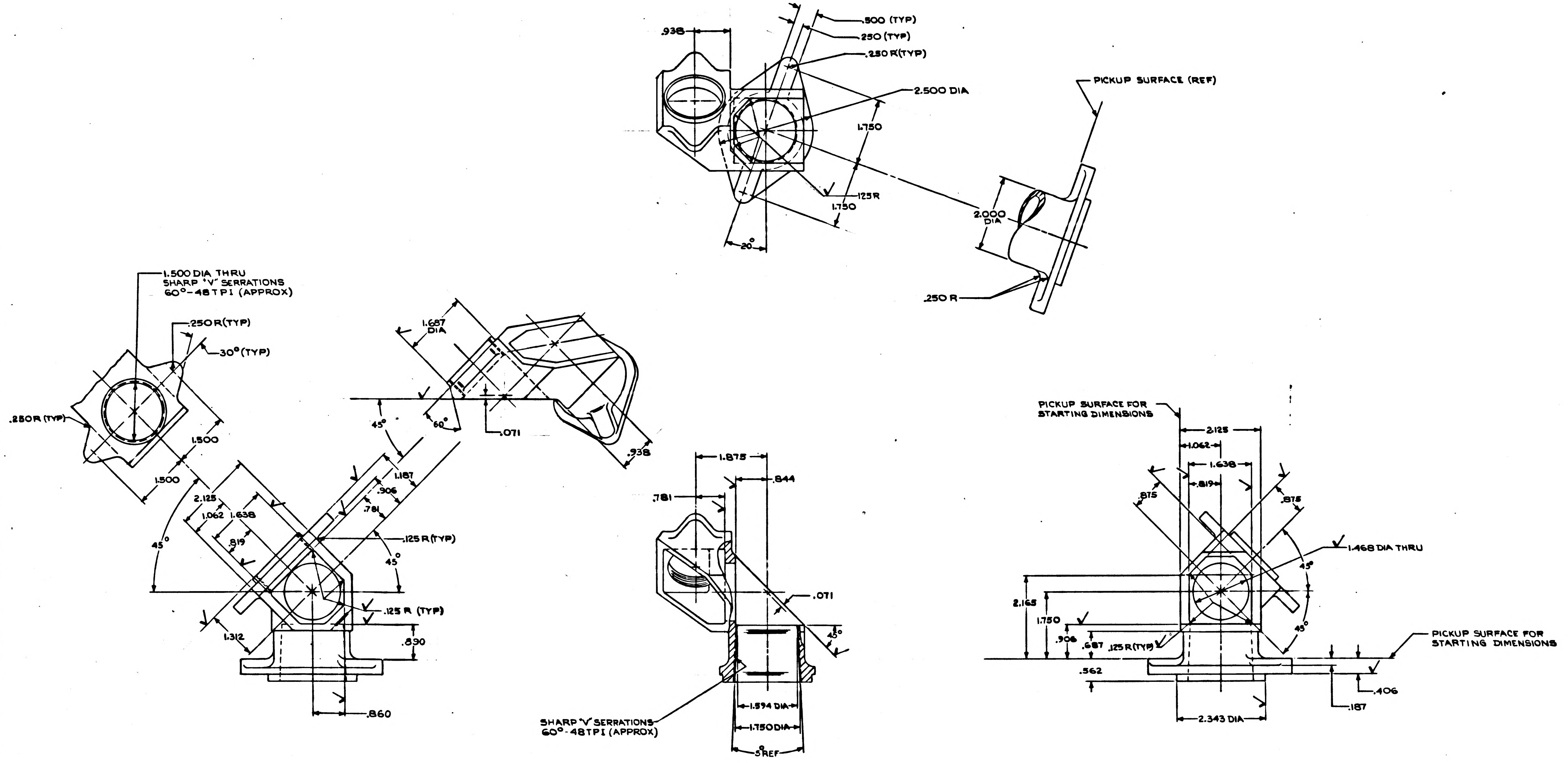
INCHES
PHOTOGRAPHIC SCALE ONLY

1011875

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. MATERIAL: INVESTMENT CASTING ALUMINUM ALLOY 356T6.
   FED. SPEC MIL-C-11866 (Ord) ALLOY NO.356, COND T6.

3. CORNER RADII AND FILLETS .031R UNLESS OTHERWISE SPECIFIED:
4. SURFACES MARKED ✓ WILL BE MACHINED.
   DIMENSIONS INCLUDE ALLOWANCE FOR MACHINING.
5. CASTING TOLERANCE ±.005 INCH/INCH
6. DIA'S AND SURFACES SUBSEQUENTLY NOT MACHINED. TO HAVE A CAST FINISH OF 80 RMS (MAX)



.938
.500 (TYP)
.250 (TYP)
.250 R (TYP)
2.500 DIA
1.750
.125 R
1.750
20°
PICKUP SURFACE (REF)
2.000 DIA
.250 R
1.500 DIA THRU
SHARP "V" SERRATIONS
60°-48 TPI (APPROX)
.250 R (TYP)
30° (TYP)
.250 R (TYP)
1.500
1.500
1.687 DIA
45°
60°
.071
.938
1.187
.906
.781
2.125
1.062
1.638
.819
.125 R (TYP)
45°
45°
.125 R (TYP)
1.312
.890
.860
1.875
.844
.781
.071
45°
1.594 DIA
1.750 DIA
5° REF
SHARP "V" SERRATIONS
60°-48 TPI (APPROX)
PICKUP SURFACE FOR STARTING DIMENSIONS
2.125
1.062
1.638
.819
.875
.875
1.468 DIA THRU
45°
45°
2.165
1.750
.906
.687
.125 R (TYP)
.562
PICKUP SURFACE FOR STARTING DIMENSIONS
.406
.187
2.343 DIA

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011257	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± —	±0° 15'

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 21386900080

DRAWN E. DRAPALA DATE 5-28-63
CHECKED E. MacDonald 5-29-63
APPROVAL E. MacDonald 5-29-63
APPROVAL E. Mowry 6-6-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING SCT PRISM
(CASTING)

CODE IDENT NO.	SIZE	NASA NUMBER
	E	1011875

SCALE WEIGHT CALC ACTUAL SHEET 1 OF 1

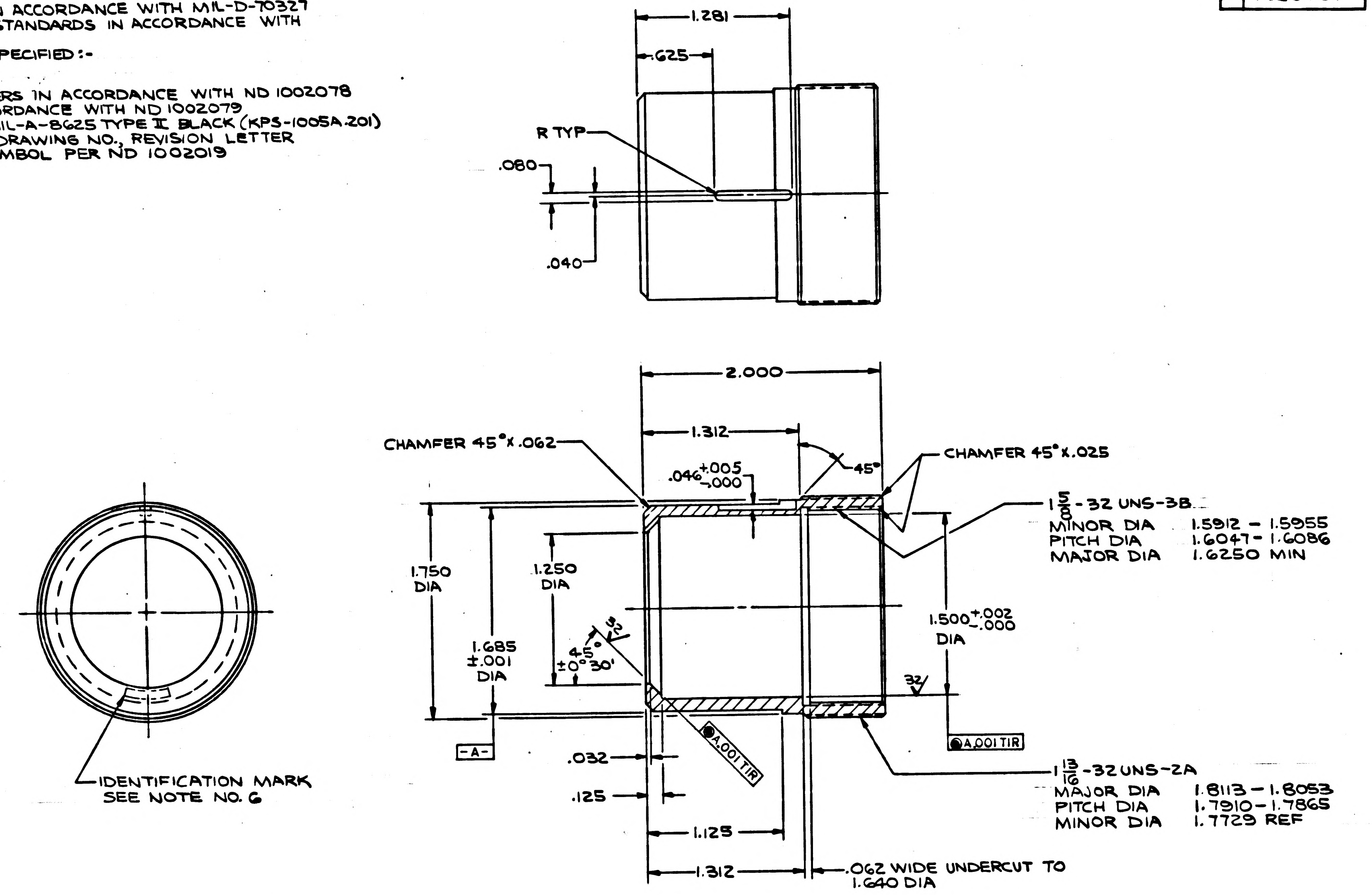
1011875

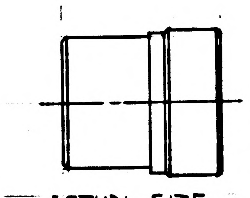
1011876

SYM	ZONE	REVISIONS DESCRIPTION	DATE	APPROVAL

NOTES:-

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:-
   - a) 63√ FINISH ALL OVER
   - b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. BLACK ANODIZE PER MIL-A-8625 TYPE II BLACK (KPS-1005A.201)
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019


1.281
.625
R TYP
.080
.040
2.000
1.312
CHAMFER 45° X .062
.046 +.005 −.000
45°
CHAMFER 45° X .025
1 5/8 -32 UNS-3B
MINOR DIA 1.5912 - 1.5955
PITCH DIA 1.6047 - 1.6086
MAJOR DIA 1.6250 MIN
1.750 DIA
1.250 DIA
1.685 ±.001 DIA
45° ±0° 30'
32
1.500 +.002 −.000 DIA
A .001 TIR
-A-
.032
.125
A .001 TIR
1 13/16 -32 UNS-2A
MAJOR DIA 1.8113 - 1.8053
PITCH DIA 1.7910 - 1.7865
MINOR DIA 1.7729 REF
1.125
1.312
.062 WIDE UNDERCUT TO 1.640 DIA
IDENTIFICATION MARK SEE NOTE NO. 6



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011793	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± –	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 6061-T6 FED SPEC QQ-A-325 TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901500

DRAWN R. BRUNELLE DATE 5-29-63
CHECKED 5-29-63
APPROVAL 6-11-63
APPROVAL 6-11-63

NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING,
SEXTANT EYEPIECE

CODE IDENT NO. | SIZE D | NASA NUMBER 1011876

SCALE 2/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

MASTER

INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

1011876

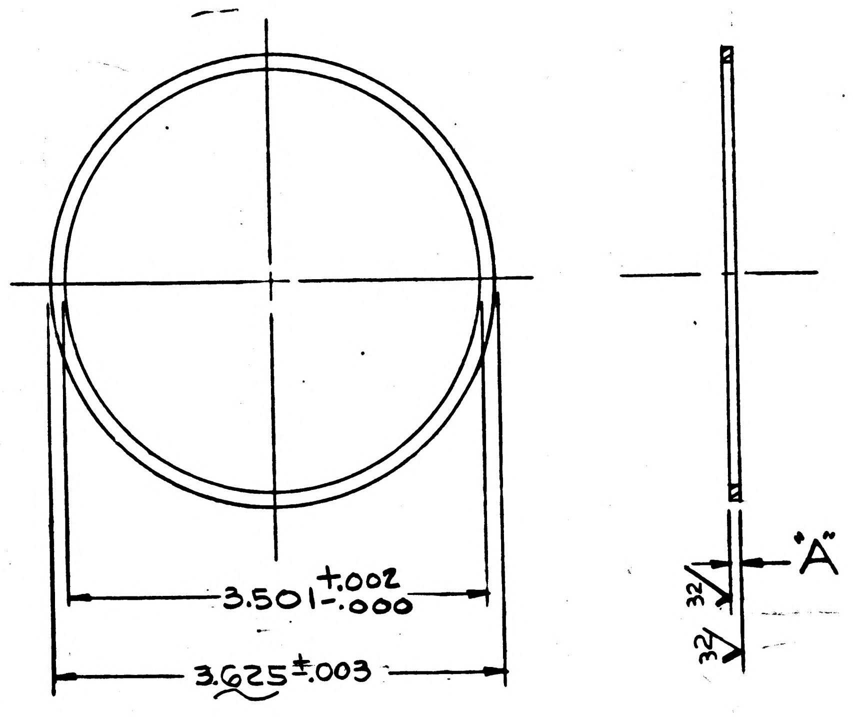
1011877 A

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A5		DIMENSIONAL CHANGES SEE TDRR NO 03056	10/4/63	WC.

REVISIONS TDRR 01724

NOTES:-
1. INTERPRET DRAWING PER MIL-D-70327
2. GENERNAL MACHINING STANDARDS PER ND 1002078
3. UNLESS OTHERWISE SPECIFIED
63✓ FINISH ALL OVER

4. REMOVE BURRS PER ND 1002079
5. PASSIVATE PER MIL-STD-171 TABLE V-A FINISH NO. 5.4.1
(KPS - 10051200)



NASA DRAWING NUMBER	KOLLSMAN DRAWING NUMBER	DIM A TOL. ±.0005
1011877-1	79 38690 0401	.0380
1011877-2	79 38690 0402	.0400
1011877-3	79 38690 0403	.0420
1011877-4	79 38690 0404	.0440
1011877-5	79 38690 0405	.0460
1011877-6	79 38690 0406	.0480

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	± .005	± ~

DO NOT SCALE THIS DRAWING

MATERIAL CORROSION RESISTANT STEEL
FED SPEC QQ-S-763
CLASS 440C COND A

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK

KIC PN 79 38690 0401 0406

DRAWN PAUL PAPPACHRISTOU DATE 5/28/63
CHECKED Paul Pappachristou
APPROVAL Ed MacDonald 6-7-63
APPROVAL E. Dhonup 6-12-63
NASA APPROVAL W J Rhine 6-26-63
MIT APPROVAL W Kupfer 26 Jun 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE SPACER

CODE IDENT NO.
SIZE C
NASA NUMBER 1011877

SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011877A

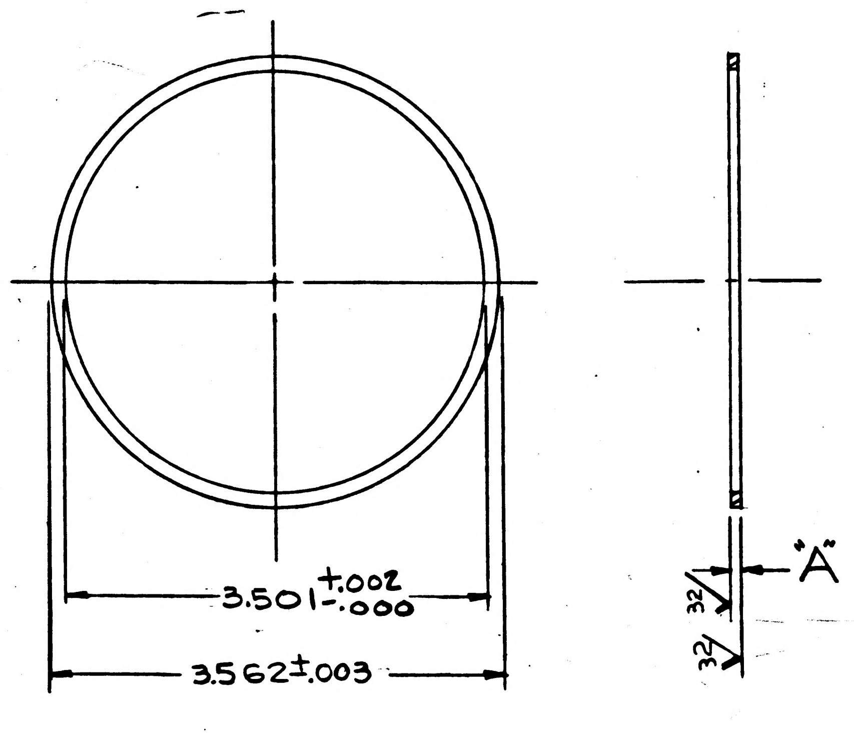
1011877

REVISIONS TDRR 01724

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:-
1. INTERPRET DRAWING PER MIL-D-70327
2. GENERNAL MACHINING STANDARDS PER ND 1002078
3. UNLESS OTHERWISE SPECIFIED
   63√ FINISH ALL OVER

4. REMOVE BURRS PER ND 1002079
5. PASSIVATE PER MIL-STD-171 (KPS-1005 I 200).



NASA DRAWING NUMBER	KOLLSMAN DRAWING NUMBER	DIM A TOL. ±.0005
1011877-1	79 38690 0401	.038
1011877-2	79 38690 0402	.040
1011877-3	79 38690 0403	.042
1011877-4	79 38690 0404	.044
1011877-5	79 38690 0405	.046
1011877-6	79 38690 0406	.048

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	±.005	± ~

DO NOT SCALE THIS DRAWING

MATERIAL STAINLESS STEEL AISI NO. 440 FED SPEC QQ-S-763 CLASS 440, CONDA

CONTRACT 440

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 79 38690 0401 / 0406
DRAWN PAUL PAPPACHRISTOU DATE 3/28/63
CHECKED Paul Pappachristou
APPROVAL Ed MacDonald 6-7-63
APPROVAL E. Thomas 6-12-63
NASA APPROVAL W J Rhine 6-26-63
MIT APPROVAL W Kupfer 26 Jun 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE SPACER

CODE IDENT NO.
SIZE C
NASA NUMBER 1011877
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

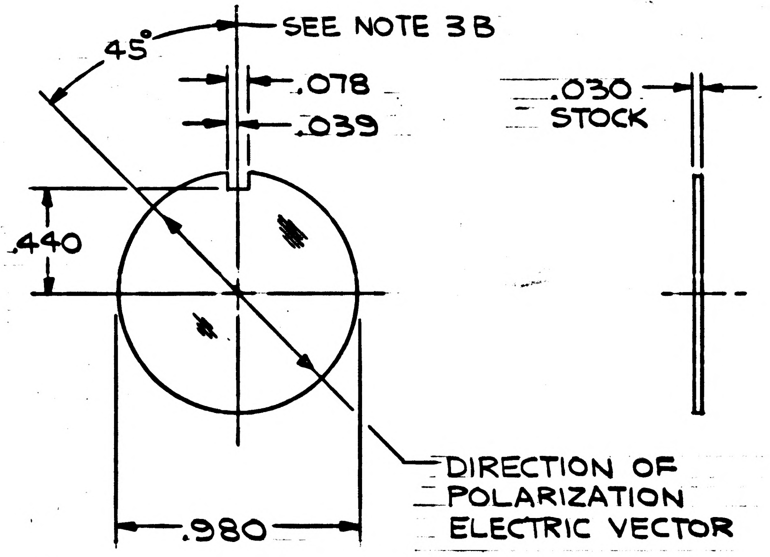
1011877

1011878 A

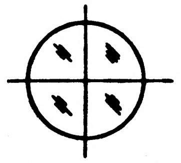
REVISIONS 01741				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	D-6	REVISED PER T.D.R.R. NO. 04588	11-12-63	WH.

REQUIREMENTS:-

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404 CLASS 3
   - C. PACKING & SHIPPING PER MIL-P-116 SUB METHOD IA 8
2. INSPECTION & ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - 1. MATERIAL - PLASTIC, CELLULOSE ACETATE BUTY RATE CONFORMING TO FED SPEC L-P-349 TYPE AND CLASS OPTIONAL, TRANSPARENT Ⓐ
   - B. MARK WITH NASA DWG NO., LATEST REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019
3. OPTICAL REQUIREMENTS:
   - A. SINGLE PART TRANSMISSION FOR NORMAL INCIDENT LIGHT SHALL BE 32% ±5% OVER VISIBLE SPECTRUM
   - B. TWO PARTS WITH NOTCHES ALIGNED SHALL EXHIBIT MAXIMUM & MINIMUM TOTAL TRANSMISSION AS ONE OF THE PAIR IS REVERSED
   - C. TRANSMISSION SHALL NOT EXCEED 0.5% AT THE MINIMUM POINT
   - D. PART SHALL CONFORM TO REQUIREMENTS OF MIL-O-13830
     - 1. SURFACE QUALITY 60-40 ALL OVER
     - 2. RESOLUTION 20 SECONDS
     - 3. DEVIATION 3 MIN MAX



PROCURE ONLY FROM APPROVED SOURCES ON ND 1002034 FOR THIS DRAWING



ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011790	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± -	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL: SEE NOTE NO. 2

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 25386900070

DRAWN R. BRUNELLE DATE 6-11-63
CHECKED Thornton Kearns 6-12-63
APPROVAL
APPROVAL E. Mooney 6-25-63
NASA APPROVAL 6-26-63
MIT APPROVAL 6-June-63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE: POLARIZATION FILTER (SPECIFICATION CONTROL DWG)

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011878

SCALE 2/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

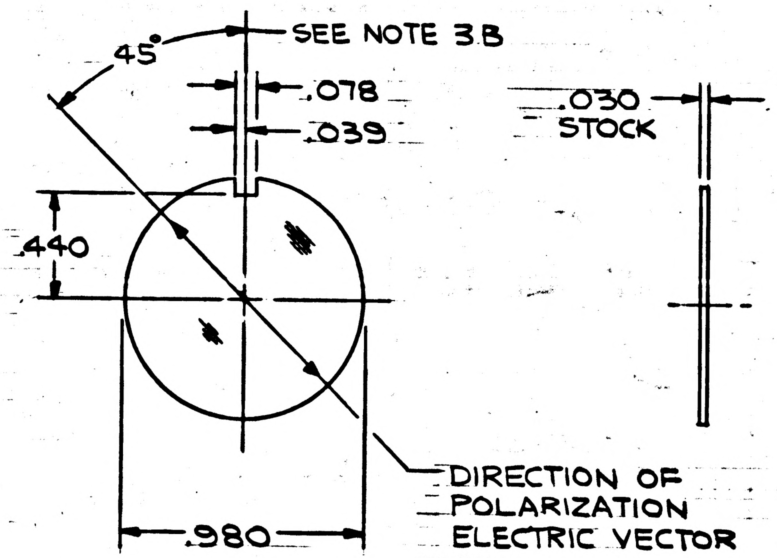
B 1011878

REVISIONS 01741

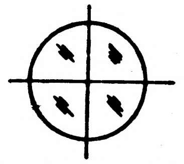
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	D-6	REVISED PER T.D.R.R. NO. 04588	11-12-63	WH
B		REVISED PER TDRR 29088	6-1-66	

REQUIREMENTS:-

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404 CLASS 3
   - C. PACKING & SHIPPING PER MIL-P-116 SUBMETHOD IA 8
2. INSPECTION & ACCEPTANCE:
   - A. MARK WITH NASA DWG NO., LATEST REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019
3. OPTICAL REQUIREMENTS:
   - A SINGLE PART TRANSMISSION FOR NORMAL INCIDENT LIGHT SHALL BE 32% ±5% OVER VISIBLE SPECTRUM
   - B. TWO PARTS WITH NOTCHES ALIGNED SHALL EXHIBIT MAXIMUM & MINIMUM TOTAL TRANSMISSION AS ONE OF THE PAIR IS REVERSED
   - C. TRANSMISSION SHALL NOT EXCEED 0.5% AT THE MINIMUM POINT
   - D. PART SHALL CONFORM TO REQUIREMENTS OF MIL-O-13830
     1. SURFACE QUALITY 60-40 ALL OVER
     2. RESOLUTION 20 SECONDS
     3. DEVIATION 3 MIN MAX
4. *DESIGN REQUIREMENTS:*
   - *A. NEUTRAL COLOR LINEAR POLARIZER LAMINATED IN CELLULOSE ACETATE BUTYRATE PLASTIC FILM*



PROCURE ONLY FROM APPROVED SOURCES ON ND 1002034 FOR THIS DRAWING



ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
Y011790	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± -	±.005	±-1°

DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE NO. 2

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 25386900070

DRAWN R. BRUNELLE DATE 6-11-63
CHECKED Thornton 6-12-63
APPROVAL
APPROVAL E. Thornp 6-25-63
NASA APPROVAL 6-26-63
MIT APPROVAL W Kupfer 26 June 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
POLARIZATION FILTER
(SPECIFICATION CONTROL DWG)

CODE IDENT NO.
SIZE C
NASA NUMBER 1011878
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011878 B

K+E

E-154

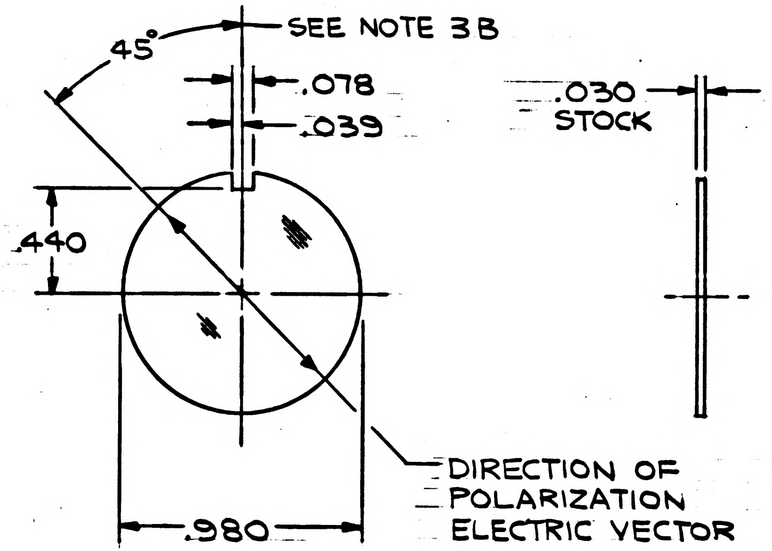
1011878

REVISIONS 01741

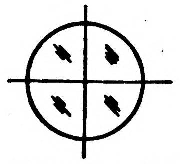
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REQUIREMENTS:-

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404 CLASS 3
   - C. PACKING & SHIPPING PER MIL-P-116 SUBMETHOD IA 8
2. INSPECTION & ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - 1. MATERIAL - POLAROID FILM HN 32 LAMINATED IN ACRYLIC RESIN SHEET, MIL-P-8184
   - B. MARK WITH NASA DWG NO., LATEST REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019
3. OPTICAL REQUIREMENTS:
   - A. SINGLE PART TRANSMISSION FOR NORMAL INCIDENT LIGHT SHALL BE 32% ±5% OVER VISIBLE SPECTRUM
   - B. TWO PARTS WITH NOTCHES ALIGNED SHALL EXHIBIT MAXIMUM & MINIMUM TOTAL TRANSMISSION AS ONE OF THE PAIR IS REVERSED
   - C. TRANSMISSION SHALL NOT EXCEED 0.5% AT THE MINIMUM POINT
   - D. PART SHALL CONFORM TO REQUIREMENTS OF MIL-O-13830
     - 1. SURFACE QUALITY 60-40 ALL OVER
     - 2. RESOLUTION 20 SECONDS
     - 3. DEVIATION 3 MIN MAX



PROCURE ONLY FROM APPROVED SOURCES ON ND 1002034 FOR THIS DRAWING



ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011790	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± -	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL: SEE NOTE NO. 2

CONTRACT:

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 25386900070

DRAWN R. BRUNELLE DATE 6-11-63
CHECKED Thornton Sleam 6-12-63
APPROVAL
APPROVAL E. Mhoruys 6-25-63
NASA APPROVAL 6-26-63
MIT APPROVAL W Kupfer 26 Jun 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE: POLARIZATION FILTER
(SPECIFICATION CONTROL DWG)

CODE IDENT NO. | SIZE C | NASA NUMBER 1011878

SCALE 2/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

K&E E-154

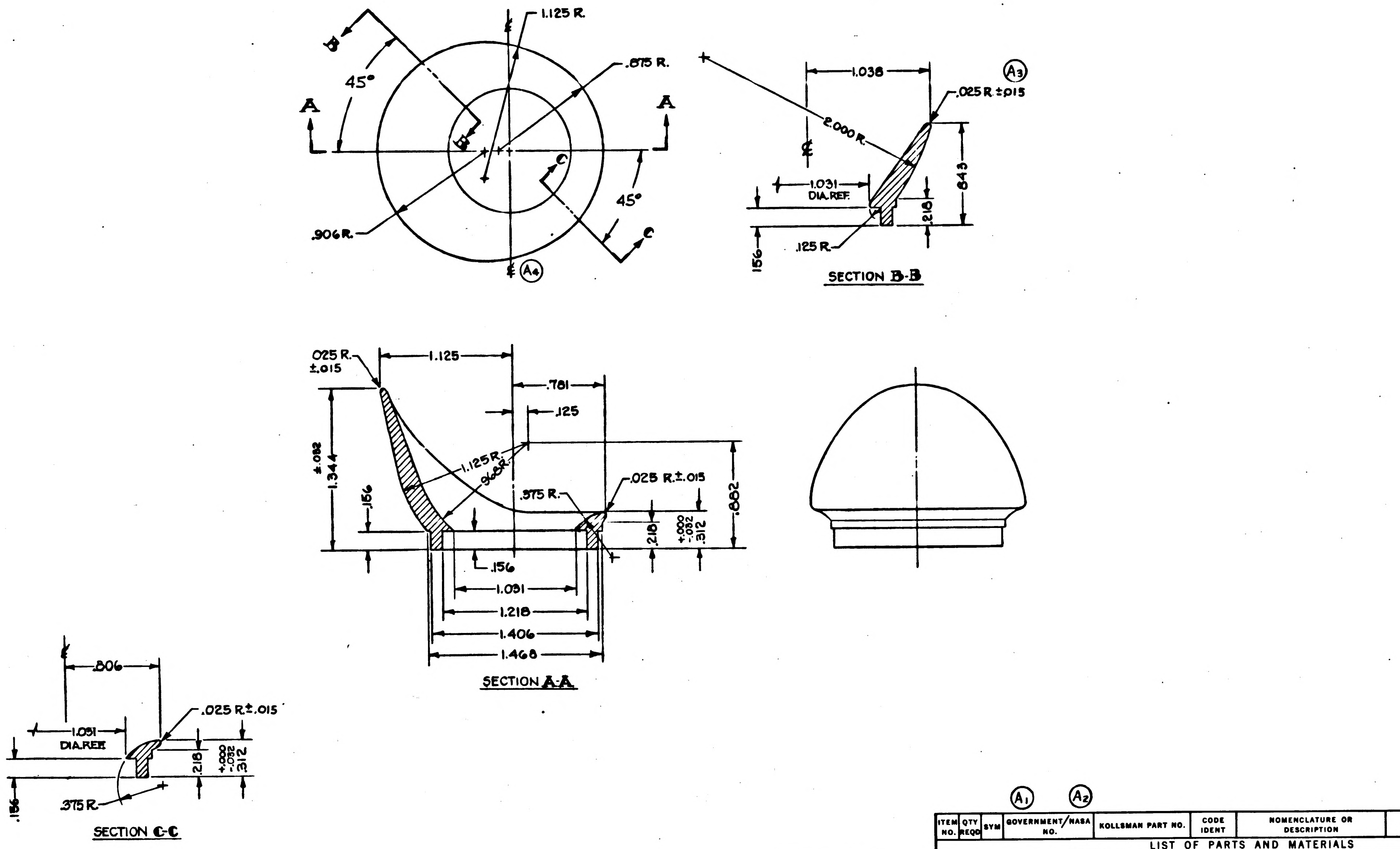
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011878

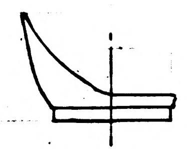
1011879 A

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS TDRR 01565				
A4		REVISED PER TDRR NO. 02805	8/28/65	

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. MATERIAL: NON-TOXIC SYNTHETIC RUBBER PER MIL-E-18648 - COLOR BLACK.



1.125 R.
.875 R.
.906 R.
45°
45°
A
A
B
B
C
C
℄
A4
1.038
A3
.025 R ±.015
2.000 R.
1.031 DIA.REF.
.843
.218
.156
.125 R.
SECTION B-B
.025 R. ±.015
1.125
.781
.125
1.125 R.
.968 R.
.375 R.
.025 R.±.015
±.032
1.344
.156
.218
+.000 -.032 .312
.882
.156
1.091
1.218
1.406
1.468
SECTION A-A
.806
1.031 DIA.REF.
.025 R±.015
.218
+.000 -.032 .312
.156
.375 R.
SECTION C-C



ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
			A1	A2					

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011791	1011000
1011789	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ; DECIMALS ±.005 ; ANGLES ± 2°
DO NOT SCALE THIS DRAWING
MATERIAL: SEE NOTE 2
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 26386900050
DRAWN A.C.WILLIAMS DATE 5-29-63
CHECKED M. Faucett
APPROVAL 6-11-63
APPROVAL E. Thomas 6-11-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
EYEGUARD

CODE IDENT NO.
SIZE D
NASA NUMBER 1011879
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET OF

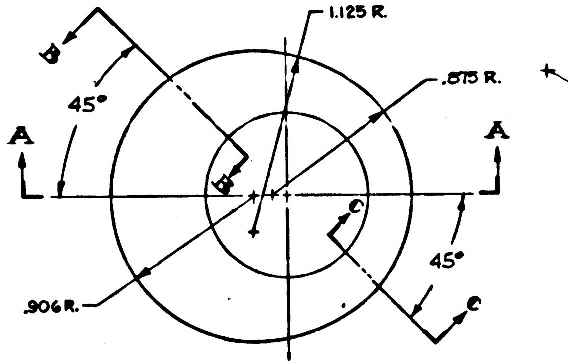
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011879

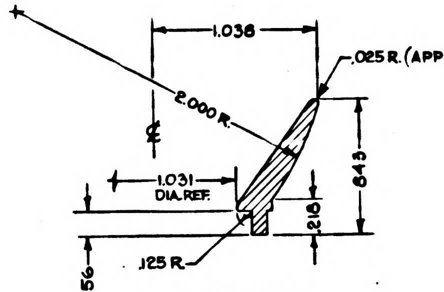
REVISIONS TDRR 01565

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. MATERIAL: NON-TOXIC SYNTHETIC RUBBER PER MIL-E-18648 - COLOR BLACK.

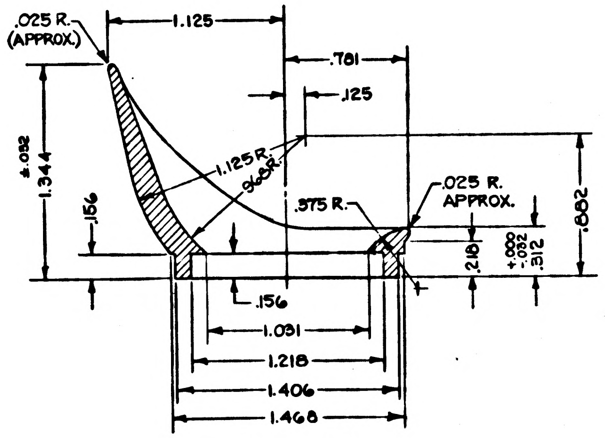


1.125 R.
.875 R.
.906 R.
45°
45°
A
A
B
B
C
C



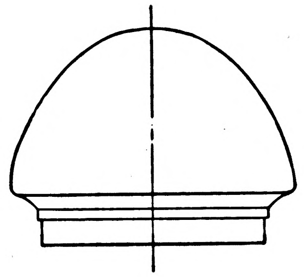
1.038
.025 R. (APPROX.)
2.000 R.
℄
1.031
DIA. REF.
.843
.218
.125 R.
.156

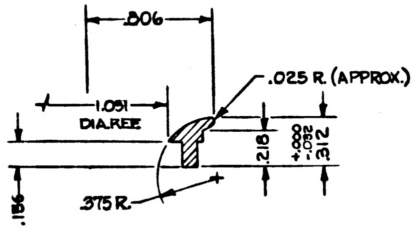
SECTION B-B



.025 R.
(APPROX.)
1.125
.781
.125
±.032
1.344
.156
1.125 R.
.968 R.
.375 R.
.025 R.
APPROX.
.218
+.000
-.032
.312
.882
.156
1.031
1.218
1.406
1.468

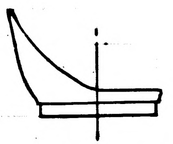
SECTION A-A





.806
.025 R. (APPROX.)
1.051
DIA. REF.
.218
+.000
-.032
.312
.156
.375 R.

SECTION C-C


ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011791	1011000
1011789	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS + − ; DECIMALS + − ; ANGLES + −
DO NOT SCALE THIS DRAWING
MATERIAL: SEE NOTE 2
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 263869C0050
DRAWN A.C. WILLIAMS DATE 5-29-63
CHECKED M. Faussell
APPROVAL 6-11-63
APPROVAL E. [illegible] 6-11-63
NASA APPROVAL Jack Bramard
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
EYEGUARD

CODE IDENT NO.
SIZE D
NASA NUMBER 1011879
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET OF

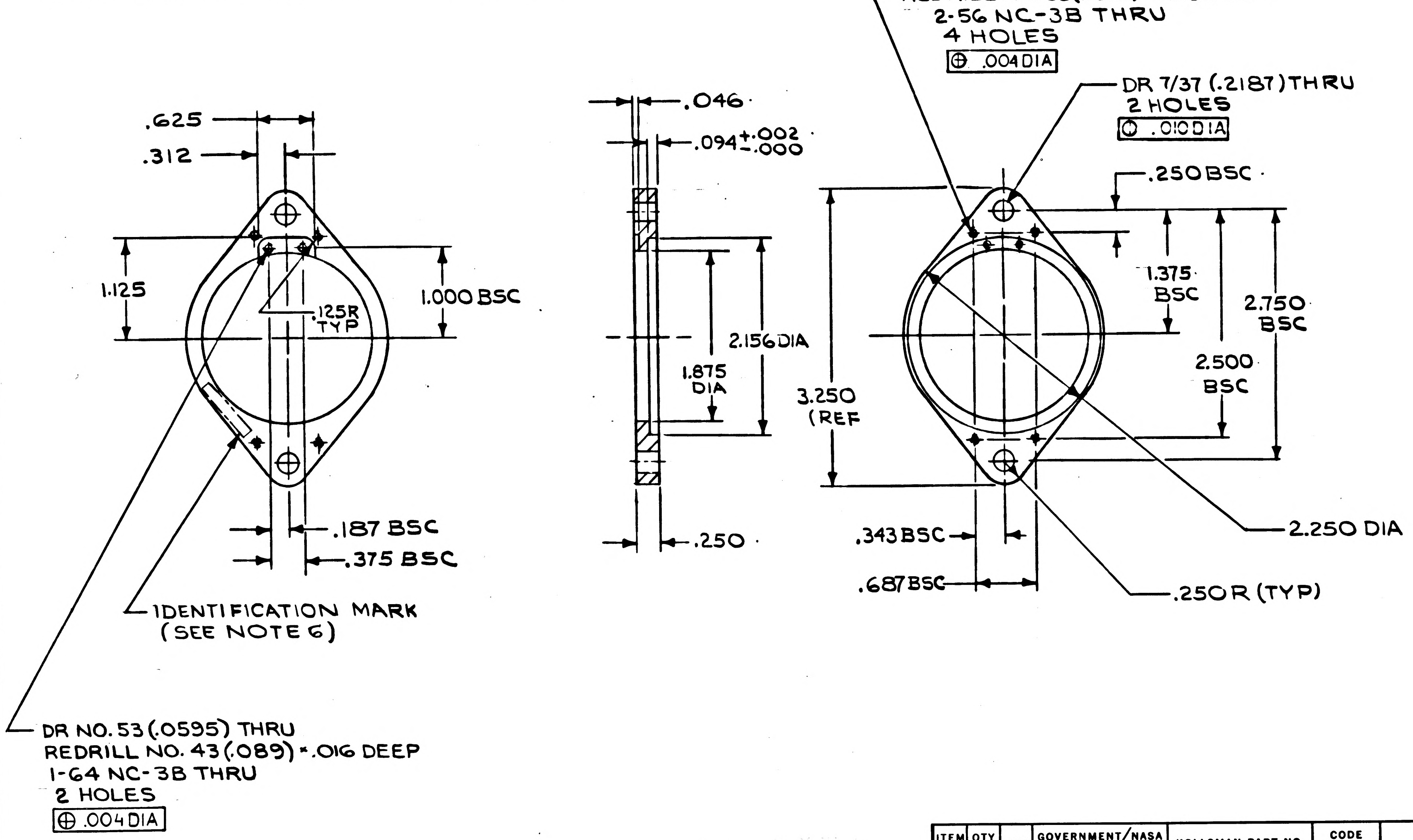
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

E-186

0881101

REVISIONS TDRR 01565				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARD IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. $\sqrt[63]{}$ FINISH ALLOVER
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. BLACK ANODIZE PER MIL-A-8625 TYPE II BLACK (KPS-1005A.201)
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019



DR NO. 50 (.070) THRU
REDRILL NO. 38 (.1015) × .018 DEEP
2-56 NC-3B THRU
4 HOLES
⊕ .004 DIA
DR 7/37 (.2187) THRU
2 HOLES
⊙ .010 DIA
.250 BSC
.625
.312
.046
.094 +.002 −.000
1.125
.125R TYP
1.000 BSC
2.156 DIA
1.875 DIA
3.250 (REF
1.375 BSC
2.750 BSC
2.500 BSC
.187 BSC
.375 BSC
.250
.343 BSC
.687 BSC
2.250 DIA
.250 R (TYP)
IDENTIFICATION MARK (SEE NOTE 6)
DR NO. 53 (.0595) THRU
REDRILL NO. 43 (.089) × .016 DEEP
1-64 NC-3B THRU
2 HOLES
⊕ .004 DIA

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011786	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON: FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL ALUMINUM ALLOY 6061-T6 FED. SPEC QQ-A-325 TEMPER T6
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900950
DRAWN E. DRAPALA DATE 5-29-63
CHECKED H. Bernstein 5-29-63
APPROVAL Thornton 6-11-63
APPROVAL E. D... 6-11-63
NASA APPROVAL Jack Barnard
MIT APPROVAL Perry K Bryant

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
PLATE, MOUNTING

CODE IDENT NO. | SIZE C | NASA NUMBER 1011880
SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

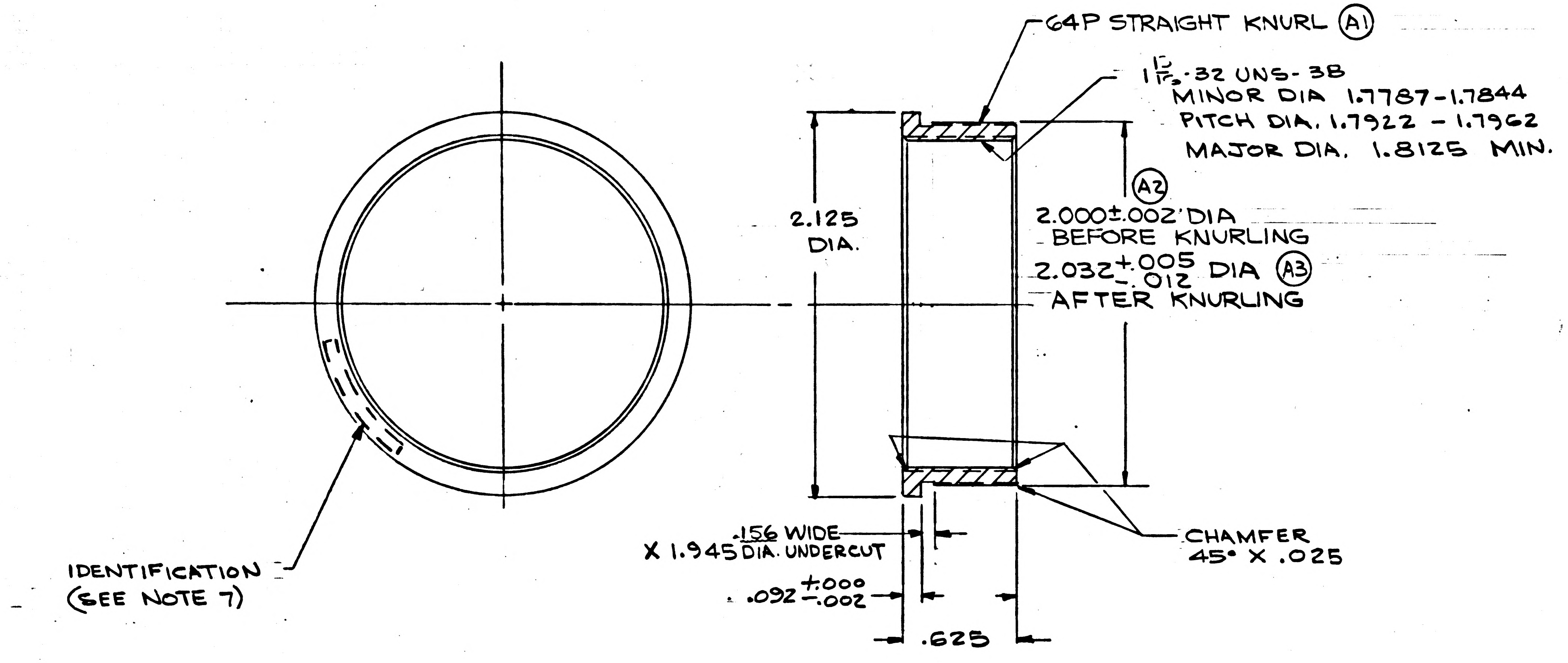
1011880

1011881 A

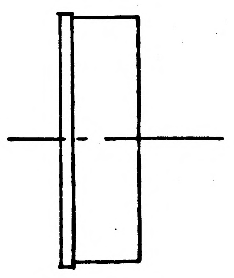
REVISIONS TDRR 01565

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3	-	REVISED PER TDRR NO. 02440	8/8/63	WK

NOTES:
1. INTERPRET DRAWING PER MIL-D-70327.
2. GENERAL MACHINING STANDARDS PER ND 1002078.
3. UNLESS OTHERWISE SPECIFIED.
   a. $\sqrt{}^{63}$ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. BLACK ANODIZE PER MIL-A-8625 TYPE II BLACK (KPS-1005I.201).
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.


64P STRAIGHT KNURL (A1)
$1\frac{13}{16}$-32 UNS-3B
MINOR DIA 1.7787-1.7844
PITCH DIA. 1.7922 - 1.7962
MAJOR DIA. 1.8125 MIN.
2.125 DIA.
(A2)
2.000±.002 DIA BEFORE KNURLING
2.032 +.005 -.012 DIA (A3) AFTER KNURLING
.156 WIDE X 1.945 DIA. UNDERCUT
.092 +.000 -.002
.625
CHAMFER 45° X .025
IDENTIFICATION (SEE NOTE 7)

MASTER


ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011786	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	±.005	±1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 6061-T6, FED SPEC QQ-A-325 TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901510

DRAWN PAUL PAPPACHRISTOU DATE 5-29-63
CHECKED Bernstein 5-29-63
APPROVAL Thornton Hemm 6-4-63
APPROVAL E. Thomp 6-11-63
NASA APPROVAL Jack Barnard
MIT APPROVAL Perry V Bryant

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE RING, ADJUSTING

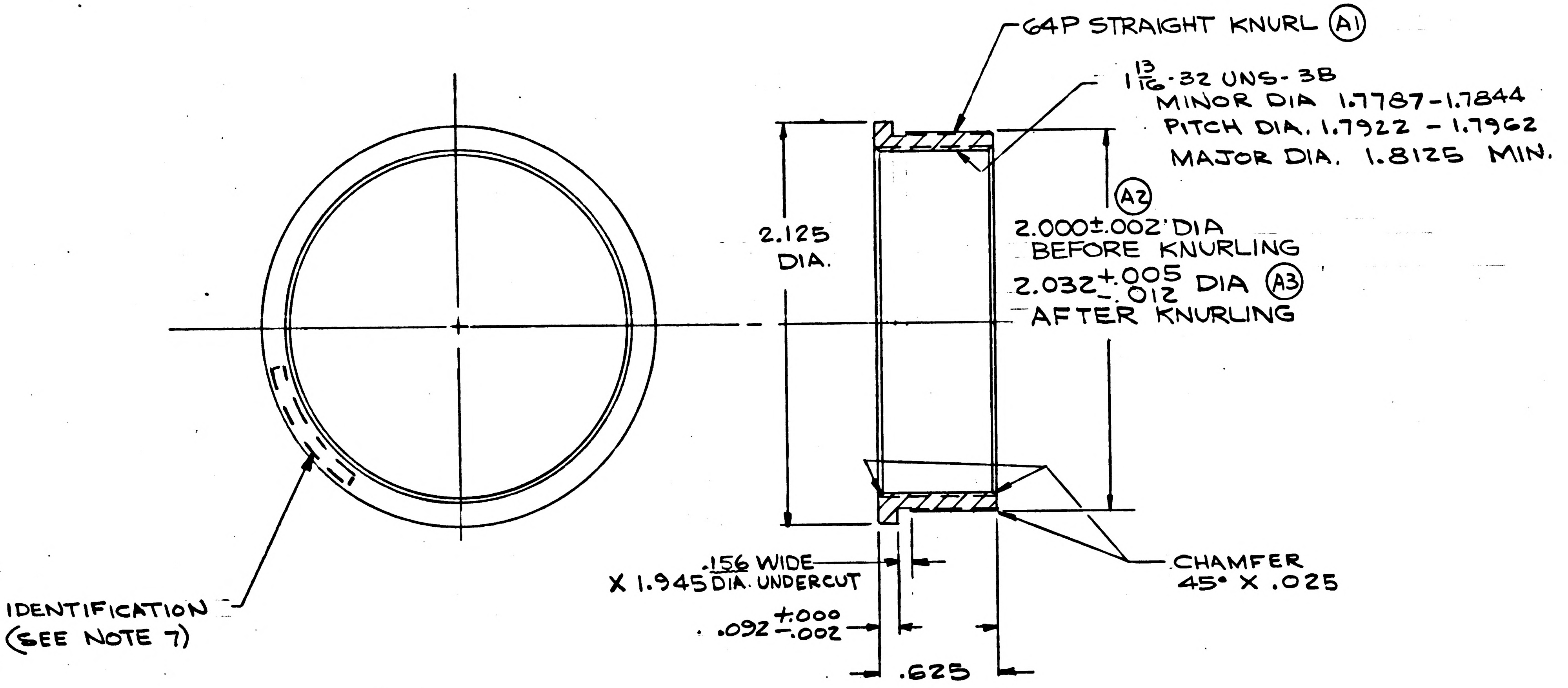
CODE IDENT NO.
SIZE C
NASA NUMBER 1011881
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

B 1881101

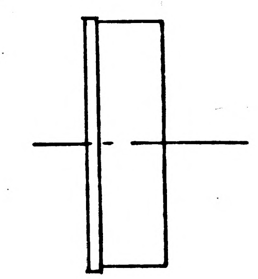
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS TDRR 01565				
A_3		REVISED PER TDRR NO. 02440	8/8/63	WK
B		REVISED PER TDRR NO. 02961	9-4-63	

NOTES:
1. INTERPRET DRAWING PER MIL-D-70327.
2. GENERAL MACHINING STANDARDS PER ND 1002078.
3. UNLESS OTHERWISE SPECIFIED.
   a. 63√ FINISH ALL OVER.
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. BLACK ANODIZE PER MIL-A-8625 TYPE II BLACK (KPS-1005I.201)
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.



64P STRAIGHT KNURL (A1)
$1\frac{13}{16}$-32 UNS-3B
MINOR DIA 1.7787-1.7844
PITCH DIA. 1.7922 - 1.7962
MAJOR DIA. 1.8125 MIN.
2.125 DIA.
(A2)
2.000±.002 DIA BEFORE KNURLING
$2.032^{+.005}_{-.012}$ DIA (A3) AFTER KNURLING
.156 WIDE X 1.945 DIA. UNDERCUT
CHAMFER 45° X .025
$.092^{+.000}_{-.002}$
.625
IDENTIFICATION (SEE NOTE 7)

MASTER



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011932	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	±.005	±1°

DO NOT SCALE THIS DRAWING

MATERIAL: ALUMINUM ALLOY 6061-T6, FED SPEC QQ-A-325 TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 57386901510

DRAWN PAUL PAPPACHRISTOU DATE 5-29-63
CHECKED 5-29-63
APPROVAL Thornton 6-4-63
APPROVAL E. Thomp 6-11-63
NASA APPROVAL Jack Barnard
MIT APPROVAL Perry V. Bryant

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RING, ADJUSTING

CODE IDENT NO. | SIZE C | NASA NUMBER 1011881

SCALE 2/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

1011881 B

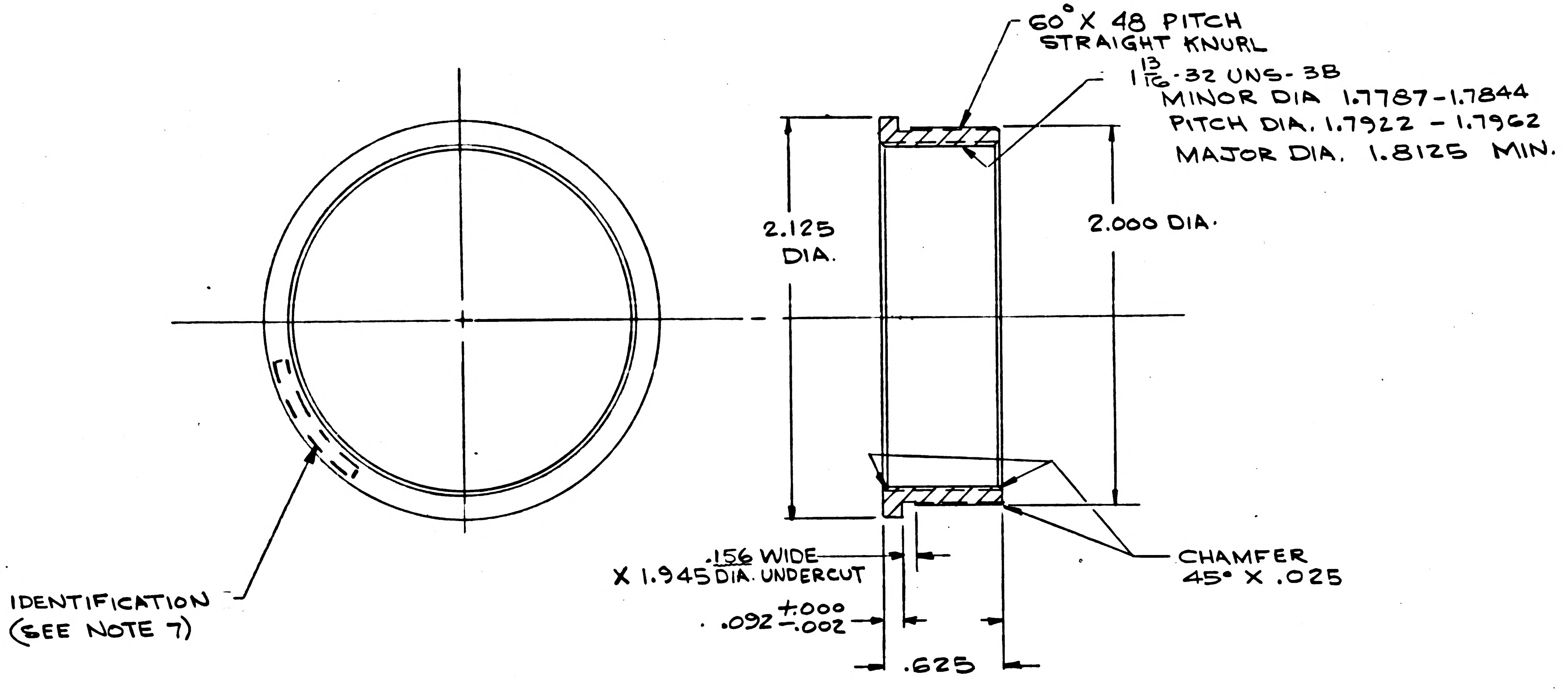
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

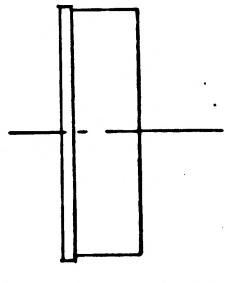
	1881101

REVISIONS TDRR 01565

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING PER MIL-D-70327.
2. GENERAL MACHINING STANDARDS PER ND 1002078.
3. UNLESS OTHERWISE SPECIFIED.
   a $\sqrt{}^{63}$ FINISH ALL OVER.
   b BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. BLACK ANODIZE PER MIL-A-8625 TYPE II BLACK (KPS-1005I.201)
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.


60° X 48 PITCH
STRAIGHT KNURL
$1\frac{13}{16}$-32 UNS-3B
MINOR DIA 1.7787-1.7844
PITCH DIA. 1.7922 - 1.7962
MAJOR DIA. 1.8125 MIN.
2.125
DIA.
2.000 DIA.
.156 WIDE
X 1.945 DIA. UNDERCUT
CHAMFER
45° X .025
.092 +.000 -.002
.625
IDENTIFICATION
(SEE NOTE 7)


ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011786	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	±.005	±1°

DO NOT SCALE THIS DRAWING

MATERIAL
ALUMINUM ALLOY
6061-T6, FED
SPEC QQ-A-325
TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 5738690 1510

DRAWN PAUL PAPPACHRISTOU DATE 5-29-63
CHECKED H Bernstein 5-29-63
APPROVAL Thornton Stearns 6-4-63
APPROVAL E. Thomp 6-11-63
NASA APPROVAL Jack Brennard
MIT APPROVAL Perry K Bryant

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RING, ADJUSTING

CODE IDENT NO.	SIZE	NASA NUMBER
	C	1011881

SCALE 2/1 | WEIGHT | CALC ACTUAL | SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

E-154

1011881

A	2881101

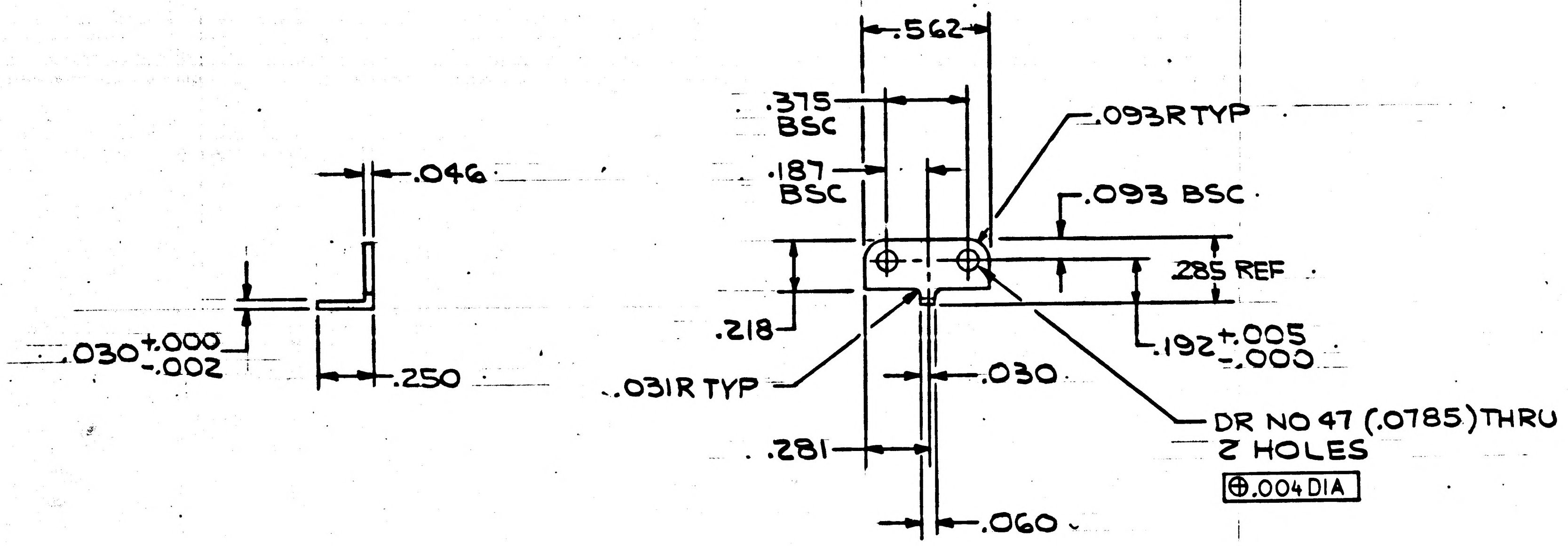
Ⓜ

REVISIONS TDRR 01565

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	A3	WAS FED SPEC QQ-S-763 CLASS 440 COND A TDRR NO. 02260	7/26/63	WH 8/6/63

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:-
   - a) 63√ FINISH ALL OVER
   - b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. PASSIVATE IN ACCORDANCE WITH MIL-STD-171 (KPS-1005I.200)
6. IDENTIFY USING NASA DRAWING NO. REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019



MASTER

ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011786	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± —

DO NOT SCALE THIS DRAWING

MATERIAL
CORROSION RESISTANT STEEL
FED SPEC QQ-S-766 CLASS 302, COND A FINISH 2B Ⓐ

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900960

DRAWN R. BRUNELLE DATE 5-29-63
CHECKED 5-29-63
APPROVAL 6-4-63
APPROVAL E. Thomp 6-11-63
NASA APPROVAL Jack Barsaud
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
KEY

CODE IDENT NO.
SIZE C
NASA NUMBER 1011882
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET OF

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

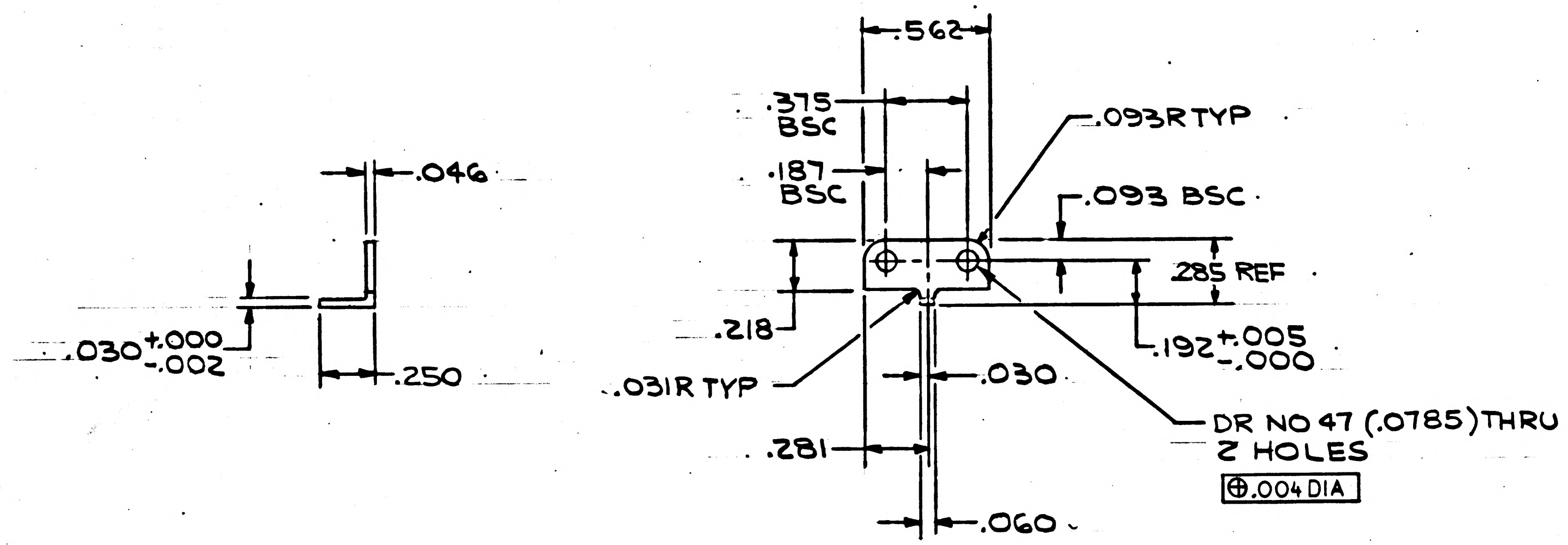
1011882A

B 2881101

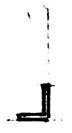
NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:-
   a) 63/√ FINISH ALL OVER
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. PASSIVATE IN ACCORDANCE WITH MIL-STD-171 (KPS-1005I.200)
6. IDENTIFY USING NASA DRAWING NO. REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019

REVISIONS TDRR 01565

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A	A3	WAS FED SPEC QQ-S-763 CLASS 440 COND A TDRR NO. 02260	7/26/63	WH 8/6/63
B		REVISED PER TDRR NO. 02447	8/9/63	WH 8/13/63



MASTER



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011786	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± —

DO NOT SCALE THIS DRAWING

MATERIAL CORROSION RESISTANT STEEL FED SPEC QQ-S-766 CLASS 302, COND A FINISH 2B Ⓐ

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900960

DRAWN R. BRUNELLE DATE 5-29-63
CHECKED Borenstein 5-29-63
APPROVAL Thornton Hearn 6-4-63
APPROVAL E. Thomp 6-11-63
NASA APPROVAL Jack Bannard
MIT APPROVAL Perry K Bryant

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE KEY

CODE IDENT NO
SIZE C
NASA NUMBER 1011882
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011882 B

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

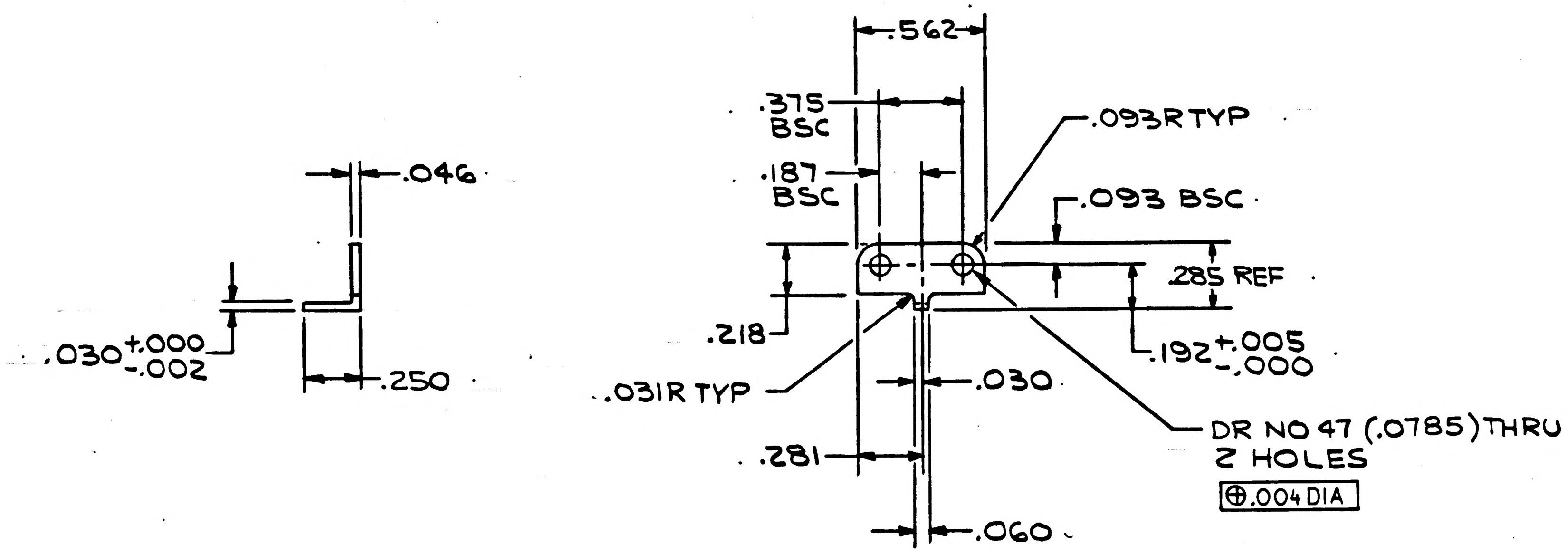
E-184

2881101

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REVISIONS TDRR 01565

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED:-
   a) $\sqrt{}^{63}$ FINISH ALL OVER
   b) BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. PASSIVATE IN ACCORDANCE WITH MIL-STD-171 (KPS-1005I.200)
6. IDENTIFY USING NASA DRAWING NO. REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011786	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± —

DO NOT SCALE THIS DRAWING
MATERIAL STAINLESS STEEL AISI 440 FED SPEC QQ-S-763 CLASS 440 COND A
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900960
DRAWN R. BRUNELLE DATE 5-29-63
CHECKED H. Borenstein 5-29-63
APPROVAL 6-4-63
APPROVAL E. [illegible] 6-11-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE KEY

CODE IDENT NO.
SIZE C
NASA NUMBER 1011882
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

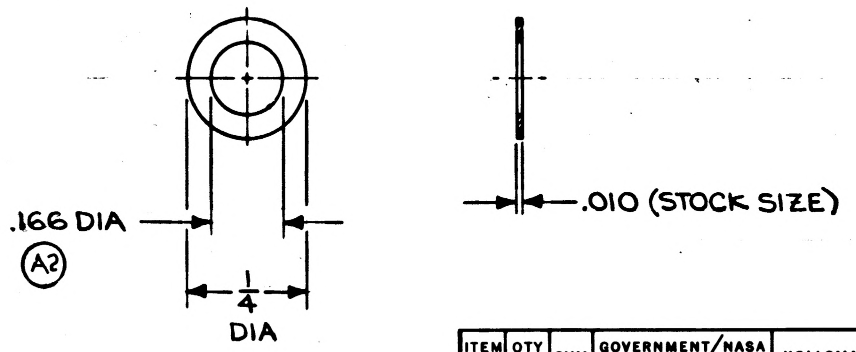
E-154

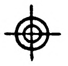
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011885 A

NOTES:
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORD WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63✓ FINISH ALL OVER
   b. BREAK SHARP CORNERS IN ACCORD WITH ND1002078.
4. REMOVE BURRS IN ACCORD WITH ND1002079.
5. FINISH: ANODIZE PER MIL-A-8625, TYPE II (KPS-1005.200)
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER MIL-STD-130 (KPS-1003 P.100) (A3)

REVISIONS TDRR 01584			
SYM	DESCRIPTION	DATE	APPROVAL
A3	1) MATERIAL WAS ALUMINUM ALLOY 2024-T3 FED SPEC QQ-A-355 TEMPER T3 2) WAS .147 DIA 3). ADDED NOTE NO 6 TDRR 02025	7/17/63	




ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011784	1011000

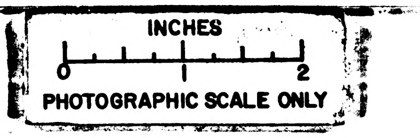
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ±.005; ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL ALUMINUM ALLOY SHEET 3003-H14 FED SPEC QQ-A-359 (A1)
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 45386900170
DRAWN [illegible] DATE 6-7-63
CHECKED J. SULLIVAN 6-10-63
APPROVAL E McDonald 6-10-63
APPROVAL E [illegible] 6-12-63
NASA APPROVAL Jack Barnard
MIT APPROVAL [illegible] 6/14/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
TITLE SHIM
CODE IDENT NO.
SIZE B
NASA NUMBER 1011885
SCALE 4/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

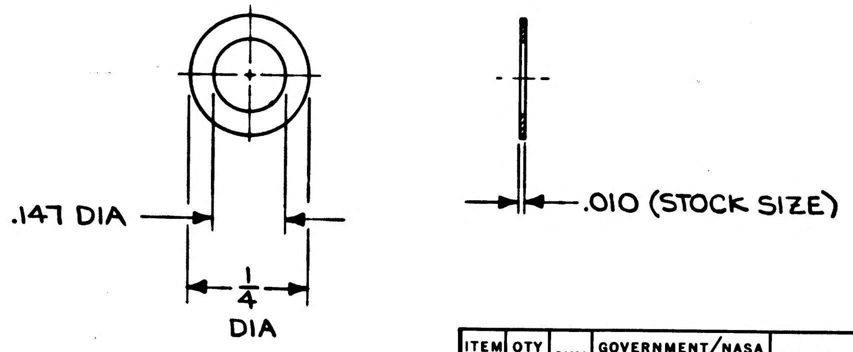
E-153



1011885

REVISIONS TORR 01584			
SYM	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORD WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER
   b. BREAK SHARP CORNERS IN ACCORD WITH ND1002078.
4. REMOVE BURRS IN ACCORD WITH ND1002079.
5. FINISH: ANODIZE PER MIL-A-8625, TYPE II (KPS-1005.200)



ACTUAL SIZE

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011784	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	±.005	± ½°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 2024-T3 FED.SPEC QQ-A-355 TEMPER T3

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 45386900170

DRAWN J. Schille DATE 6-7-63
CHECKED J. SULLIVAN 6-10-63
APPROVAL E. MacDonald 6-10-63
APPROVAL E. Munz 6-12-63
NASA APPROVAL Jack Barnard
MIT APPROVAL L. E. Larson Jr. 6/14/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE SHIM

CODE IDENT NO.	SIZE	NASA NUMBER
	B	1011885

SCALE 4/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

E-153

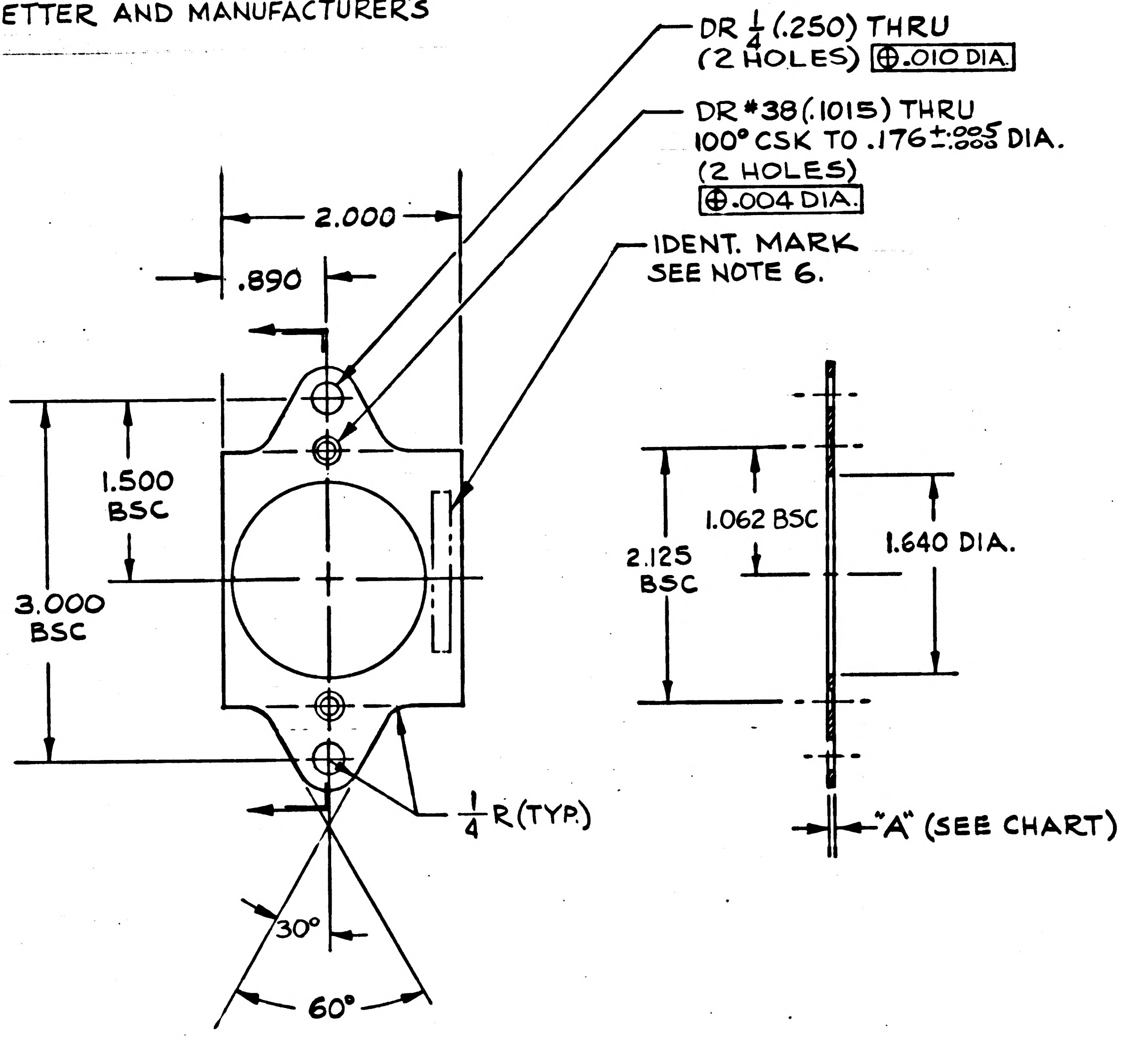
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

A	1011887

REVISIONS TDRR 01584				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A2	A4 D6	1) NEXT ASSY WAS 1011734 2) REVISED NOTE 6	7/12/63	
		TDRR NO. 02032	7/17/63	

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63 FINISH ALL OVER
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. FINISH: ANODIZE (SULFURIC) PER MIL-A-8625, TYPE II (KPS-1005A.200).
6. (A2) IDENTIFY USING NASA DWG. NO., REVISION LETTER AND MANUFACTURER'S SYMBOL PER ND1002019.


DR 1/4 (.250) THRU
(2 HOLES) ⊕ .010 DIA.
DR #38 (.1015) THRU
100° CSK TO .176 +.005 -.000 DIA.
(2 HOLES)
⊕ .004 DIA.
IDENT. MARK
SEE NOTE 6.
2.000
.890
1.500
BSC
3.000
BSC
1/4 R (TYP.)
30°
60°
2.125
BSC
1.062 BSC
1.640 DIA.
"A" (SEE CHART)

PART NO.	K.I.C. PART NO.	"A" DIM. ±.002
1011887-1	56386900500	.030
1011887-2	56386900510	.040
1011887-3	56386900520	.050
1011887-4	56386900530	.060
1011887-5	56386900540	.070
1011887-6	56386900550	.080
1011887-7	56386900560	.090

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

MASTER

NEXT ASSY	USED ON
(A1) 1011737	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ±.005; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL ALUMINUM ALLOY 6061-T6 FED. SPEC. QQ-A-327 TEMPER T6
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 5638690 0500 THRU 0560

DRAWN H. BORENSTEIN DATE 6-12-63
CHECKED [illegible] 6-12-63
APPROVAL E. Macdonald 6-12-63
APPROVAL E. [illegible] 6-12-63
NASA APPROVAL [illegible]
MIT APPROVAL [illegible] 6/14/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SHIM, SPACER
(SCT TURRET)

CODE IDENT NO.
SIZE C
NASA NUMBER 1011887
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-184

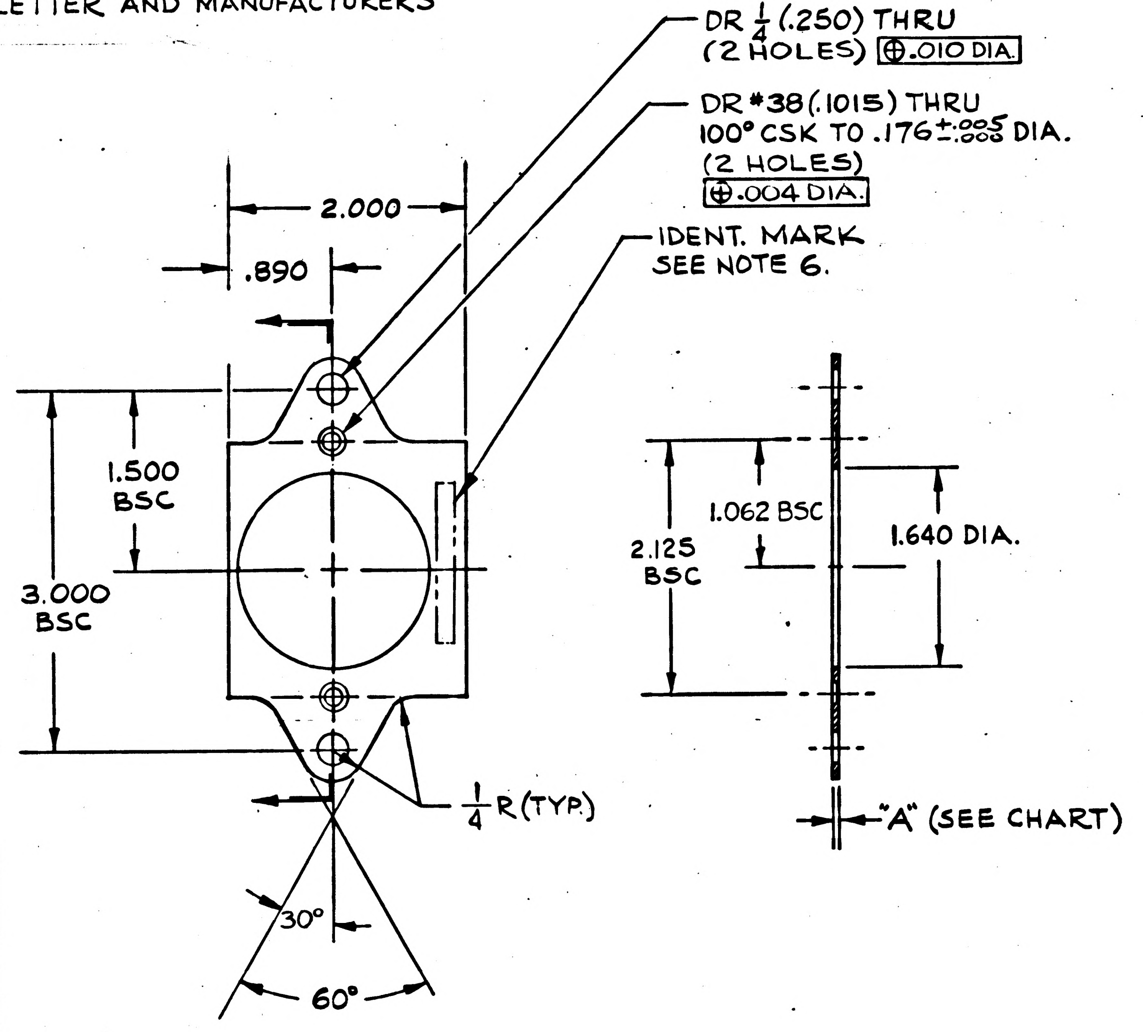
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011887 A

B	1011887

REVISIONS TDRR 01584				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A_2	A4 D6	1) NEXT ASSY WAS 1011734 2) REVISED NOTE 6 TDRR NO. 02032	7/12/63 7/17/63	
B	D6	REVISED PER TDRR NO.02453	8/8/63	WK

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. FINISH: ANODIZE (SULFURIC) PER MIL-A-8625, TYPE II (KPS-1005A.200).
6. (A2) IDENTIFY USING NASA DWG. NO., REVISION LETTER AND MANUFACTURER'S SYMBOL PER ND1002019.



DR 1/4 (.250) THRU
(2 HOLES) ⊕ .010 DIA.
DR #38 (.1015) THRU
100° CSK TO .176 +.005 -.000 DIA.
(2 HOLES)
⊕ .004 DIA.
IDENT. MARK
SEE NOTE 6.
2.000
.890
1.500 BSC
3.000 BSC
1/4 R (TYP.)
30°
60°
2.125 BSC
1.062 BSC
1.640 DIA.
"A" (SEE CHART)

PART NO.	K.I.C. PART NO.	"A" DIM. ±.002
1011887-1	56386900500	.030
1011887-2	56386900510	.040
1011887-3	56386900520	.050
1011887-4	56386900530	.060
1011887-5	56386900540	.070
1011887-6	56386900550	.080
1011887-7	56386900560	.090

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

(A1) 1011737	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	±.005	± 1°

DO NOT SCALE THIS DRAWING
MATERIAL ALUMINUM ALLOY 6061-T6 FED. SPEC. QQ-A-327 TEMPER T6
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 5638690 0500 THRU 0560

DRAWN A. BORENSTEIN DATE 6-12-63
CHECKED [illegible] 6-12-63
APPROVAL E. [illegible] 6-12-63
APPROVAL E. [illegible] 6-12-63
NASA APPROVAL [illegible]
MIT APPROVAL [illegible] 6/14/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SHIM, SPACER
(SCT TURRET)

CODE IDENT NO. | SIZE C | NASA NUMBER 1011887
SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

E-154

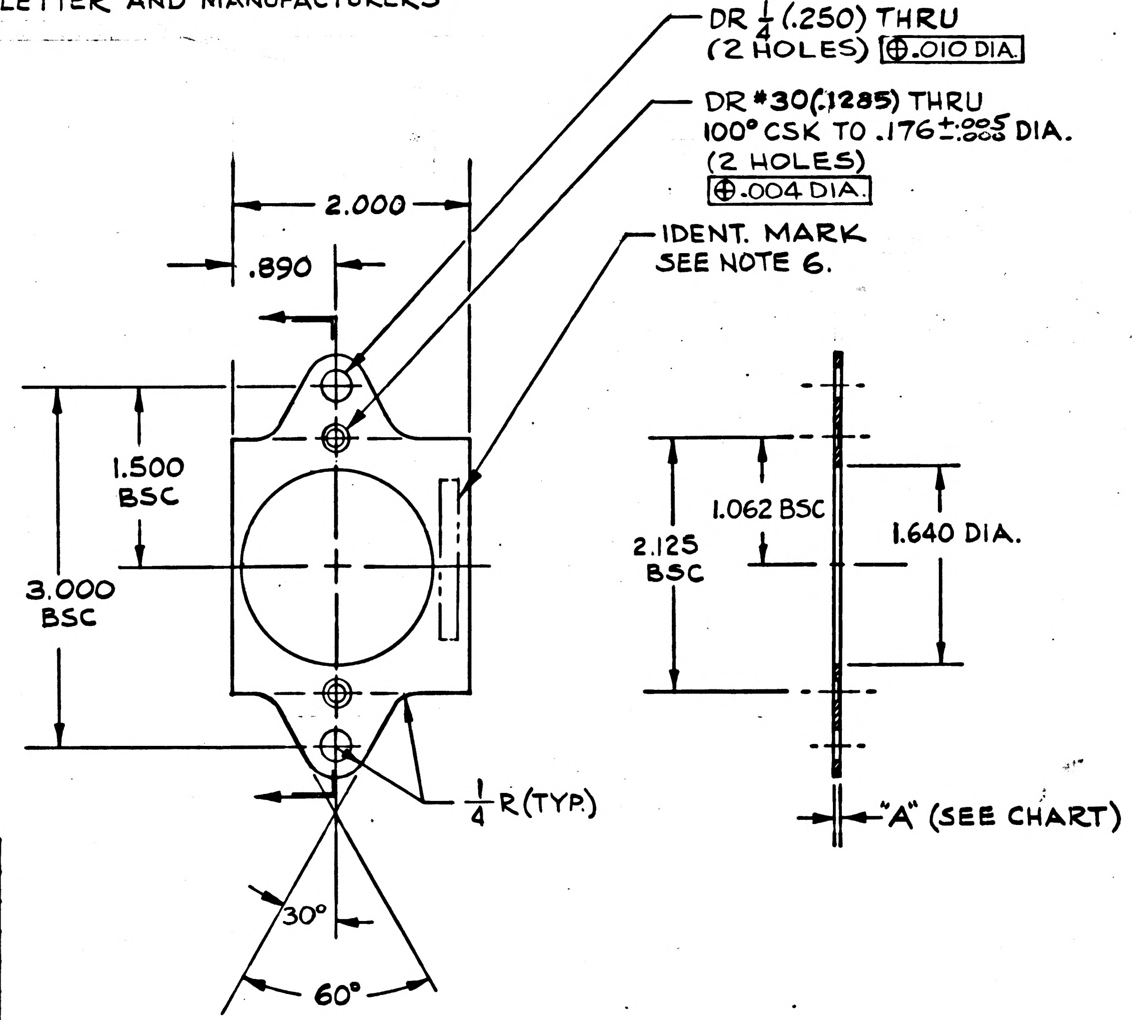
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

C 1011887

REVISIONS TDRR 01584				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A_2	A4 D6	1) NEXT ASSY WAS 1011734 2) REVISED NOTE 6 TDRR NO. 02032	7/12/63 7/17/63	
B	D6	REVISED PER TDRR NO. 02453	8/8/63	WK
C_2		REVISED PER TDRR NO. 03348	9/23/63	9/26

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63 FINISH ALL OVER
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. FINISH: ANODIZE (SULFURIC) PER MIL-A-8625, TYPE II (KPS-1005A.200).
6. (A2) IDENTIFY USING NASA DWG. NO., REVISION LETTER AND MANUFACTURER'S SYMBOL PER ND1002019.



PART NO.	K.I.C. PART NO.	"A" DIM. ±.002
1011887-1	56386900500	.030
1011887-2	56386900510	.040
1011887-3	56386900520	.050
1011887-4	56386900530	.060
1011887-5	56386900540	.070
1011887-6	56386900550	.080
1011887-7	56386900560	.090

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
(A1) 1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 6061-T6 FED. SPEC. QQ-A-327 TEMPER T6

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 5638690 0500 THRU 0560

DRAWN H. BORENSTEIN DATE 6-12-63
CHECKED 6-12-63
APPROVAL E. McDonald 6-12-63
APPROVAL E. Thorup 6-12-63
NASA APPROVAL
MIT APPROVAL 6/14/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SHIM, SPACER
(SCT TURRET)

CODE IDENT NO. | SIZE C | NASA NUMBER 1011887

SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

E-184

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

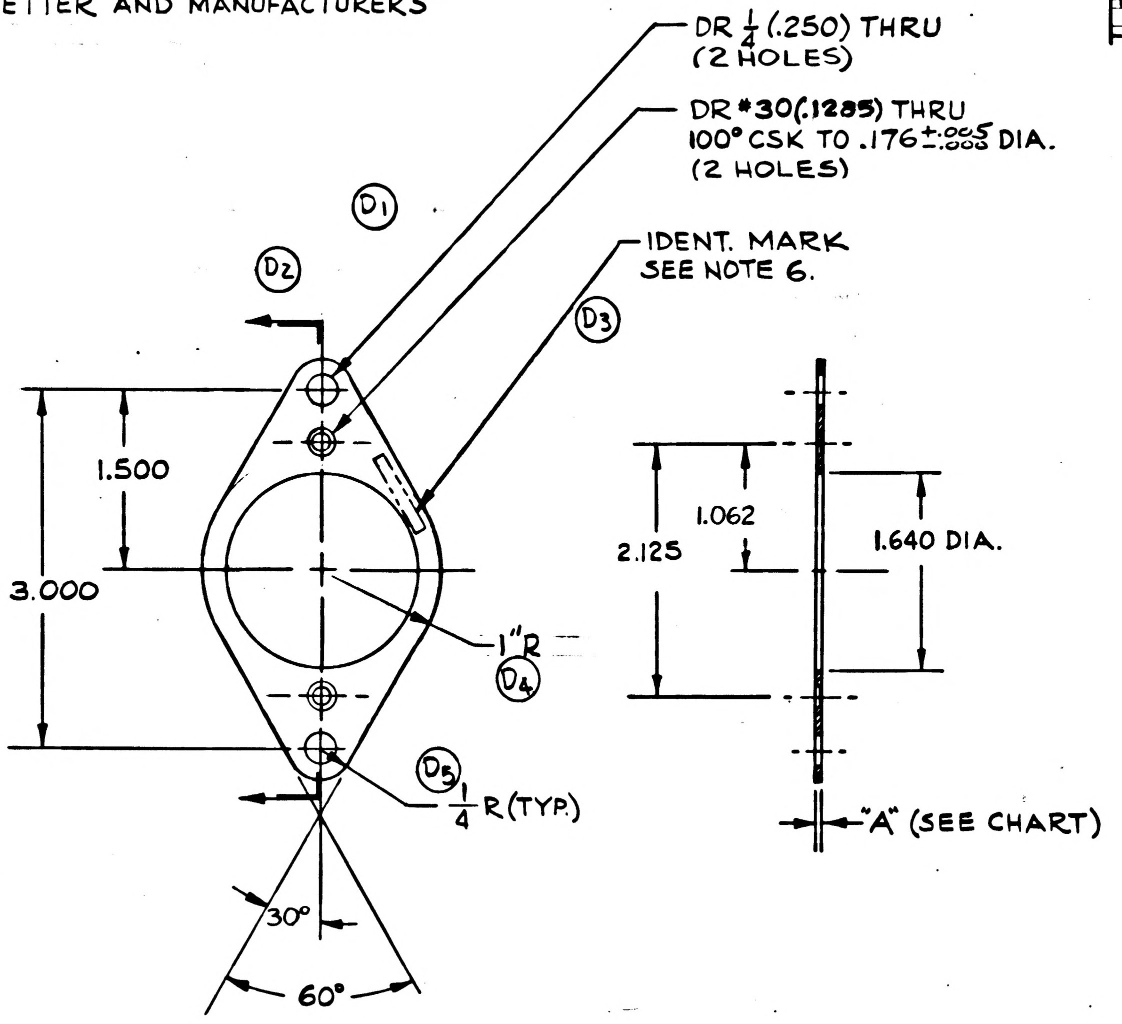
1011887

D 1011887

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. FINISH: ANODIZE (SULFURIC) PER MIL-A-8625, TYPE II (KPS-1005A.200).
6. (A2) IDENTIFY USING NASA DWG. NO., REVISION LETTER AND MANUFACTURER'S SYMBOL PER ND1002019.

			REVISIONS TDRR 01584		
	SYM	ZONE	DESCRIPTION	DATE	APPROVAL
(M) (M)	A_2	A4 D6	1) NEXT ASSY WAS 1011734 2) REVISED NOTE 6 TDRR NO. 02032	7/12/63 7/17/63	
(M)	B	D6	REVISED PER TDRR NO. 02453	8/8/63	WK
(M)	C_2		REVISED PER TDRR NO. 03348	9/23/63	9/26
	D_5		REVISED PER TDRR NO. 07529	4/7/64	



PART NO.	K.I.C. PART NO.	"A" DIM. ±.002
1011887-1	56386900500	.030
1011887-2	56386900510	.040
1011887-3	56386900520	.050
1011887-4	56386900530	.060
1011887-5	56386900540	.070
1011887-6	56386900550	.080
1011887-7	56386900560	.090

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
(A1) 1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ± .005; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL ALUMINUM ALLOY 6061-T6 FED. SPEC. QQ-A-327 TEMPER T6
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 5638690 0500 THRU 0560
DRAWN H. BORENSTEIN DATE 6-12-63
CHECKED 6-17-63
APPROVAL E. McDonald 6-12-63
APPROVAL E. Thomp 6-12-63
NASA APPROVAL
MIT APPROVAL 6/14/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SHIM, SPACER
(SCT TURRET)

CODE IDENT NO.
SIZE C
NASA NUMBER 1011887
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

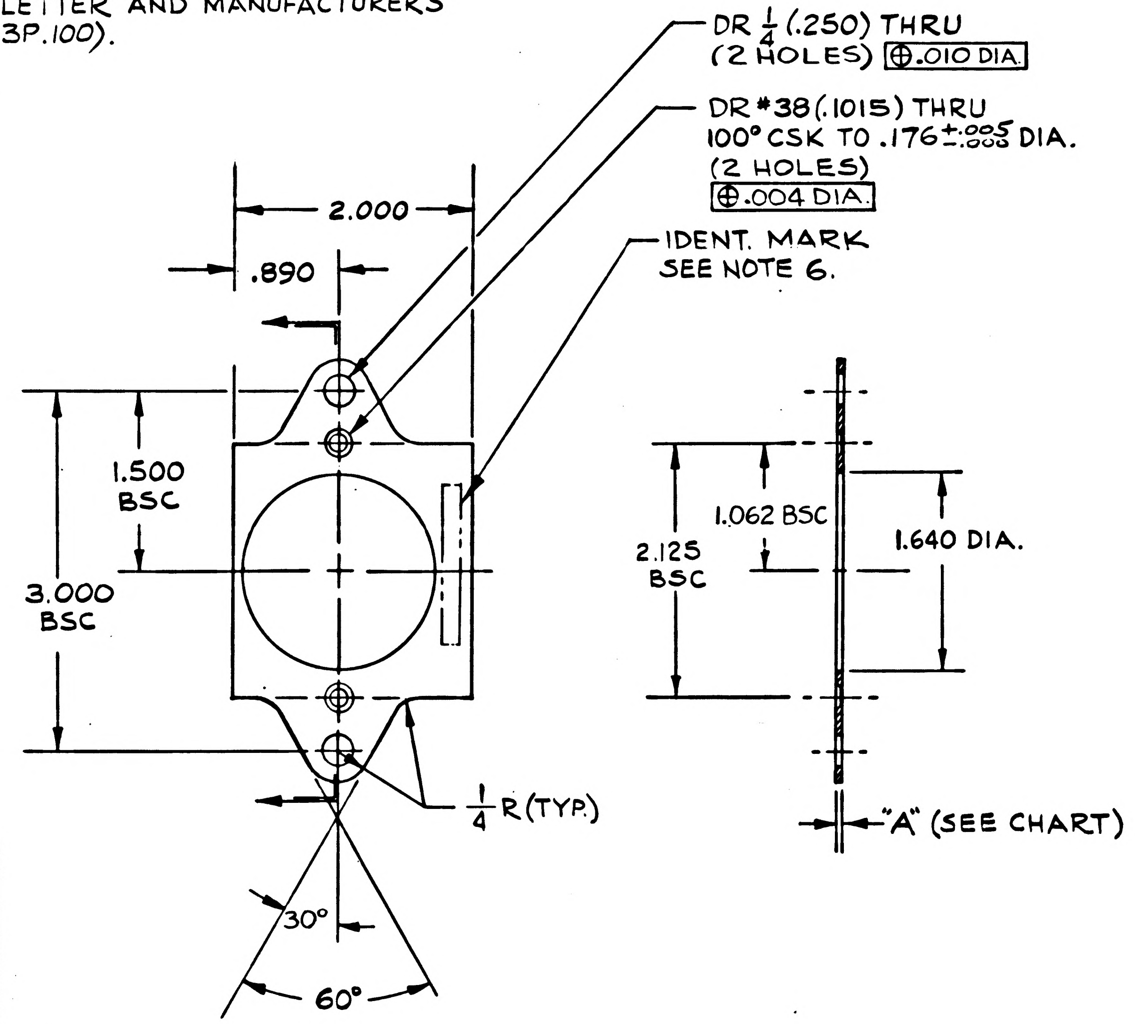
1011887 D

1011887

REVISIONS TDRR 01584				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND 1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. FINISH: ANODIZE (SULFURIC) PER MIL-A-8625, TYPE II (KPS-1005A.200).
6. IDENTIFY USING NASA DWG. NO., REVISION LETTER AND MANUFACTURER'S SYMBOL PER MIL-STD-130 (KPS-1003P.100).


DR 1/4 (.250) THRU
(2 HOLES) ⊕.010 DIA.
DR #38 (.1015) THRU
100° CSK TO .176 +.005 -.000 DIA.
(2 HOLES)
⊕.004 DIA.
IDENT. MARK
SEE NOTE 6.
2.000
.890
1.500
BSC
3.000
BSC
1/4 R (TYP.)
30°
60°
2.125
BSC
1.062 BSC
1.640 DIA.
"A" (SEE CHART)

PART NO.	K.I.C. PART NO.	"A" DIM. ±.002
1011887-1	56386900500	.030
1011887-2	56386900510	.040
1011887-3	56386900520	.050
1011887-4	56386900530	.060
1011887-5	56386900540	.070
1011887-6	56386900550	.080
1011887-7	56386900560	.090

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

MASTER

1011734	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64; DECIMALS ±.005; ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL ALUMINUM ALLOY 6061-T6 FED. SPEC. QQ-A-327 TEMPER T6
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 5638690 0500 THRU 0560
DRAWN A. BORENSTEIN DATE 6-12-63
CHECKED 6-12-63
APPROVAL E. Mactonald 6-12-63
APPROVAL E. Mhorey 6-12-63
NASA APPROVAL Jack Barnard
MIT APPROVAL 6/14/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE SHIM, SPACER (SCT TURRET)

CODE IDENT NO.
SIZE C
NASA NUMBER 1011887
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

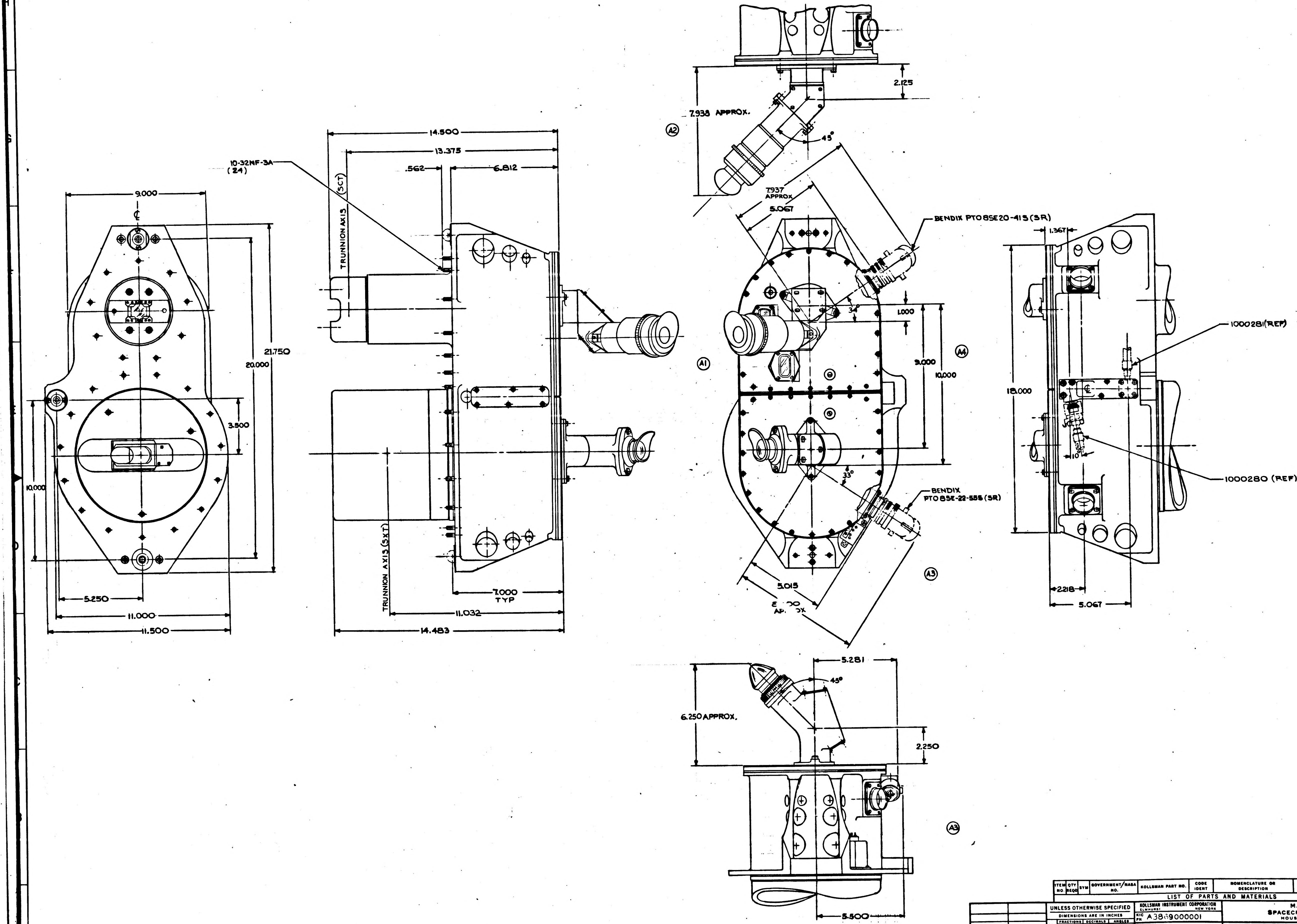
1011887

NOTE
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.

A 1011888

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A₄		REVISED PER TDRR NO.06512	8-16-63	

REVISIONS 02625 8-16-63


9.000
℄
10-32NF-3A (24)
21.750
20.000
3.500
10.000
5.250
11.000
11.500
14.500
13.375
.562
6.812
TRUNNION AXIS (SCT)
TRUNNION AXIS (SXT)
7.000 TYP
11.032
14.483
7.938 APPROX.
2.125
45°
7.937 APPROX
5.067
BENDIX PT08SE20-41S (SR)
34°
1.000
9.000
10.000
A1
A2
A3
A4
33°
BENDIX PT08SE-22-55S (SR)
5.015
8.100 APPROX
1.367
18.000
1000281 (REF)
1000280 (REF)
2.218
5.067
5.281
45°
6.250 APPROX.
2.250
5.500

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
—	—

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .020	± 2°

DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN A3869000001
DRAWN E.DRAPALA DATE 8-14-63
CHECKED W. CABAN 7-24-63
APPROVAL 8-16-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT
(OUTLINE DWG)

CODE IDENT NO.
SIZE E
NASA NUMBER 1011888
SCALE 1/2
WEIGHT
ACTUAL
SHEET 1 OF 1

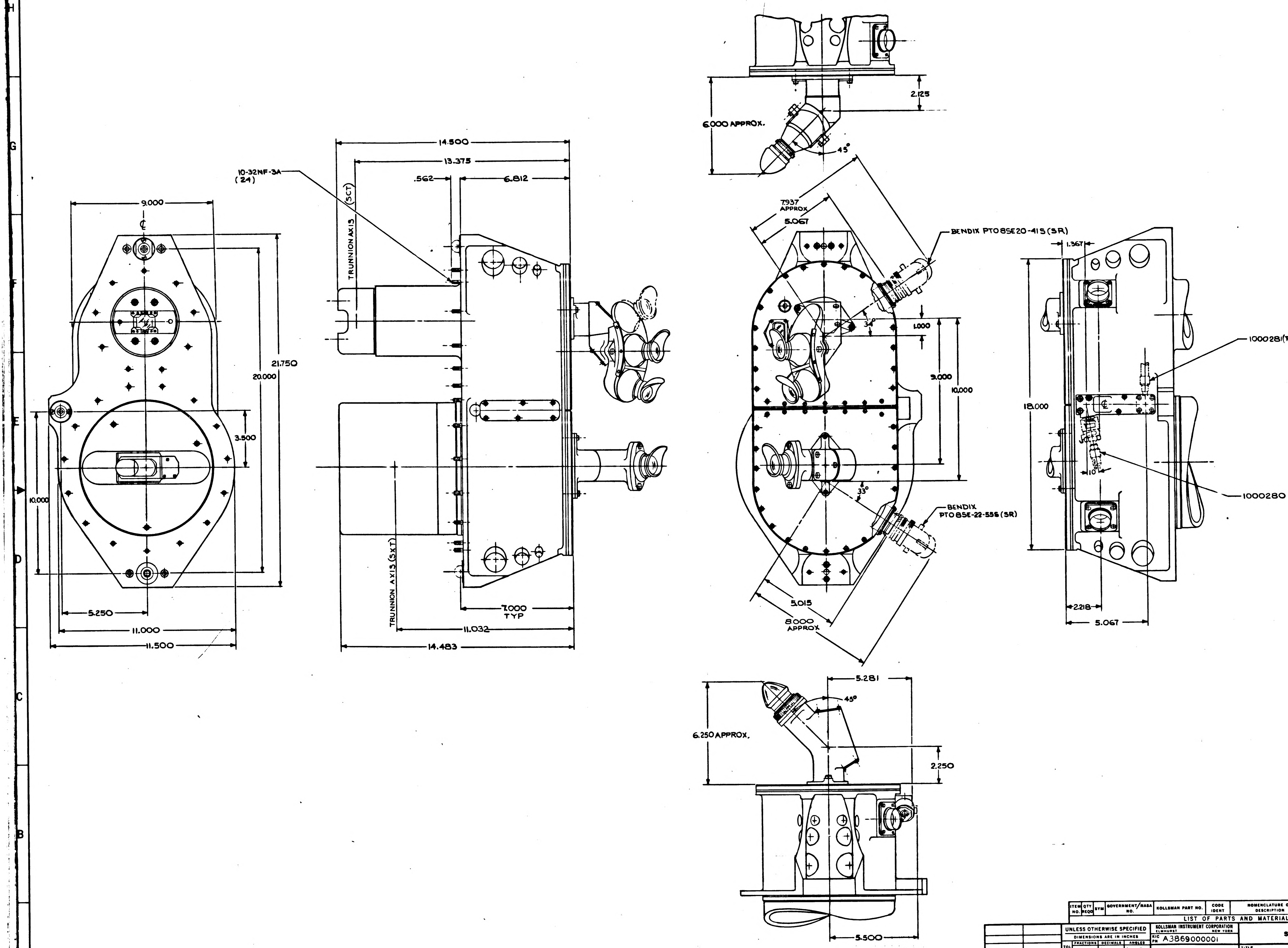
INCHES
PHOTOGRAPHIC SCALE ONLY

8881101

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REVISIONS 02625 8-16-63

NOTE
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.



9.000
℄
21.750
20.000
3.500
10.000
5.250
11.000
11.500
10-32NF-3A
(24)
14.500
13.375
.562
6.812
TRUNNION AXIS (SCT)
TRUNNION AXIS (SXT)
7.000
TYP
11.032
14.483
6.000 APPROX.
2.125
45°
7.937
APPROX
5.067
BENDIX PT08SE20-41S(SR)
34°
1.000
9.000
10.000
33°
BENDIX
PT08SE-22-55S(SR)
5.015
8.000
APPROX
1.367
18.000
1000281(REF)
1000280 (REF)
10°
2.218
5.067
5.281
45°
6.250 APPROX.
2.250
5.500

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.020	± 2°

DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN A3869000001
DRAWN ~~E.DRAPALA~~ DATE ~~8-14-63~~
CHECKED W. CABAN 7-24-63
APPROVAL 8-16-63
APPROVAL 8-15-63
NASA APPROVAL W. J. 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT
(OUTLINE DWG)

CODE IDENT NO.
SIZE E
NASA NUMBER 1011888
SCALE 1/2
WEIGHT CALC ACTUAL
SHEET OF

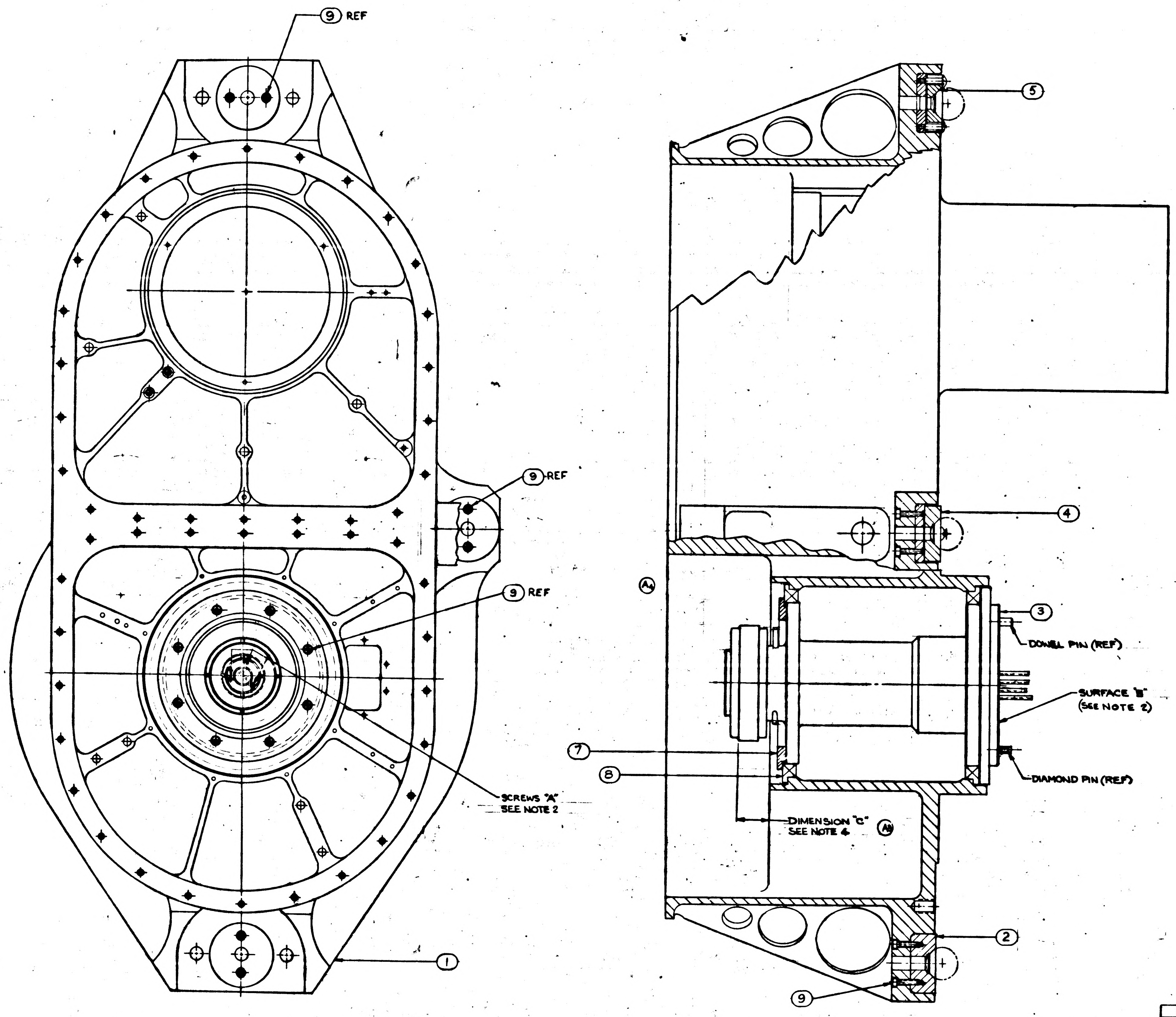
1011888

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLE PER ATP 1011889.
3. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019.
Ⓐ2 4. RECORD THIS DIMENSION AGAINST SERIAL NUMBER OF RESOLVER AS DATA FOR COMPLETION OF ASSEMBLY 1011906.

A 1011889

REVISIONS 0262				8-16-63
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A 4		REVISED PER TDRR NO. 08477	5/14/64	



Ⓐ1

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
9	14	NAS	1352C04LL8	74455157015		SCREW, CAP, SOCKET HEAD			
8	2		1011607-2	30205772400		BEARING, BALL, ANNULAR			
7	1		1011316	57386900750		RETAINER SHAFT			
6									
5	1		1011739	85386900540		INSERT, BALL MOUNT, LINE, ASSY OF			
4	1		1011738	85386900530		INSERT, BALL MOUNT, PLANE, ASSY OF			
3	1		1011704	85386900690		SHAFT AXIS ASSY, SEXTANT			
2	1		1011566	57386900850		INSERT, BALL MOUNT, STATIONARY			
1	1		1011631	85386900380		OPTICAL BASE, ASSY OF			

LIST OF PARTS AND MATERIALS

1011890	1011000
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900700
DRAWN M. FAUVELL DATE 6-13-63
CHECKED
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL W J 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT
SUB ASSY STAGE I

CODE IDENT NO.
SIZE E
NASA NUMBER 1011889
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

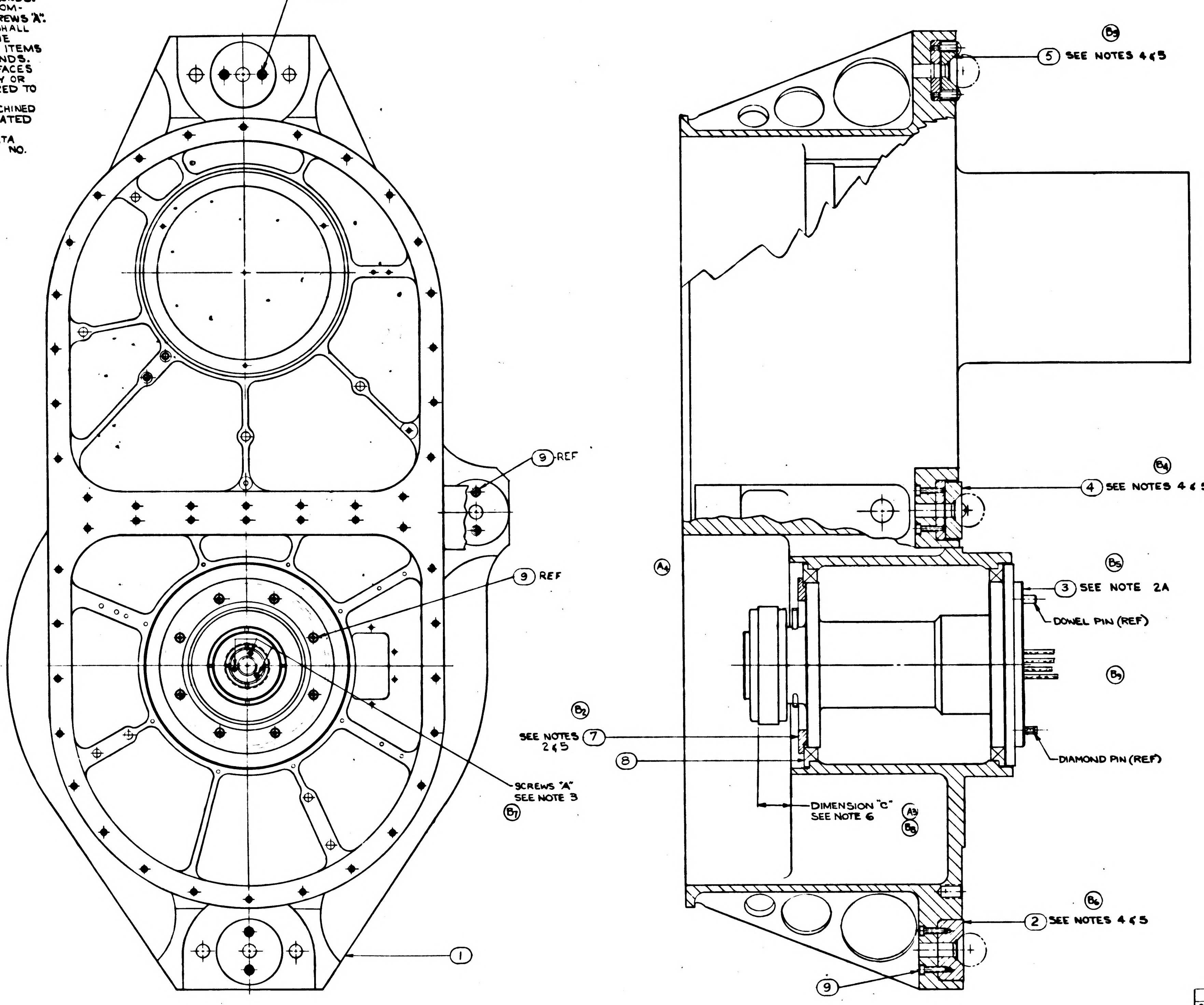
1011889

8	6881101

REVISIONS 02625			9-16-63	
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A 4		REVISED PER TDRR NO. 08477	5/14/64	
B 9		REVISED PER TDRR NO. 08478	5/14/64	

NOTES: (B1)

1. INTERPRET DWG IN ACCORDANCE WITH STDS PRESCRIBED BY MIL-D-70327.
2. ITEM 7 SHALL BE ADJUSTED AT ASSEMBLY BY MACHINING TO PROVIDE THE FOLLOWING SHAFT ROTATIONAL CHARACTERISTICS:
   - A) THERE SHALL BE ZERO END PLAY OF ITEM 3 WITH RESPECT TO ITEM 1 UNDER AN AXIAL THRUST OF 5Lbs IN EITHER DIRECTION.
   - B) THE MAXIMUM TORQUE REQUIRED TO START ROTATION ITEM 3 SHALL BE 10 INCH OUNCES THROUGH 360° OF ROTATION.
3. THE SXT RETICLE (PART OF ITEM 3) SHALL BE CONCENTRIC TO THE AXIS OF ITS ROTATION WITHIN 5 ARC SECONDS. THIS ALIGNMENT SHALL BE ACCOMPLISHED BY ADJUSTMENT TO SCREWS "A".
4. THE ROTATIONAL AXIS OF ITEM 3 SHALL BE PERPENDICULAR TO THE PLANE DEFINED BY THE BALL SEATS OF ITEMS 2, 4, AND 5 WITHIN 10 ARC SECONDS. MACHINING OF THE BOTTOM SURFACES OF ITEMS 2, 4 AND 5 INDIVIDUALLY OR IN COMBINATION MAY BE REQUIRED TO ACCOMPLISH THIS ALIGNMENT.
5. ALL STAINLESS STEEL PARTS MACHINED AT ASSEMBLY SHALL BE PASSIVATED PRIOR TO FINAL ASSEMBLY
6. RECORD THIS DIMENSION AS DATA FOR COMPLETION OF ASSEMBLY NO. 11011906.



(A1)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
9	14	NAS	1352C04LL8	74455157015		SCREW, CAP, SOCKET HEAD			
8	2		1011607-2	30205772400		BEARING, BALL, ANNULAR			
7	1		1011316	57386900750		RETAINER SHAFT			
6									
5	1		1011739	85386900540		INSERT, BALL MOUNT, LINE, ASSY OF			
4	1		1011738	85386900530		INSERT, BALL MOUNT, PLANE, ASSY OF			
3	1		1011704	85386900690		SHAFT AXIS ASSY, SEXTANT			
2	1		1011566	57386900850		INSERT, BALL MOUNT, STATIONARY			
1	1		1011631	85386900380		OPTICAL BASE, ASSY OF			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900-00

DRAWN N. FAUVELL DATE 6-13-63
CHECKED
APPROVAL 8-5-63
APPROVAL 8-15-63
NASA APPROVAL 8-6-63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT
SUB ASSY STAGE I

CODE IDENT NO.
SIZE E
NASA NUMBER 1011883
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011883

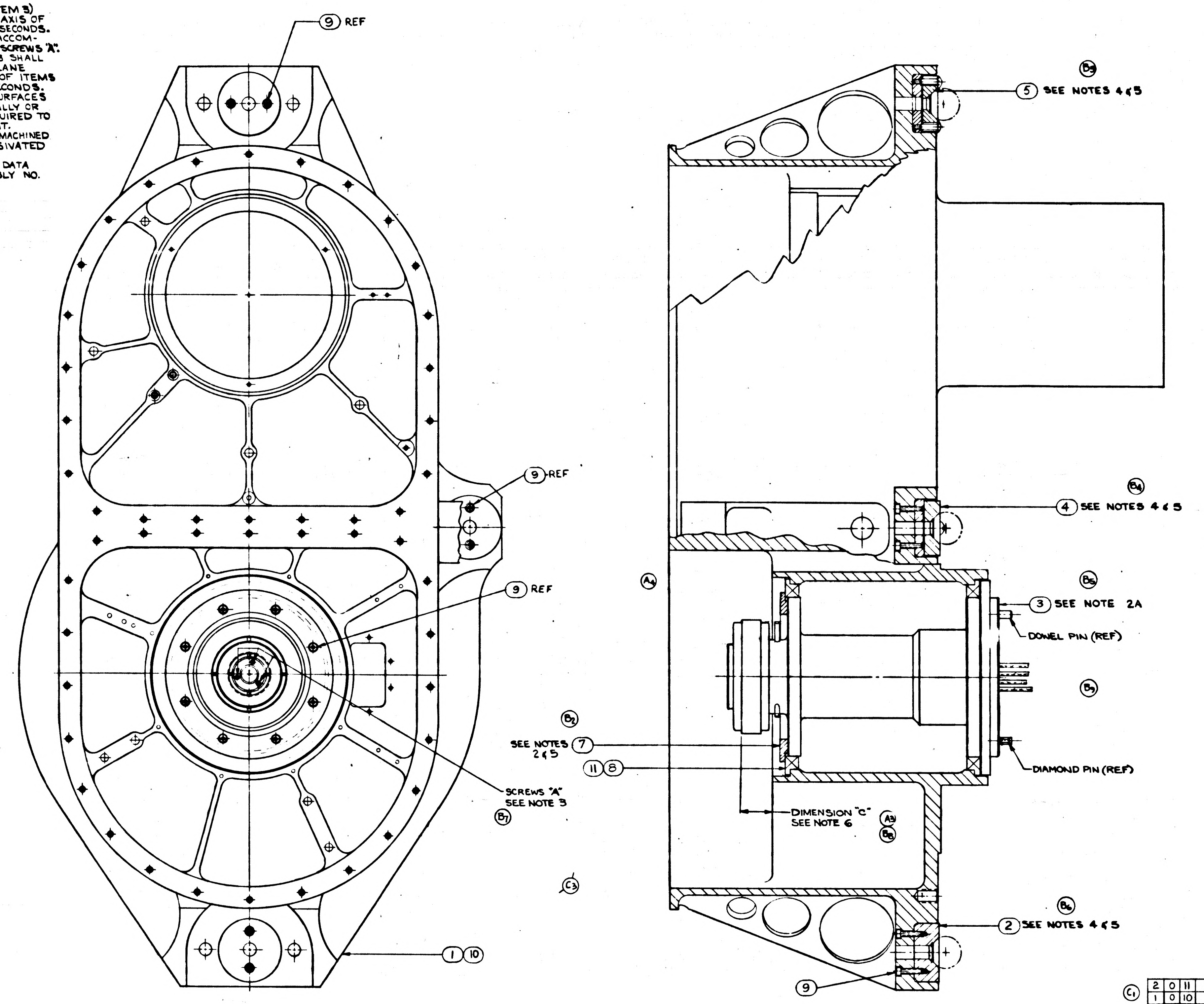
NOTES: (B1)

1. INTERPRET DWG IN ACCORDANCE WITH STDS PRESCRIBED BY MIL-D-70327.
2. ITEM 7 SHALL BE ADJUSTED AT ASSEMBLY BY MACHINING TO PROVIDE THE FOLLOWING SHAFT ROTATIONAL CHARACTERISTICS:
   - A) THERE SHALL BE ZERO END PLAY OF ITEM 3 WITH RESPECT TO ITEM 1 UNDER AN AXIAL THRUST OF 5Lbs IN EITHER DIRECTION.
   - B) THE MAXIMUM TORQUE REQUIRED TO START ROTATION ITEM 3 SHALL BE 10 INCH OUNCES THROUGH 360° OF ROTATION.
3. THE SXT RETICLE (PART OF ITEM 3) SHALL BE CONCENTRIC TO THE AXIS OF ITS ROTATION WITHIN 5 ARC SECONDS. THIS ALIGNMENT SHALL BE ACCOMPLISHED BY ADJUSTMENT TO SCREWS "A".
4. THE ROTATIONAL AXIS OF ITEM 3 SHALL BE PERPENDICULAR TO THE PLANE DEFINED BY THE BALL SEATS OF ITEMS 2, 4, AND 5 WITHIN 10 ARC SECONDS. MACHINING OF THE BOTTOM SURFACES OF ITEMS 2, 4 AND 5 INDIVIDUALLY OR IN COMBINATION MAY BE REQUIRED TO ACCOMPLISH THIS ALIGNMENT.
5. ALL STAINLESS STEEL PARTS MACHINED AT ASSEMBLY SHALL BE PASSIVATED PRIOR TO FINAL ASSEMBLY
6. RECORD THIS DIMENSION AS DATA FOR COMPLETION OF ASSEMBLY NO. 11011906.

1011889 C

REVISIONS 02625 9-16-65

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO. 08477	5/14/64	
B9		REVISED PER TDRR NO. 08478	5/14/64	
C3		REVISED PER TDRR NO. 13449	10/14/64	



(C1) (A1) (C2)

QTY REQD 001	QTY REQD 000	ITEM NO	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	0	11		1012506-2			BEARING, BALL, ANNULAR (FLANGED)			
1	0	10		1011631-001			OPTICAL BASE, ASSEMBLY OF			
14	14	9	NAS	1352C04LL8	74455157015		SCREW, CAP, SOCKET HEAD			
0	2	8		1011607-2	30205772400		BEARING, BALL, ANNULAR			
1	1	7		1011316	57386900750		RETAINER SHAFT			
		6								
1	1	5		1011739	85386900540		INSERT, BALL MOUNT, LINE, ASSY OF			
1	1	4		1011738	85386900530		INSERT, BALL MOUNT, PLANE, ASSY OF			
1	1	3		1011704	85386900690		SHAFT AXIS ASSY, SEXTANT			
1	1	2		1011566	57386900850		INSERT, BALL MOUNT, STATIONARY			
0	1	1		1011631	85386900380		OPTICAL BASE, ASSY OF			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900700

DRAWN N. FAUVELL DATE 6-13-63
CHECKED
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL W. G. Kline 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT
SUB ASSY STAGE I

CODE IDENT NO. SIZE E NASA NUMBER 1011889
SCALE 1/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

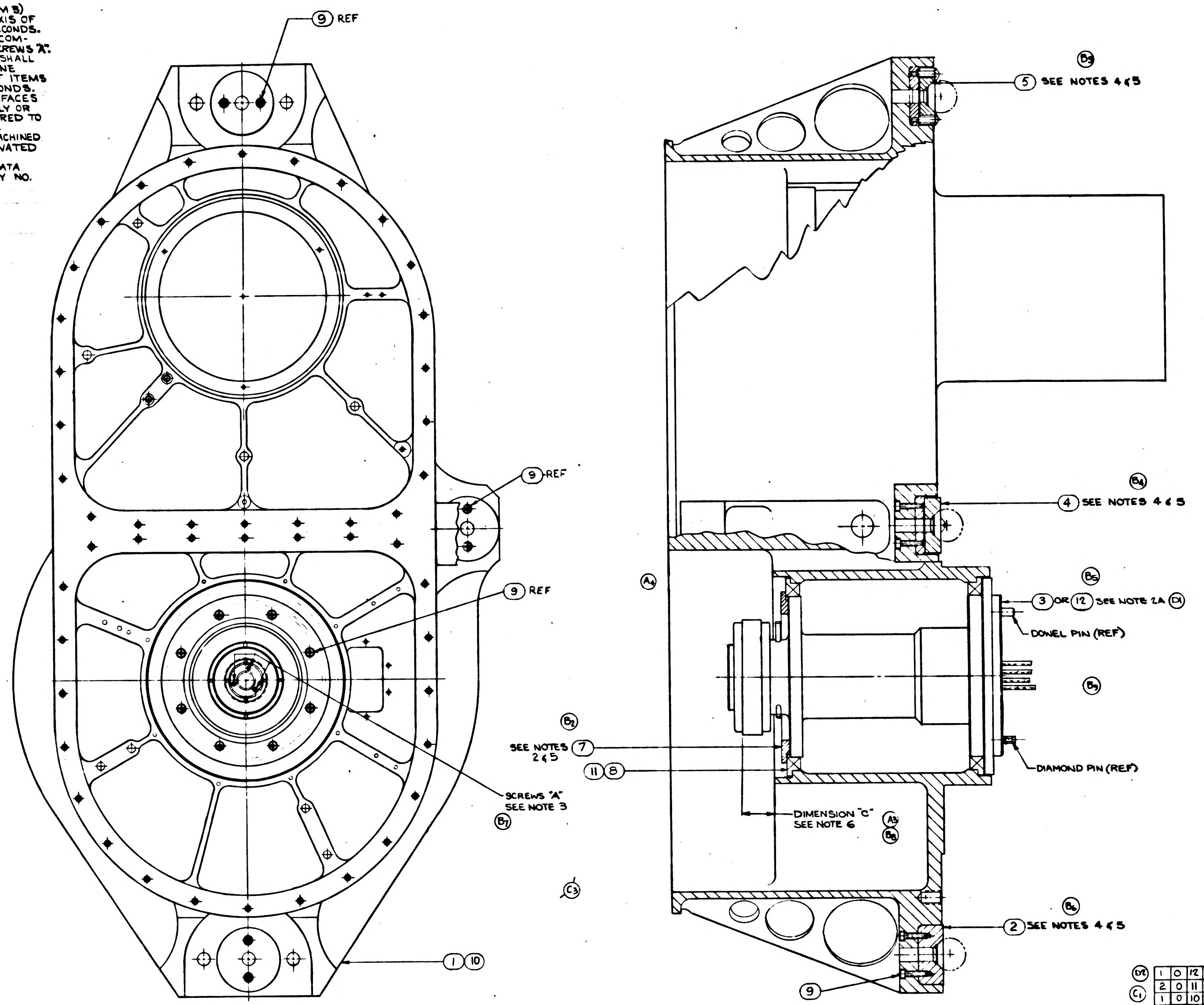
D 1011889

NOTES: (B1)

1. INTERPRET DWG IN ACCORDANCE WITH STDS PRESCRIBED BY MIL-D-70327.
2. ITEM 7 SHALL BE ADJUSTED AT ASSEMBLY BY MACHINING TO PROVIDE THE FOLLOWING SHAFT ROTATIONAL CHARACTERISTICS:
   - A) THERE SHALL BE ZERO END PLAY OF ITEM 3 OR 12 WITH RESPECT TO ITEM 1 UNDER AN AXIAL THRUST OF 5 Lbs IN EITHER DIRECTION.
   - B) THE MAXIMUM TORQUE REQUIRED TO START ROTATION ITEM 3 SHALL BE 10 INCH OUNCES THROUGH 360° OF ROTATION.
3. THE SXT RETICLE (PART OF ITEM 3) SHALL BE CONCENTRIC TO THE AXIS OF ITS ROTATION WITHIN 5 ARC SECONDS. THIS ALIGNMENT SHALL BE ACCOMPLISHED BY ADJUSTMENT TO SCREWS "A".
4. THE ROTATIONAL AXIS OF ITEM 3 SHALL BE PERPENDICULAR TO THE PLANE DEFINED BY THE BALL SEATS OF ITEMS 2, 4, AND 5 WITHIN 10 ARC SECONDS. MACHINING OF THE BOTTOM SURFACES OF ITEMS 2, 4 AND 5 INDIVIDUALLY OR IN COMBINATION MAY BE REQUIRED TO ACCOMPLISH THIS ALIGNMENT.
5. ALL STAINLESS STEEL PARTS MACHINED AT ASSEMBLY SHALL BE PASSIVATED PRIOR TO FINAL ASSEMBLY
6. RECORD THIS DIMENSION AS DATA FOR COMPLETION OF ASSEMBLY NO. 11011906.

REVISIONS O2625 9-16-63

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO. 08477	5/14/64	Jwb
B9		REVISED PER TDRR NO. 08478	5/14/64	Jwb
C3		REVISED PER TDRR NO. 13449	10/4/64	Jwb
D3		REVISED PER TDRR NO. 15424	1/7/65	Jwb



	QTY REQ 001	QTY REQ 000	ITEM NO.	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UN
D2	1	0	12		1011704-001			SHAFT AXIS ASSY, SEXTANT			
C1	2	0	11		1012506-2			BEARING, BALL, ANNULAR (FLANGED)			
	1	0	10		1011631-001			OPTICAL BASE, ASSEMBLY OF			
	14	14	9	NAS	1352C04LL8	74455157015		SCREW, CAP, SOCKET HEAD			
	0	2	8		1011607-2	30205772400		BEARING, BALL, ANNULAR			
	1	1	7		1011316	57386900750		RETAINER SHAFT			
A1			6								
	1	1	5		1011739	85386900540		INSERT, BALL MOUNT, LINE, ASSY OF			
	1	1	4		1011738	85386900530		INSERT, BALL MOUNT, PLANE, ASSY OF			
D3	0	1	3		1011704	85386900690		SHAFT AXIS ASSY, SEXTANT			
	1	1	2		1011566	57386900850		INSERT, BALL MOUNT, STATIONARY			
	0	1	1		1011631	85386900380		OPTICAL BASE, ASSY OF			

C2

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900700

DRAWN M. FAUVELL DATE 6-13-63
CHECKED
APPROVAL 9-5-63
APPROVAL 9-5-63
NASA APPROVAL W.G. 9-16-63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT
SUB ASSY STAGE I

CODE IDENT NO.
SIZE E
NASA NUMBER 1011889
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

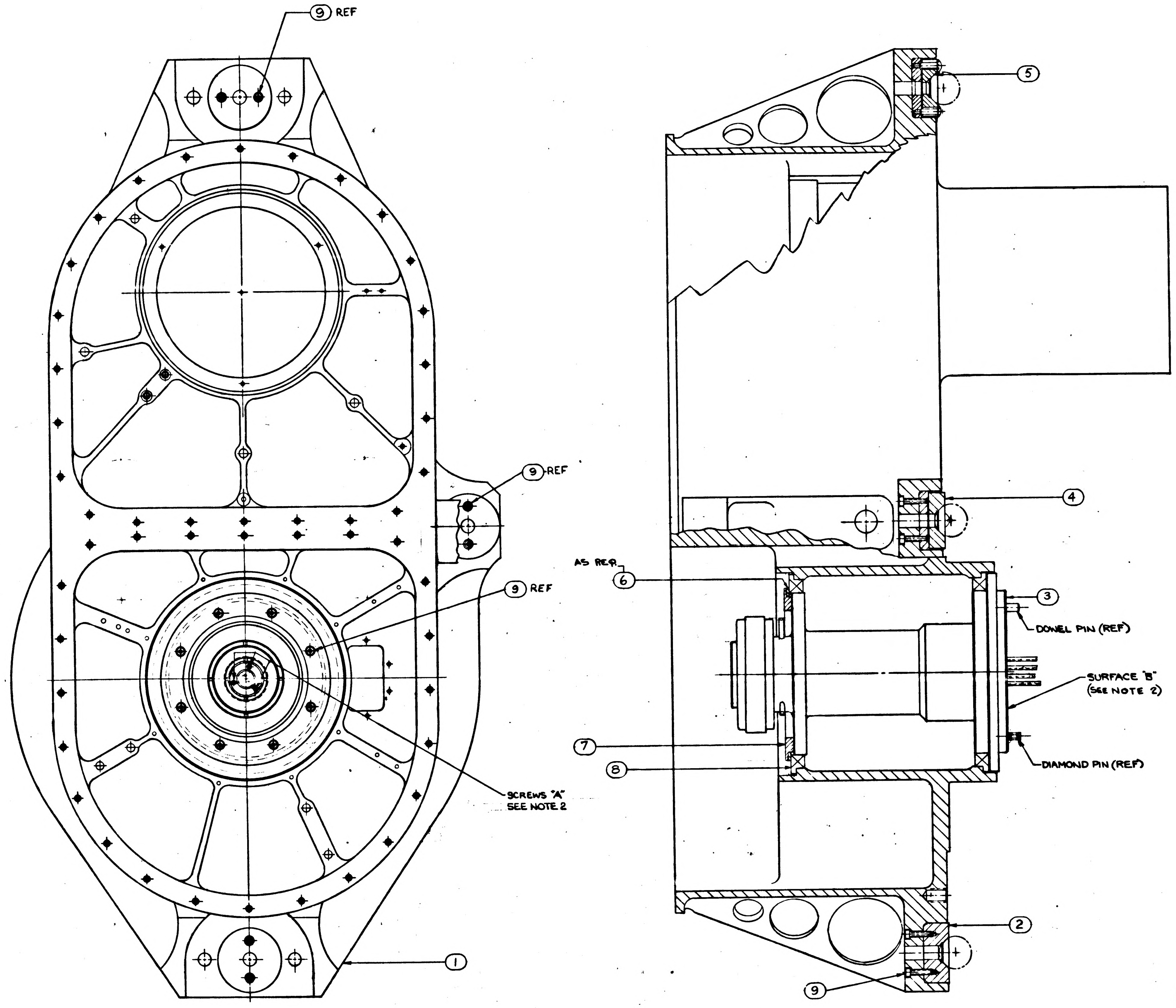
1011889

6881101

REVISIONS 02625 8-16-63

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. ASSEMBLE PER ATP 1011889
3. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019



1011889

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
9	14	NAS	1352C04LL8	74455157015		SCREW, CAP, SOCKET HEAD			
8	2		1011607-2	30205772400		BEARING, BALL, ANNULAR			
7	1		1011316	57386900750		RETAINER SHAFT			
6	2		1011319	45386900150		SHIM, SHAFT BRG			
5	1		1011739	85386900540		INSERT, BALL MOUNT, LINE, ASSY OF			
4	1		1011738	85386900530		INSERT, BALL MOUNT, PLANE, ASSY OF			
3	1		1011704	85386900690		SHAFT AXIS ASSY, SEXTANT			
2	1		1011566	57386900850		INSERT, BALL MOUNT, STATIONARY			
1	1		1011631	85386900380		OPTICAL BASE, ASSY OF			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900700
DRAWN N. FAUVELL DATE 6-13-63
CHECKED
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL W J 8-16-63
MIT APPROVAL 16 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT
SUB ASSY STAGE I

CODE IDENT NO.
SIZE E
NASA NUMBER 1011889
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

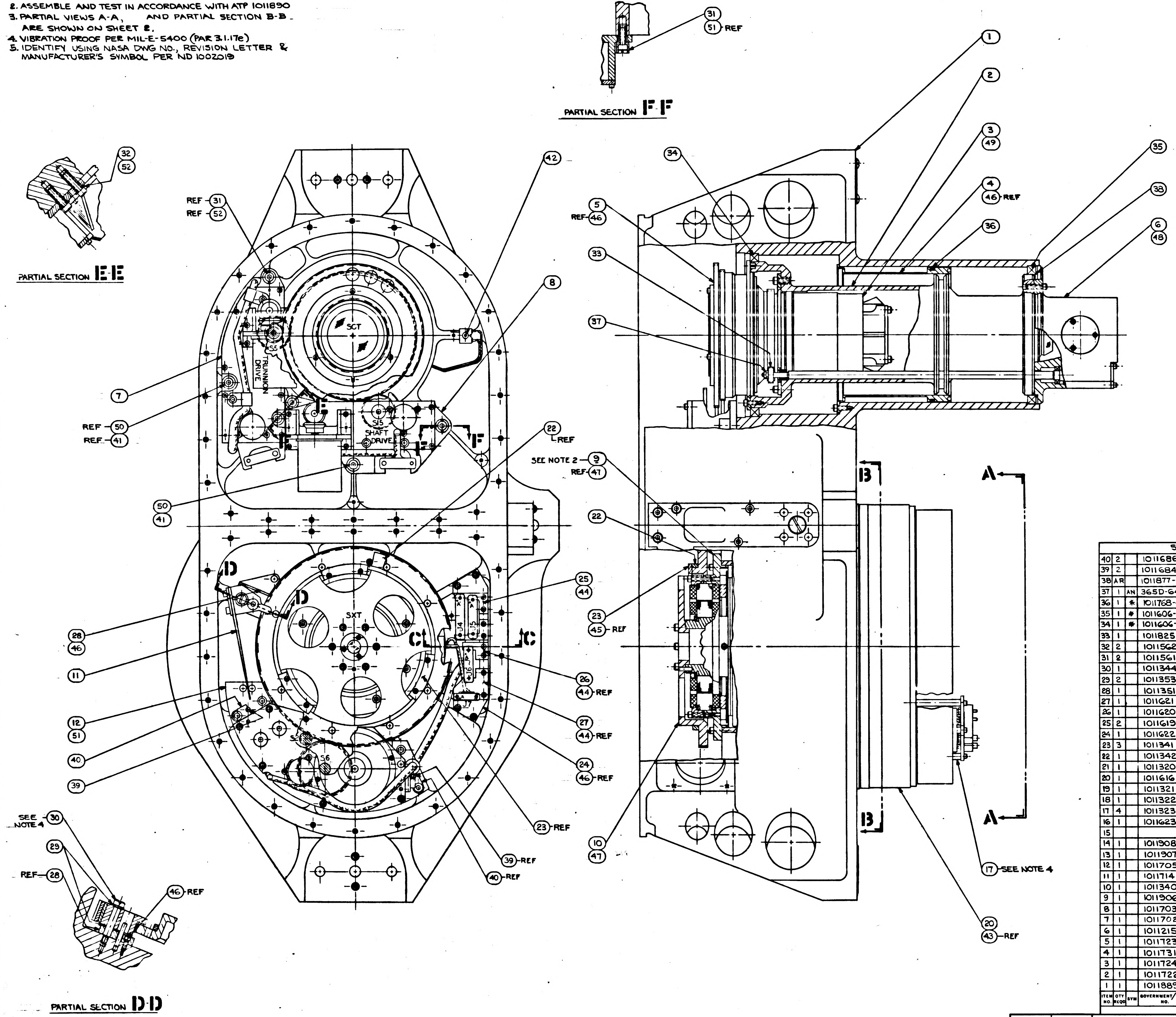
MASTER

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLE AND TEST IN ACCORDANCE WITH ATP 1011890
3. PARTIAL VIEWS A-A, AND PARTIAL SECTION B-B ARE SHOWN ON SHEET 2.
4. VIBRATION PROOF PER MIL-E-5400 (PAR 3.1.17e)
5. IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019

A 1011890

REVISIONS 02625 8-16-63				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO 03061	5-9-63	WK


PARTIAL SECTION F-F
31
51 REF
PARTIAL SECTION E-E
32
52
REF 31
REF 52
42
SCT
TRUNNION DRIVE
8
7
REF 50
REF 41
S15
SHAFT DRIVE
F
50
41
22 REF
D
D
SXT
C
C
25
44
28
46
11
J4
J5
26
44 REF
12
51
27
44 REF
40
39
24
46 REF
S6
23 REF
SEE NOTE 4 30
29
REF 28
46 REF
39 REF
40 REF
PARTIAL SECTION D-D
1
2
3
49
34
4
46 REF
35
5
REF 46
36
38
33
6
48
37
SEE NOTE 2 9
REF 47
22
23
45 REF
B
B
A
A
10
47
17 SEE NOTE 4
20
43 REF

SEE SHEET 2 FOR ITEMS 41 THRU 52

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
40	2		1011686	56386900390		RETAINER, PIN			
39	2		1011684	48386900010		PIN, THREADED			
38	AR		1011877-1 T 6	7938690 0401 THRU 0406		SPACER			
37	1	AN	365D-640			NUT, HEX, (SELF-LOCKING)			
36	1	*	1011768-44	744530443044		PACKING, PREFORMED			
35	1	*	1011606-1	30205772240		BEARING, BALL			
34	1	*	1011606-2	30205772720		BEARING, BALL			
33	1		1011825	33386900590		GEAR, SPUR (42T-96P)			
32	2		1011562	57386900840		BUSHING, LOCATING			
31	2		1011561	57386900830		BUSHING, ECCENTRIC			
30	1		1011344	45386900160		SCREW, SHOULDER			
29	2		1011353	56386900250		SPACER, SPRING HOLDER			
28	1		1011351	52386900710		BRACKET, MOUNTING, SPRING HOLDER			
27	1		1011621	56386900340		PLATE, MOUNTING, CONNECTOR			
26	1		1011620	56386900330		PLATE, MOUNTING, CONNECTOR			
25	2		1011619	56386900320		PLATE, MOUNTING, CONNECTOR			
24	1		1011622	56386900350		PLATE, BRIDGE, MOUNTING PLATES			
23	3		1011341	57386900810		PLATE, RETAINING, STOP RING			
22	1		1011342	57386900820		RING, LIMIT STOP			
21	1		1011320	52386900760		PLATE, FLEXPRINT CONDUIT			
20	1		1011616	57386901020		RING, MOUNTING, COVER			
19	1		1011321	56386900300		PLATE, MOUNTING, CONNECTOR			
18	1		1011322	56386900310		PLATE, MOUNTING, CONNECTOR			
17	4		1011323	53386900050		POST, SHOULDERED, THREADED			
16	1		1011623	52386900780		PLATE, FLEXPRINT CONDUIT			
15									
14	1		1011908	85386900910		FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
13	1		1011907	85386900900		FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
12	1		1011705	85386900790		SHAFT DRIVE GEAR BOX, ASSY OF (SXT)			
11	1		1011714	85386900390		LIMIT STOP ASSY			
10	1		1011340	85386900310		GEAR & PIN, ASSY OF			
9	1		1011906	85386900890		HOUSING, STATOR & LAMP, ASSY OF			
8	1		1011703	85386900780		SHAFT AXIS DRIVE GEAR BOX			
7	1		1011702	85386900770		SCT TRUNNION DRIVE GEARBOX, ASSY OF			
6	1		1011215	85386900210		TELESCOPE TRUNNION AXIS ASSY			
5	1		1011723	85386900480		DRIVE GEAR, CLUSTER ASSY			
4	1		1011731	85386900490		HOUSING & LAMP, ASSY OF			
3	1		1011724	85386900580		INNER TELESCOPE TUBE, ASSY OF			
2	1		1011722	85386900460		OUTER TELESCOPE TUBE ASSY			
1	1		1011889	85386900700		OPTICAL UNIT SUBASSY - STAGE I			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900710
DRAWN V. AMATO DATE 7-26-63
CHECKED 6-8-63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE II

CODE IDENT NO.
SIZE E
NASA NUMBER 1011890
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 2

1011890

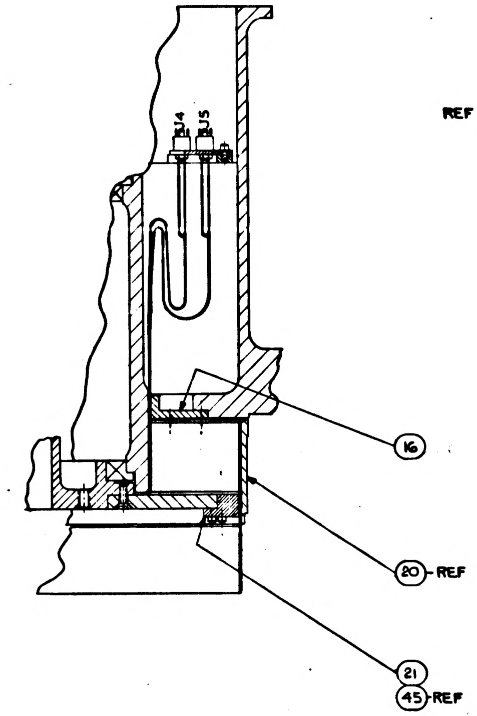
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011890 A

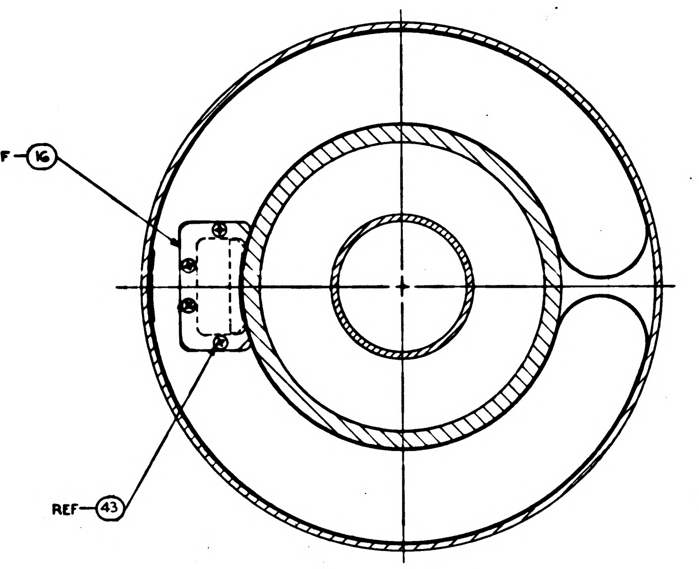
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A 4		SEE SHEET # 1. TDRR 0 3061	5-9-63 10 Sep 63	WR.

REVISIONS 0 2625 8-16-63

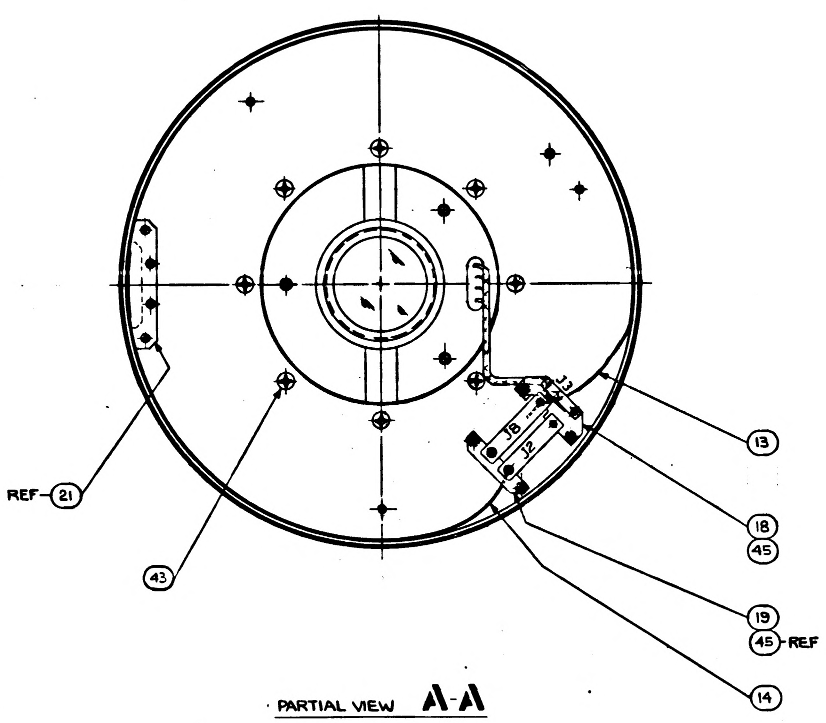
NOTES:
REFER TO SHEET 1



PARTIAL SECTION C-C



PARTIAL SECTION B-B



PARTIAL VIEW A-A

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
52	2	NAS	1352C08LL12	74455157029		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
51	6	NAS	1352C08LL8	74455157027		↕			
50	2	NAS	1352C08LL6	74455157026		↕			
49	4	NAS	1352C06LL4	74455157018		↕			
48	7	NAS	1352C04LL8	74455157015		↕			
47	14	NAS	1352C04LL6	74455157014		↕			
46	11	NAS	1352C04LL4	74455157013		↕			
45	14	NAS	1352C02LL4	74455157006		↕			
44	8	NAS	1352C02LL3	74455157005		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
43	12	NAS	1189C04P6L	74455155010		SCREW, SELF LOCKING, 100° FLAT HEAD			
42	1	NAS	1189C02P4L	74455155002		SCREW, SELF LOCKING, 100° FLAT HEAD			
41	2	AN	960-C8	74468051004		WASHER, FLAT, REGULAR			
						SEE SHEET 1 FOR ITEMS 1 THRU 40			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900710

DRAWN DATE 7-26-63
CHECKED 8-8-63
APPROVAL 8-13-63
APPROVAL 8-14-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE II

CODE IDENT NO. SIZE E NASA NUMBER 1011890
SCALE 1/1 WEIGHT CALC ACTUAL SHEET 2 OF 2

MASTER

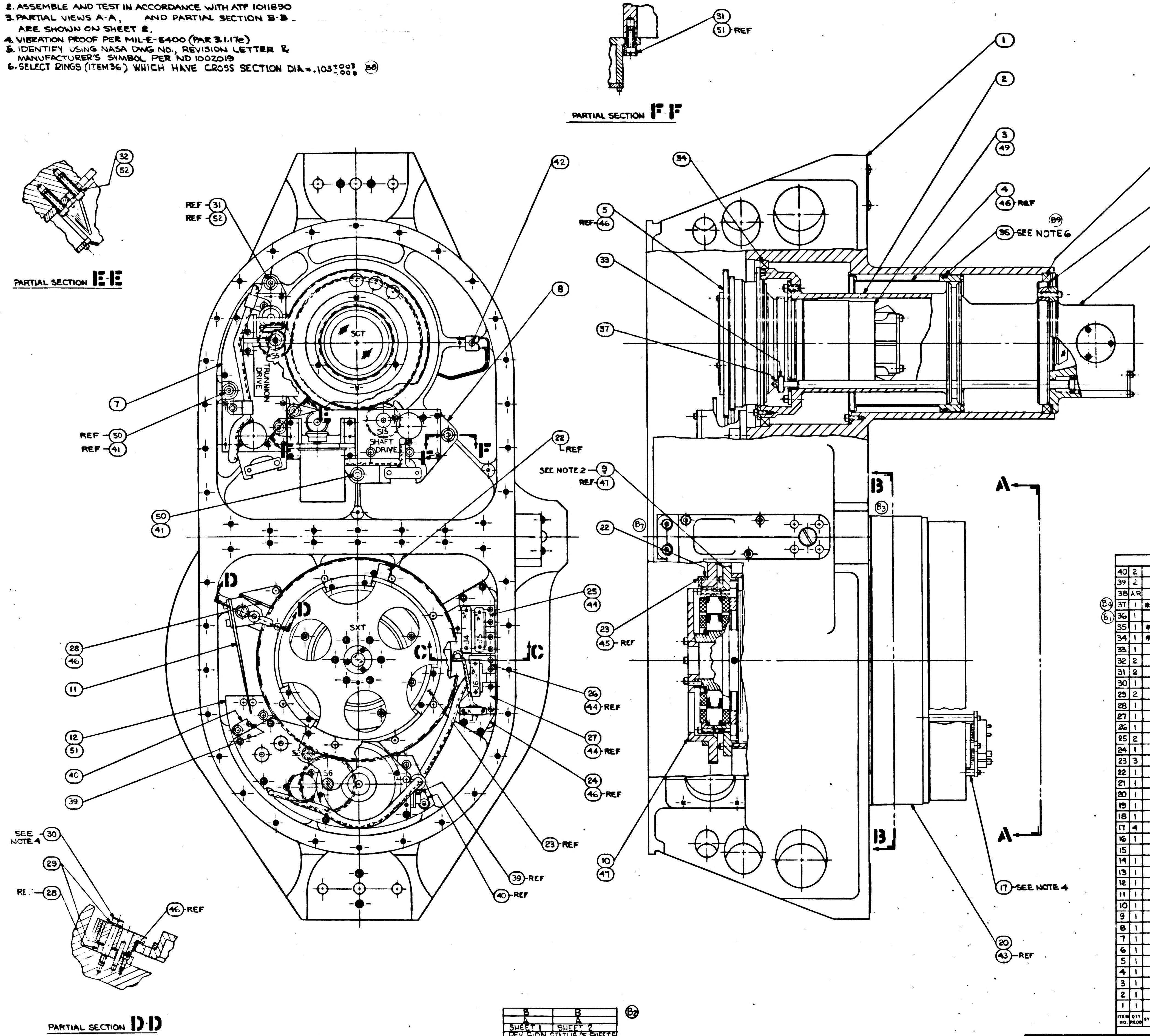
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

B	0681101

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS 02625 8-16-63				
A4		REVISED PER TDRR NO 03061	5-9-63	
B4		REVISED PER TDRR NO. 08040		

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLE AND TEST IN ACCORDANCE WITH ATP 1011890
3. PARTIAL VIEWS A-A, AND PARTIAL SECTION B-B ARE SHOWN ON SHEET 2.
4. VIBRATION PROOF PER MIL-E-5400 (PAR 3.1.17e)
5. IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019
6. SELECT RINGS (ITEM 36) WHICH HAVE CROSS SECTION DIA = $.103^{+.003}_{-.000}$ (B8)


PARTIAL SECTION F-F

PARTIAL SECTION E-E

PARTIAL SECTION D-D

B	B
SHEET 1	SHEET 2
REVISION STATUS OF SHEETS	

(B2)

SEE SHEET 2 FOR ITEMS 41 THRU 52

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
40	2		1011686	56386900390		RETAINER, PIN			
39	2		1011684	48386900010		PIN, THREADED			
38	AR		1011877-1/6T	7938690 0481 THRU 0488		SPACER			
(B4) 37	1	*	1011363-1	74443127001		NUT, HEX, (SELF-LOCKING)			
(B1) 36	1		MS-9021-154			PACKING, PREFORMED			
35	1	*	1011606-1	30205772240		BEARING, BALL			
34	1	*	1011606-2	30205772720		BEARING, BALL			
33	1		1011825	33386900590		GEAR, SPUR (42T-96P)			
32	2		1011562	57386900840		BUSHING, LOCATING			
31	2		1011561	57386900830		BUSHING, ECCENTRIC			
30	1		1011344	45386900160		SCREW, SHOULDER			
29	2		1011353	56386900250		SPACER, SPRING HOLDER			
28	1		1011351	52386900710		BRACKET, MOUNTING, SPRING HOLDER			
27	1		1011621	56386900340		PLATE, MOUNTING, CONNECTOR			
26	1		1011620	56386900330		PLATE, MOUNTING, CONNECTOR			
25	2		1011619	56386900320		PLATE, MOUNTING, CONNECTOR			
24	1		1011622	56386900350		PLATE, BRIDGE, MOUNTING PLATES			
23	3		1011341	57386900810		PLATE, RETAINING, STOP RING			
22	1		1011342	57386900820		RING, LIMIT STOP			
21	1		1011320	52386900760		PLATE, FLEXPRINT CONDUIT			
20	1		1011616	57386901020		RING, MOUNTING, COVER			
19	1		1011321	56386900300		PLATE, MOUNTING, CONNECTOR			
18	1		1011322	56386900310		PLATE, MOUNTING, CONNECTOR			
17	4		1011323	53386900050		POST, SHOULDERED, THREADED			
16	1		1011623	52386900780		PLATE, FLEXPRINT CONDUIT			
15									
14	1		1011908	85386900910		FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
13	1		1011907	85386900900		FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
12	1		1011705	85386900790		SHAFT DRIVE GEAR BOX, ASSY OF (SXT)			
11	1		1011714	85386900390		LIMIT STOP ASSY			
10	1		1011340	85386900310		GEAR & PIN, ASSY OF			
9	1		1011906	85386900890		HOUSING, STATOR & LAMP, ASSY OF			
8	1		1011703	85386900780		SHAFT AXIS DRIVE GEAR BOX			
7	1		1011702	85386900770		SCT TRUNNION DRIVE GEARBOX, ASSY OF			
6	1		1011215	85386900210		TELESCOPE TRUNNION AXIS ASSY			
5	1		1011723	85386900480		DRIVE GEAR, CLUSTER ASSY			
4	1		1011731	85386900490		HOUSING & LAMP, ASSY OF			
3	1		1011724	85386900580		INNER TELESCOPE TUBE, ASSY OF			
2	1		1011722	85386900460		OUTER TELESCOPE TUBE ASSY			
1	1		1011889	85386900700		OPTICAL UNIT SUBASSY - STAGE I			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

NEXT ASSY	USED ON
1011891	1011000
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900710
DRAWN V. AMATO DATE 7-26-63
CHECKED 6-8-63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL 16 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE II

CODE IDENT NO.
SIZE E
NASA NUMBER 1011890
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 2

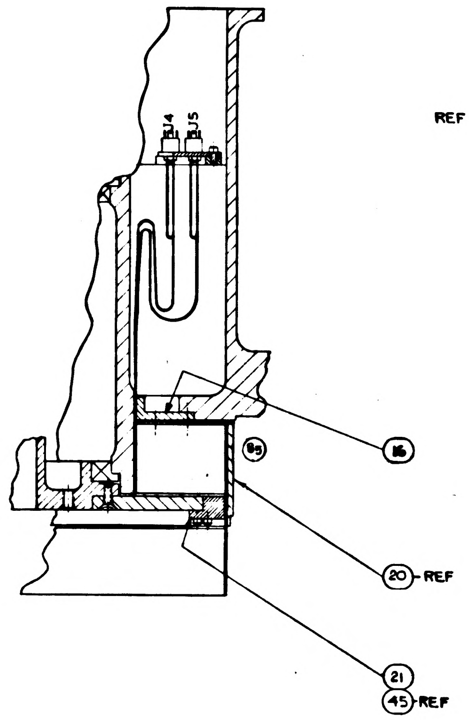
1011890 B

NOTES:
REFER TO SHEET 1

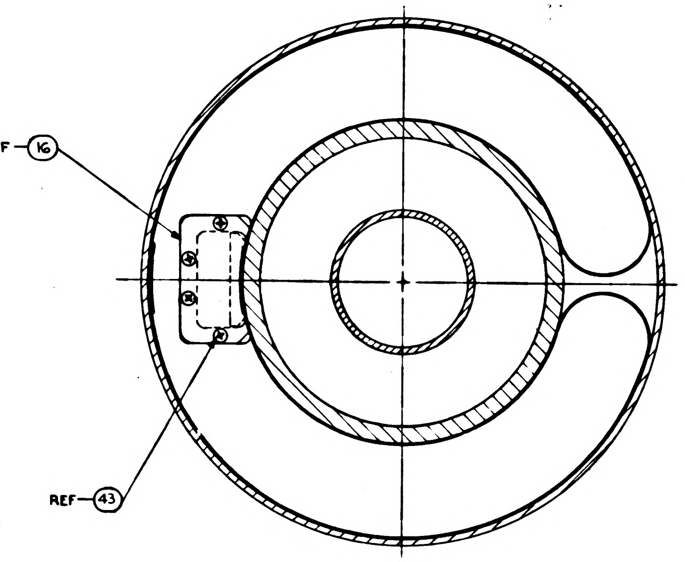
B 0681101

REVISIONS 02625 8-16-63

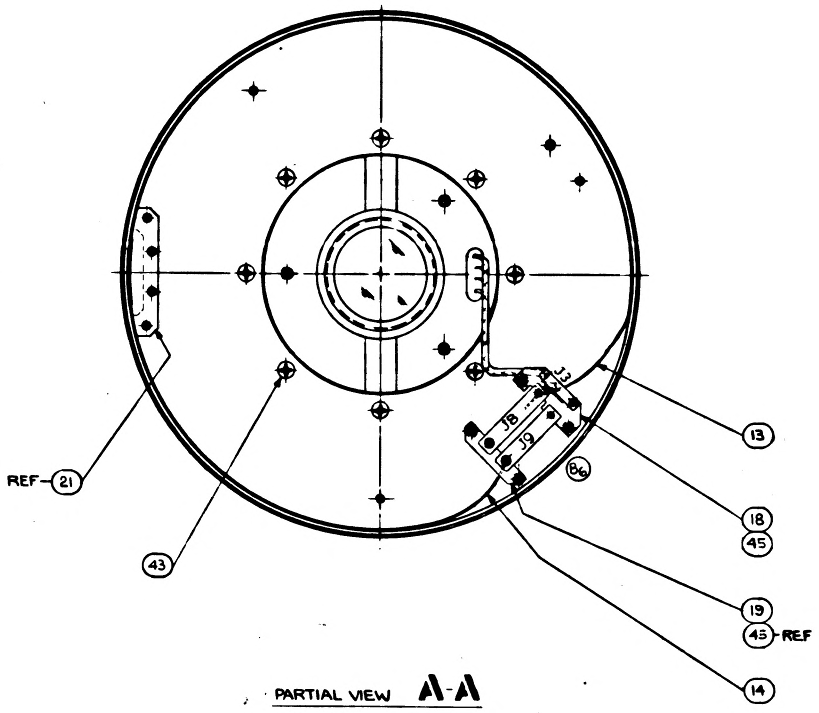
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A 4		SEE SHEET #1. TDRR 03061	5-9-63 10-[illegible]	WR
B6		REVISED PER TDRR NO. 080 40	[illegible]	



PARTIAL SECTION C-C



PARTIAL SECTION B-B



PARTIAL VIEW A-A

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
52	2	NAS	1352C08LL12	74455157029		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
51	6	NAS	1352C08LL8	74455157027					
50	2	NAS	1352C08LL6	74455157026					
49	4	NAS	1352C06LL4	74455157018					
48	7	NAS	1352C04LL8	74455157015					
47	14	NAS	1352C04LL6	74455157014					
46	11	NAS	1352C04LL4	74455157013					
45	14	NAS	1352C02LL4	74455157006					
44	8	NAS	1352C02LL3	74455157005		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
43	12	NAS	1189C04P6L	74455155010		SCREW, SELF LOCKING, 100° FLAT HEAD			
42	1	NAS	1189C02P4L	74455155002		SCREW, SELF LOCKING, 100° FLAT HEAD			
41	2	AN	960-C8	74468051004		WASHER, FLAT, REGULAR			
						SEE SHEET 1 FOR ITEMS 1 THRU 40			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900710
DRAWN [illegible] DATE 7-26-63
CHECKED [illegible] 8-8-63
APPROVAL [illegible] 8-13-63
APPROVAL [illegible] 8-1-63
NASA APPROVAL W. J. [illegible] 8-[illegible]-63
MIT APPROVAL [illegible]

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE II

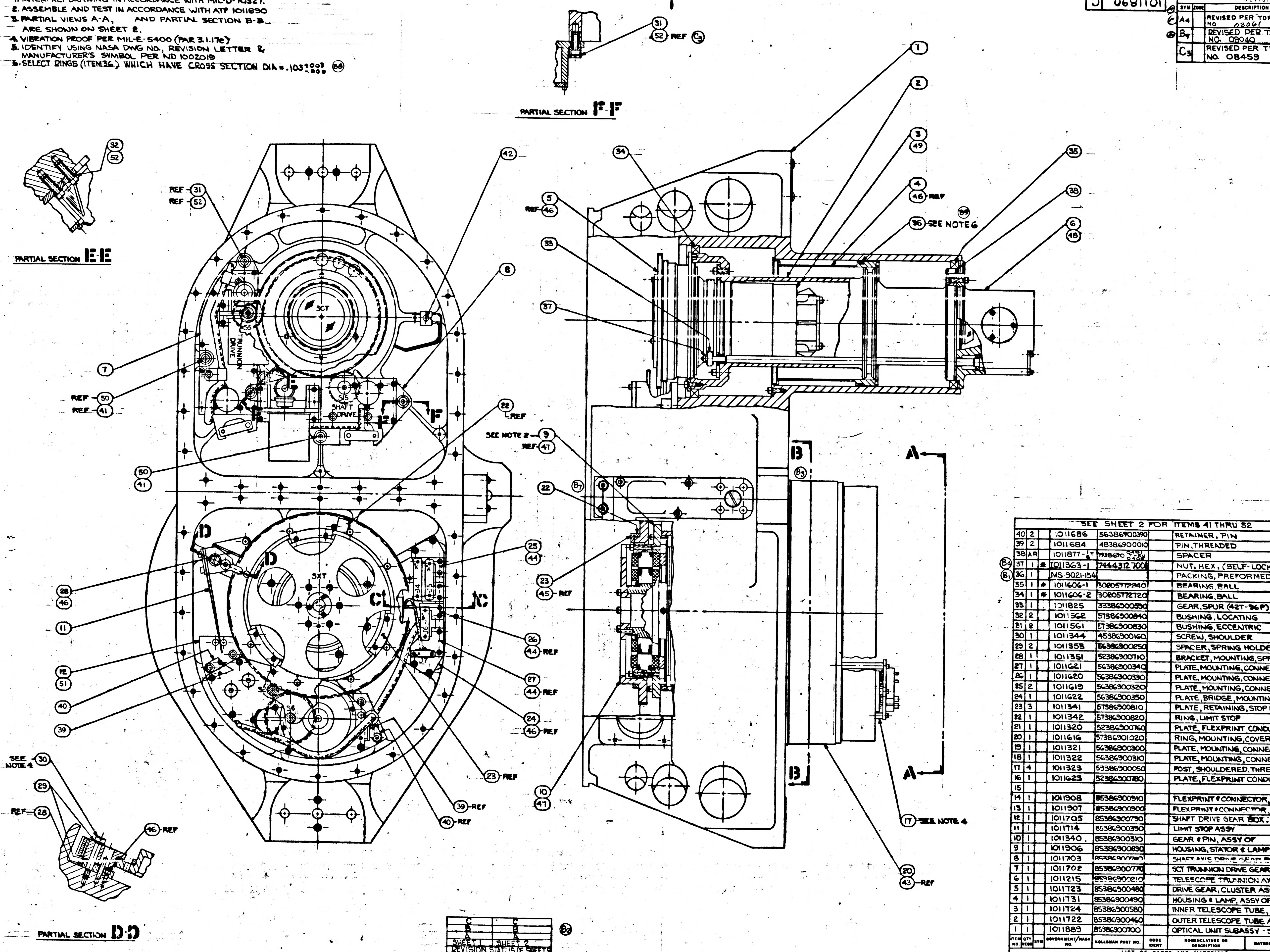
CODE IDENT NO.
SIZE E
NASA NUMBER 1011890
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 2 OF 2

1011890 B

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLE AND TEST IN ACCORDANCE WITH ATP 1011890
3. PARTIAL VIEWS A-A, AND PARTIAL SECTION B-B ARE SHOWN ON SHEET 2.
4. VIBRATION PROOF PER MIL-E-5400 (PAR 3.1.17e)
5. IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019
6. SELECT RINGS (ITEM 36) WHICH HAVE CROSS SECTION DIA = .103 +.003 -.000 (B8)

C 0681101

REVISIONS 02625 8-16-63				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO 03061	5-9-63	
B7		REVISED PER TDRR NO. 08040		
C3		REVISED PER TDRR NO. 08459	5/14/64	


PARTIAL SECTION F-F
31
52 REF C3
PARTIAL SECTION E-E
32
52
REF 31
REF 52
42
8
7
REF 50
REF 41
50
41
SCT
TRUNNION DRIVE
SHAFT DRIVE
S15
S5
S6
F
F
22 REF
D
D
SXT
C
C
28
46
11
12
51
40
39
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44
26
44 REF
27
44 REF
24
46 REF
23 REF
39 REF
40 REF
SEE NOTE 4 30
29
REF 28
46 REF
PARTIAL SECTION D-D
1
2
3
49
4
46 REF
34
5
REF 46
33
37
36 SEE NOTE 6
B9
35
38
6
48
SEE NOTE 2 9
REF 47
22
B7
23
45 REF
B
B3
B
A
A
10
47
17 SEE NOTE 4
20
43 REF

SEE SHEET 2 FOR ITEMS 41 THRU 52

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
40	2		1011686	56386900390		RETAINER, PIN			
39	2		1011684	48386900010		PIN, THREADED			
38	AR		1011877-1 T 6	7738690 0481 THRU 0486		SPACER			
(B4) 37	1	*	1011363-1	7444312 7001		NUT, HEX, (SELF-LOCKING)			
(B1) 36	1		MS-9021-154			PACKING, PREFORMED			
35	1	*	1011606-1	30205772240		BEARING, BALL			
34	1	*	1011606-2	30205772720		BEARING, BALL			
33	1		1011825	33386900590		GEAR, SPUR (42T-36P)			
32	2		1011562	57386900840		BUSHING, LOCATING			
31	2		1011561	57386900830		BUSHING, ECCENTRIC			
30	1		1011344	45386900160		SCREW, SHOULDER			
29	2		1011353	56386900250		SPACER, SPRING HOLDER			
28	1		1011351	52386900710		BRACKET, MOUNTING, SPRING HOLDER			
27	1		1011621	56386900340		PLATE, MOUNTING, CONNECTOR			
26	1		1011620	56386900330		PLATE, MOUNTING, CONNECTOR			
25	2		1011619	56386900320		PLATE, MOUNTING, CONNECTOR			
24	1		1011622	56386900350		PLATE, BRIDGE, MOUNTING PLATES			
23	3		1011341	57386900810		PLATE, RETAINING, STOP RING			
22	1		1011342	57386900820		RING, LIMIT STOP			
21	1		1011320	52386900760		PLATE, FLEXPRINT CONDUIT			
20	1		1011616	57386901020		RING, MOUNTING, COVER			
19	1		1011321	56386900300		PLATE, MOUNTING, CONNECTOR			
18	1		1011322	56386900310		PLATE, MOUNTING, CONNECTOR			
17	4		1011323	53386900050		POST, SHOULDERED, THREADED			
16	1		1011623	52386900780		PLATE, FLEXPRINT CONDUIT			
15									
14	1		1011908	85386900910		FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
13	1		1011907	85386900900		FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
12	1		1011705	85386900790		SHAFT DRIVE GEAR BOX, ASSY OF (SXT)			
11	1		1011714	85386900390		LIMIT STOP ASSY			
10	1		1011340	85386900310		GEAR & PIN, ASSY OF			
9	1		1011906	85386900890		HOUSING, STATOR & LAMP, ASSY OF			
8	1		1011703	85386900780		SHAFT AXIS DRIVE GEAR BOX			
7	1		1011702	85386900770		SCT TRUNNION DRIVE GEARBOX, ASSY OF			
6	1		1011215	85386900210		TELESCOPE TRUNNION AXIS ASSY			
5	1		1011723	85386900480		DRIVE GEAR, CLUSTER ASSY			
4	1		1011731	85386900490		HOUSING & LAMP, ASSY OF			
3	1		1011724	85386900580		INNER TELESCOPE TUBE, ASSY OF			
2	1		1011722	85386900460		OUTER TELESCOPE TUBE ASSY			
1	1		1011889	85386900700		OPTICAL UNIT SUBASSY - STAGE I			

LIST OF PARTS AND MATERIALS

C	C
B	B
A	A
SHEET 1	SHEET 2

REVISION STATUS OF SHEETS (B2)

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS + - DECIMALS + - ANGLES + -
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900710
DRAWN J. AMATO DATE 7-26-63
CHECKED 6-8-63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL 8-16-63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE II

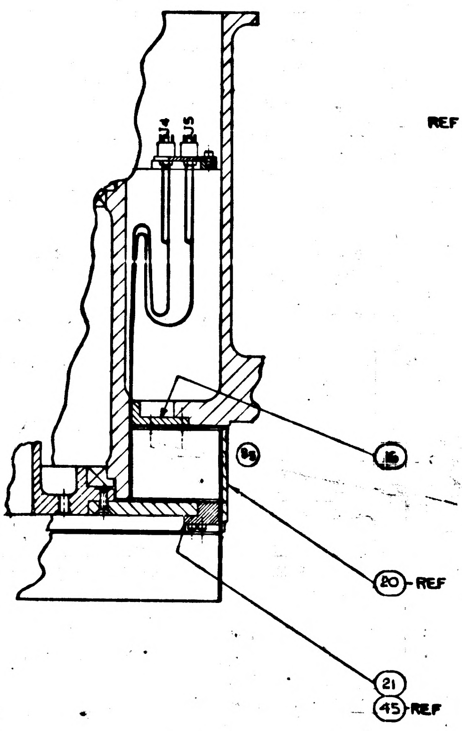
CODE IDENT NO.
SIZE E
NASA NUMBER 1011890
SCALE 1/1
WEIGHT
SHEET 1 OF 2

C 0681101

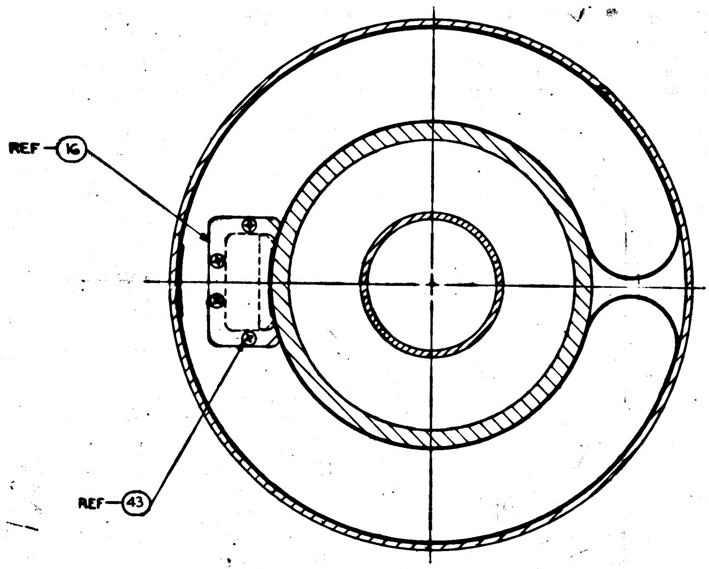
NOTES:
REFER TO SHEET 1

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A 4		SEE SHEET #1. TDRR 03061	5-9-63 10/2/63	WR.
B6		REVISED PER TDRR NO. 080 40	7-28-64	
C3		REVISED PER TDRR NO. 08459	3/14/64	

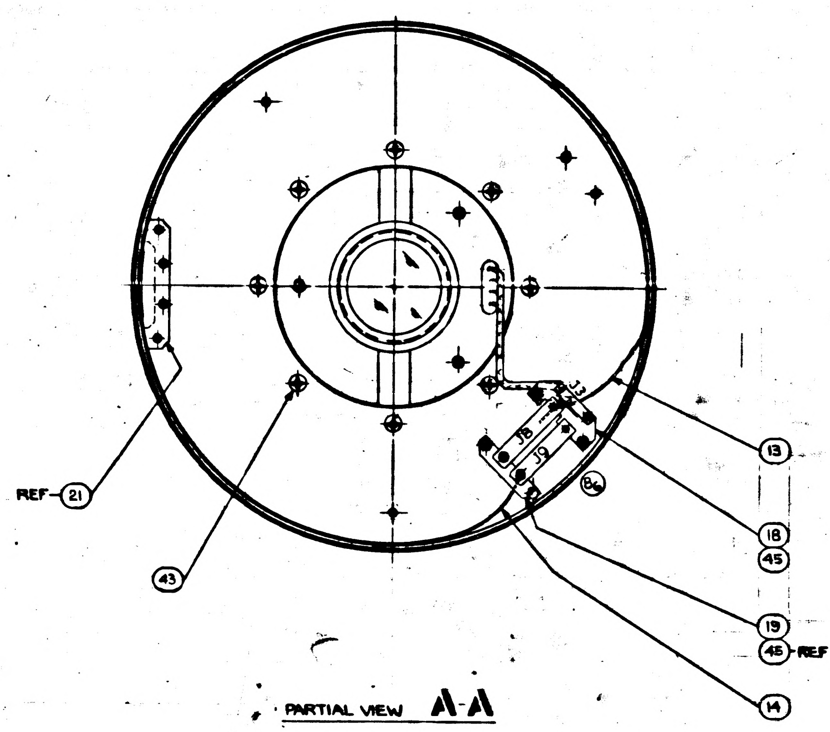
REVISIONS 02625 8-16-63



PARTIAL SECTION C-C



PARTIAL SECTION B-B



PARTIAL VIEW A-A

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
52	4	NAS	1352C08LL12	74455157029		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
51	5	NAS	1352C08LL8	74455157027					
50	2	NAS	1352C08LL6	74455157026					
49	4	NAS	1352C06LL4	74455157018					
48	7	NAS	1352C04LL8	74455157015					
47	14	NAS	1352C04LL6	74455157014					
46	11	NAS	1352C04LL4	74455157013					
45	14	NAS	1352C02LL4	74455157006					
44	8	NAS	1352C02LL3	74455157005		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
43	12	NAS	1189C04P6L	74455155010		SCREW, SELF LOCKING, 100° FLAT HEAD			
42	1	NAS	1189C02P4L	74455155002		SCREW, SELF LOCKING, 100° FLAT HEAD			
41	2	AN	960-C8	74468051004		WASHER, FLAT, REGULAR			
						SEE SHEET 1 FOR ITEMS 1 THRU 40			

C1 C2

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
K:C PN 85386900710

DRAWN DATE 7-26-63
CHECKED 8-8-63
APPROVAL 8-13-63
APPROVAL 8-1-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY.
STAGE II

CODE IDENT NO.
SIZE E
NASA NUMBER 1011890
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 2 OF 2

1C11890

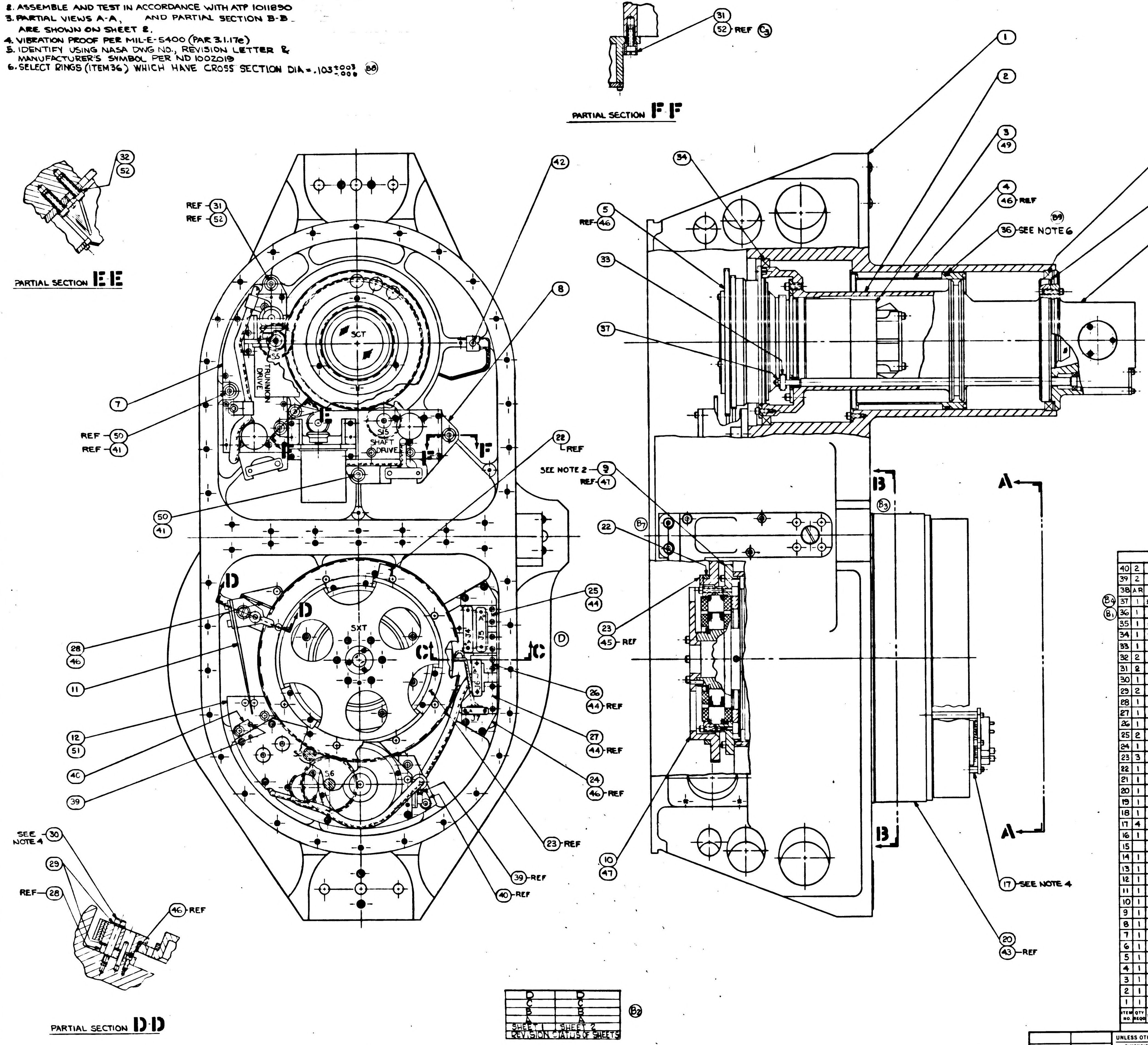
MASTER

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLE AND TEST IN ACCORDANCE WITH ATP 1011890
3. PARTIAL VIEWS A-A, AND PARTIAL SECTION B-B ARE SHOWN ON SHEET 2.
4. VIBRATION PROOF PER MIL-E-5400 (PAR 3.1.17e)
5. IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019
6. SELECT RINGS (ITEM 36) WHICH HAVE CROSS SECTION DIA = $.103^{+.003}_{-.000}$ (B8)

D	0681101

REVISIONS 02625 8-16-63

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO 03061	5-9-63	
B4		REVISED PER TDRR NO. 08040	4-28-64	
C3		REVISED PER TDRR NO. 08459	5/14/64	JWB
D		REVISED PER TDRR NO. 08450	5/12/64	JWB



D	D
C	C
B	B
A	A
SHEET 1	SHEET 2

REVISION STATUS OF SHEETS (B2)

SEE SHEET 2 FOR ITEMS 41 THRU 52

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
40	2		1011686	56386900390		RETAINER, PIN			
39	2		1011684	48386900010		PIN, THREADED			
38	AR		1011877-1T6	7938690 0451 THRU 0498		SPACER			
(B4) 37	1	*	1011363-1	74443127001		NUT, HEX, (SELF-LOCKING)			
(B1) 36	1		MS-9021-154			PACKING, PREFORMED			
35	1	*	1011606-1	30205772240		BEARING, BALL			
34	1	*	1011606-2	30205772720		BEARING, BALL			
33	1		1011825	33386900590		GEAR, SPUR (42T-96P)			
32	2		1011562	57386900840		BUSHING, LOCATING			
31	2		1011561	57386900830		BUSHING, ECCENTRIC			
30	1		1011344	45386900160		SCREW, SHOULDER			
29	2		1011353	56386900250		SPACER, SPRING HOLDER			
28	1		1011351	52386900710		BRACKET, MOUNTING, SPRING HOLDER			
27	1		1011621	56386900340		PLATE, MOUNTING, CONNECTOR			
26	1		1011620	56386900330		PLATE, MOUNTING, CONNECTOR			
25	2		1011619	56386900320		PLATE, MOUNTING, CONNECTOR			
24	1		1011622	56386900350		PLATE, BRIDGE, MOUNTING PLATES			
23	3		1011341	57386900810		PLATE, RETAINING, STOP RING			
22	1		1011342	57386900820		RING, LIMIT STOP			
21	1		1011320	52386900760		PLATE, FLEXPRINT CONDUIT			
20	1		1011616	57386901020		RING, MOUNTING, COVER			
19	1		1011321	56386900300		PLATE, MOUNTING, CONNECTOR			
18	1		1011322	56386900310		PLATE, MOUNTING, CONNECTOR			
17	4		1011323	53386900050		POST, SHOULDERED, THREADED			
16	1		1011623	52386900780		PLATE, FLEXPRINT CONDUIT			
15									
14	1		1011908	85386900910		FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
13	1		1011907	85386900900		FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
12	1		1011705	85386900790		SHAFT DRIVE GEAR BOX, ASSY OF (SXT)			
11	1		1011714	85386900390		LIMIT STOP ASSY			
10	1		1011340	85386900310		GEAR & PIN, ASSY OF			
9	1		1011906	85386900890		HOUSING, STATOR & LAMP, ASSY OF			
8	1		1011703	85386900780		SHAFT AXIS DRIVE GEAR BOX			
7	1		1011702	85386900770		SCT TRUNNION DRIVE GEARBOX, ASSY OF			
6	1		1011215	85386900210		TELESCOPE TRUNNION AXIS ASSY			
5	1		1011723	85386900480		DRIVE GEAR, CLUSTER ASSY			
4	1		1011731	85386900490		HOUSING & LAMP, ASSY OF			
3	1		1011724	85386900580		INNER TELESCOPE TUBE, ASSY OF			
2	1		1011722	85386900460		OUTER TELESCOPE TUBE ASSY			
1	1		1011889	85386900700		OPTICAL UNIT SUBASSY - STAGE I			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900710
DRAWN V. AMATO DATE 7-26-63
CHECKED 6-8-63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL W. J. 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE II

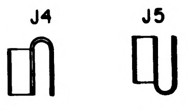
CODE IDENT NO.
SIZE E
NASA NUMBER 1011890
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 2

1011890

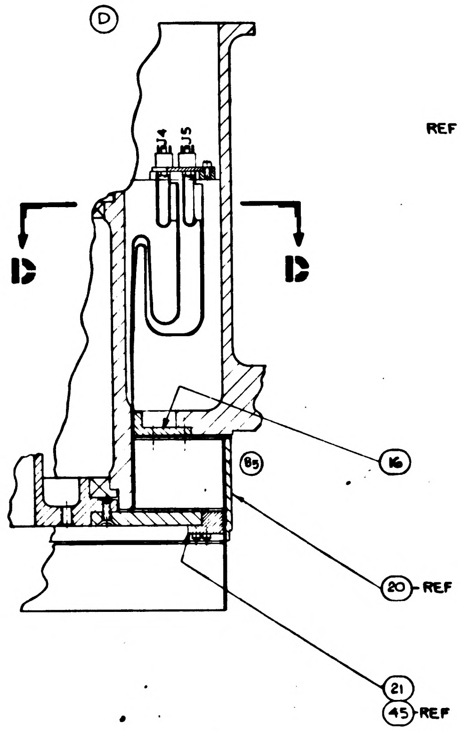
D 0681101

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS 02625 8-16-63				
A 4		SEE SHEET #1. TDRR 03061	5-9-63 10-4-63	WR
B6		REVISED PER TDRR NO. 08040	4-28-64	
C3		REVISED PER TDRR NO. 08459	5/4/64	
D		REVISED PER TDRR NO. 08450	5/13/64	

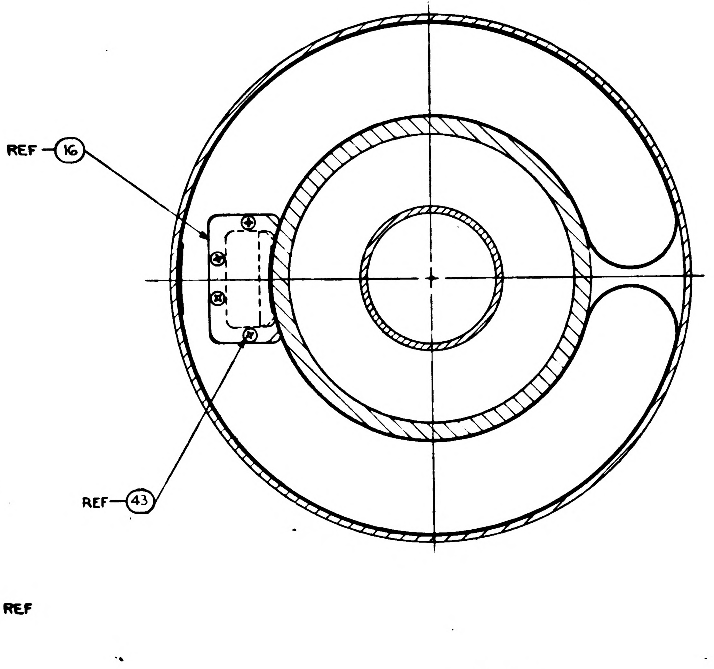
NOTES:
REFER TO SHEET 1



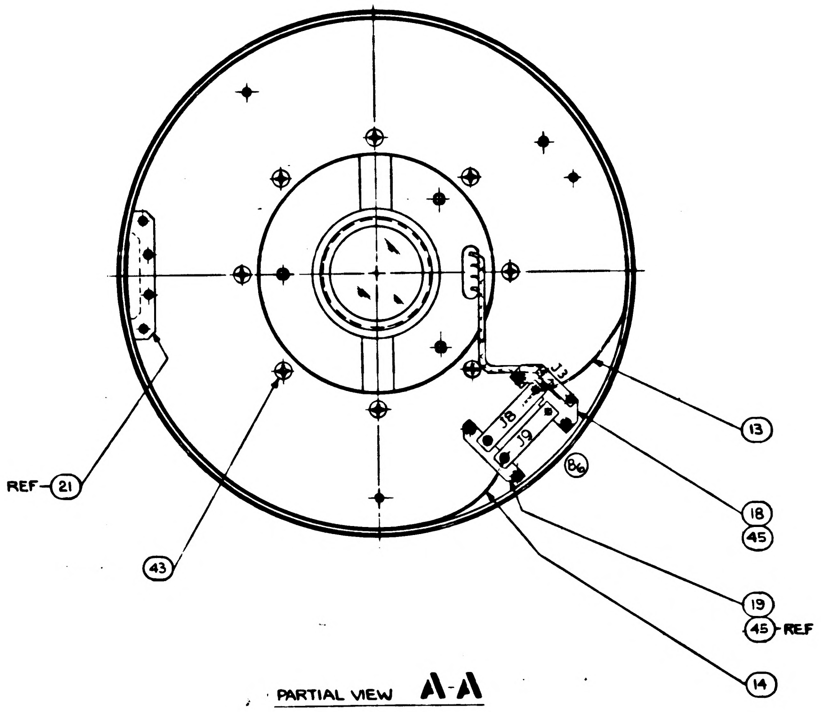
PARTIAL SECTION D-D
SCALE: NONE



PARTIAL SECTION C-C



PARTIAL SECTION B-B



PARTIAL VIEW A-A

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
52	4	NAS	1352C08LL12	74455157029		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
51	5	NAS	1352C08LL8	74455157027					
50	2	NAS	1352C08LL6	74455157026					
49	4	NAS	1352C06LL4	74455157018					
48	7	NAS	1352C04LL8	74455157015					
47	14	NAS	1352C04LL6	74455157014					
46	11	NAS	1352C04LL4	74455157013					
45	14	NAS	1352C02LL4	74455157006					
44	8	NAS	1352C02LL3	74455157005		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
43	12	NAS	1189C04P6L	74455155010		SCREW, SELF LOCKING, 100° FLAT HEAD			
42	1	NAS	1189C02P4L	74455155002		SCREW, SELF LOCKING, 100° FLAT HEAD			
41	2	AN	960-C8	74468051004		WASHER, FLAT, REGULAR			
						SEE SHEET 1 FOR ITEMS 1 THRU 40			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900710
DRAWN DATE 7-26-63
CHECKED 8-8-63
APPROVAL 8-13-63
APPROVAL 8 1963
NASA APPROVAL W. J. Kline
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE II

CODE IDENT NO.
SIZE E
NASA NUMBER 1011890
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 2 OF 2

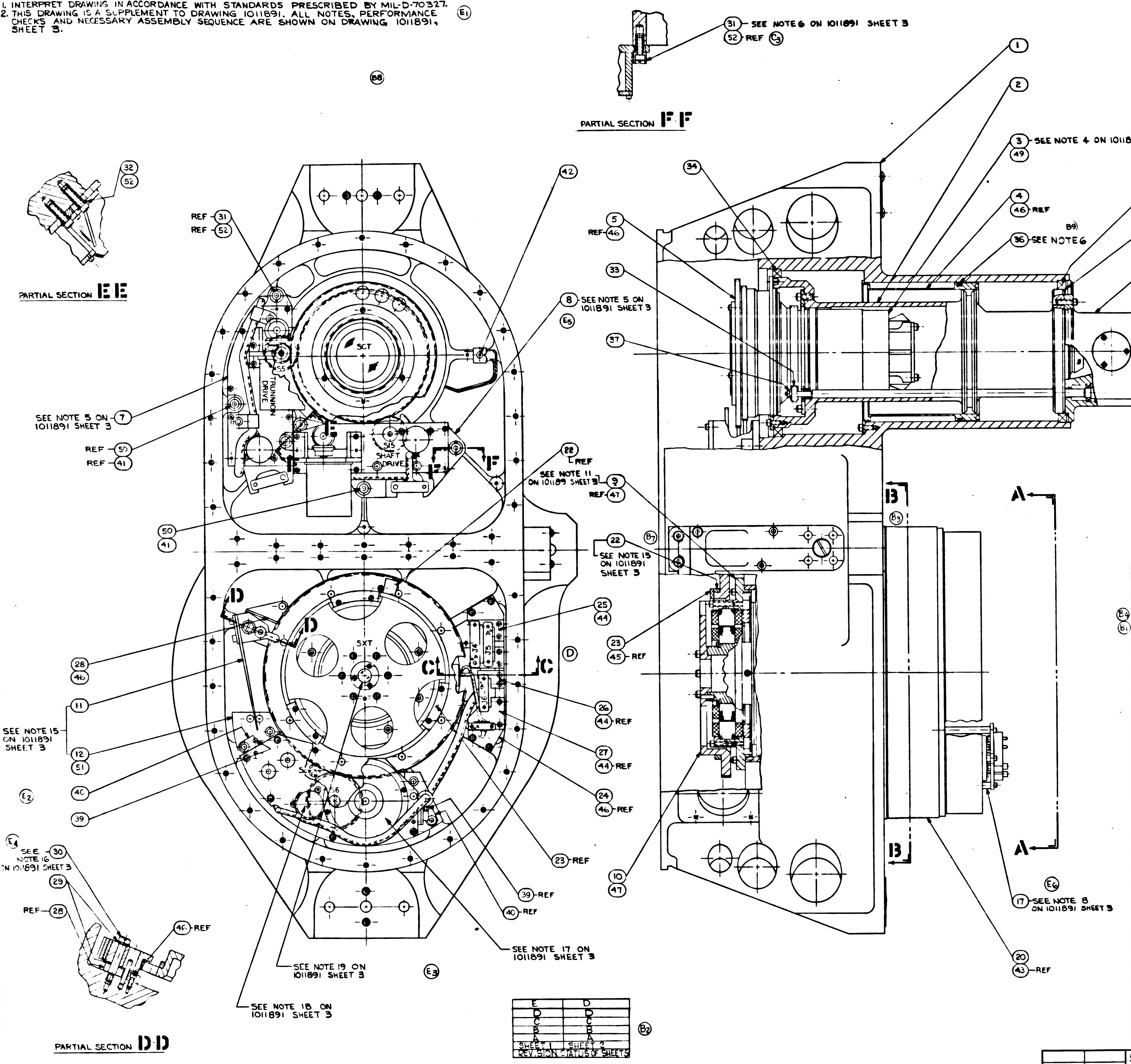
D 1011890

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. THIS DRAWING IS A SUPPLEMENT TO DRAWING 1011891. ALL NOTES, PERFORMANCE CHECKS AND NECESSARY ASSEMBLY SEQUENCE ARE SHOWN ON DRAWING 1011891, SHEET 3. (E1)

3	0681101

REVISIONS 02625 8-16-63

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO 03061	5-9-63	
B9		REVISED PER TDRR NO. 08040		
C3		REVISED PER TDRR NO. 08459	5/14/64	
D		REVISED PER TDRR NO. 08450	5/12/64	
E6		REVISED PER TDRR NO. 08460	5/14/64	


(31) SEE NOTE 6 ON 1011891 SHEET 3
(52) REF (C3)
PARTIAL SECTION F-F
(B8)
PARTIAL SECTION E-E
(32)
(52)
REF (31)
REF (52)
(42)
(8) SEE NOTE 5 ON 1011891 SHEET 3
(E5)
SCT
TRUNNION DRIVE
SHAFT DRIVE
S5
S15
F
SEE NOTE 5 ON (7) 1011891 SHEET 3
REF (50)
REF (41)
(50)
(41)
(22) REF
SEE NOTE 11 ON 1011891 SHEET 3
(9)
REF (47)
(22)
SEE NOTE 15 ON 1011891 SHEET 3
(B7)
D
SXT
C
(D)
(25)
(44)
(23)
(45) REF
(28)
(46)
(11)
SEE NOTE 15 ON 1011891 SHEET 3
(12)
(51)
(40)
(39)
(E2)
(26)
(44) REF
(27)
(44) REF
(24)
(46) REF
(23) REF
(39) REF
(40) REF
(E4)
SEE NOTE 16 ON 1011891 SHEET 3 (30)
(29)
REF (28)
(46) REF
SEE NOTE 17 ON 1011891 SHEET 3
SEE NOTE 19 ON 1011891 SHEET 3
(E3)
SEE NOTE 18 ON 1011891 SHEET 3
PARTIAL SECTION D-D
(10)
(47)
(1)
(2)
(3) SEE NOTE 4 ON 1011891 SHEET 3
(49)
(34)
(35)
(4)
(46) REF
(38) SEE NOTE 1 ON 1011891 SHEET 3
(5)
REF (46)
B9
(36) SEE NOTE 6
(6) SEE NOTE 2 ON 1011891 SHEET 3
(48)
(33)
(37)
B
(B3)
A
(E6)
(17) SEE NOTE 8 ON 1011891 SHEET 3
(20)
(43) REF

E	D
D	D
C	C
B	B
A	A
SHEET 1	SHEET 2

REVISION STATUS OF SHEETS (B2)

SEE SHEET 2 FOR ITEMS 41 THRU 52

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
40	2		1011686	56386900390		RETAINER, PIN			
39	2		1011684	48386900010		PIN, THREADED			
38	AR		1011877-1T 6	7938690 0481 0498		SPACER			
(E4) 37	1	*	1011363-1	74443127001		NUT, HEX, (SELF-LOCKING)			
(B1) 36	1		MS-9021-154			PACKING, PREFORMED			
35	1	*	1011606-1	30205772240		BEARING, BALL			
34	1	*	1011606-2	30205772720		BEARING, BALL			
33	1		1011825	33386900590		GEAR, SPUR (42T-96P)			
32	2		1011562	57386900840		BUSHING, LOCATING			
31	2		1011561	57386900830		BUSHING, ECCENTRIC			
30	1		1011344	45386900160		SCREW, SHOULDER			
29	2		1011353	56386900250		SPACER, SPRING HOLDER			
28	1		1011351	52386900710		BRACKET, MOUNTING, SPRING HOLDER			
27	1		1011621	56386900340		PLATE, MOUNTING, CONNECTOR			
26	1		1011620	56386900330		PLATE, MOUNTING, CONNECTOR			
25	2		1011619	56386900320		PLATE, MOUNTING, CONNECTOR			
24	1		1011622	56386900350		PLATE, BRIDGE, MOUNTING PLATES			
23	3		1011341	57386900610		PLATE, RETAINING, STOP RING			
22	1		1011342	57386900820		RING, LIMIT STOP			
21	1		1011320	52386900760		PLATE, FLEXPRINT CONDUIT			
20	1		1011616	57386901020		RING, MOUNTING, COVER			
19	1		1011321	56386900300		PLATE, MOUNTING, CONNECTOR			
18	1		1011322	56386900310		PLATE, MOUNTING, CONNECTOR			
17	4		1011323	53386900050		POST, SHOULDERED, THREADED			
16	1		1011623	52386900780		PLATE, FLEXPRINT CONDUIT			
15									
14	1		1011908	85386900910		FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
13	1		1011907	85386900900		FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
12	1		1011705	85386900790		SHAFT DRIVE GEAR BOX, ASSY OF (SXT)			
11	1		1011714	85386900390		LIMIT STOP ASSY			
10	1		1011340	85386900310		GEAR & PIN, ASSY OF			
9	1		1011906	85386900890		HOUSING, STATOR & LAMP, ASSY OF			
8	1		1011703	85386900780		SHAFT AXIS DRIVE GEAR BOX			
7	1		1011702	85386900770		SCT TRUNNION DRIVE GEARBOX, ASSY OF			
6	1		1011215	85386900210		TELESCOPE TRUNNION AXIS ASSY			
5	1		1011723	85386900480		DRIVE GEAR, CLUSTER ASSY			
4	1		1011731	85386900490		HOUSING & LAMP, ASSY OF			
3	1		1011724	85386900580		INNER TELESCOPE TUBE, ASSY OF			
2	1		1011722	85386900460		OUTER TELESCOPE TUBE ASSY			
1	1		1011889	85386900700		OPTICAL UNIT SUBASSY - STAGE I			

LIST OF PARTS AND MATERIALS

1011890

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ −	+ −	+ −

DO NOT SCALE THIS DRAWING

MATERIAL

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900710

DRAWN V. AMATO DATE 7-26-63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL 8-7-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE II

CODE IDENT NO. | SIZE E | NASA NUMBER 1011890

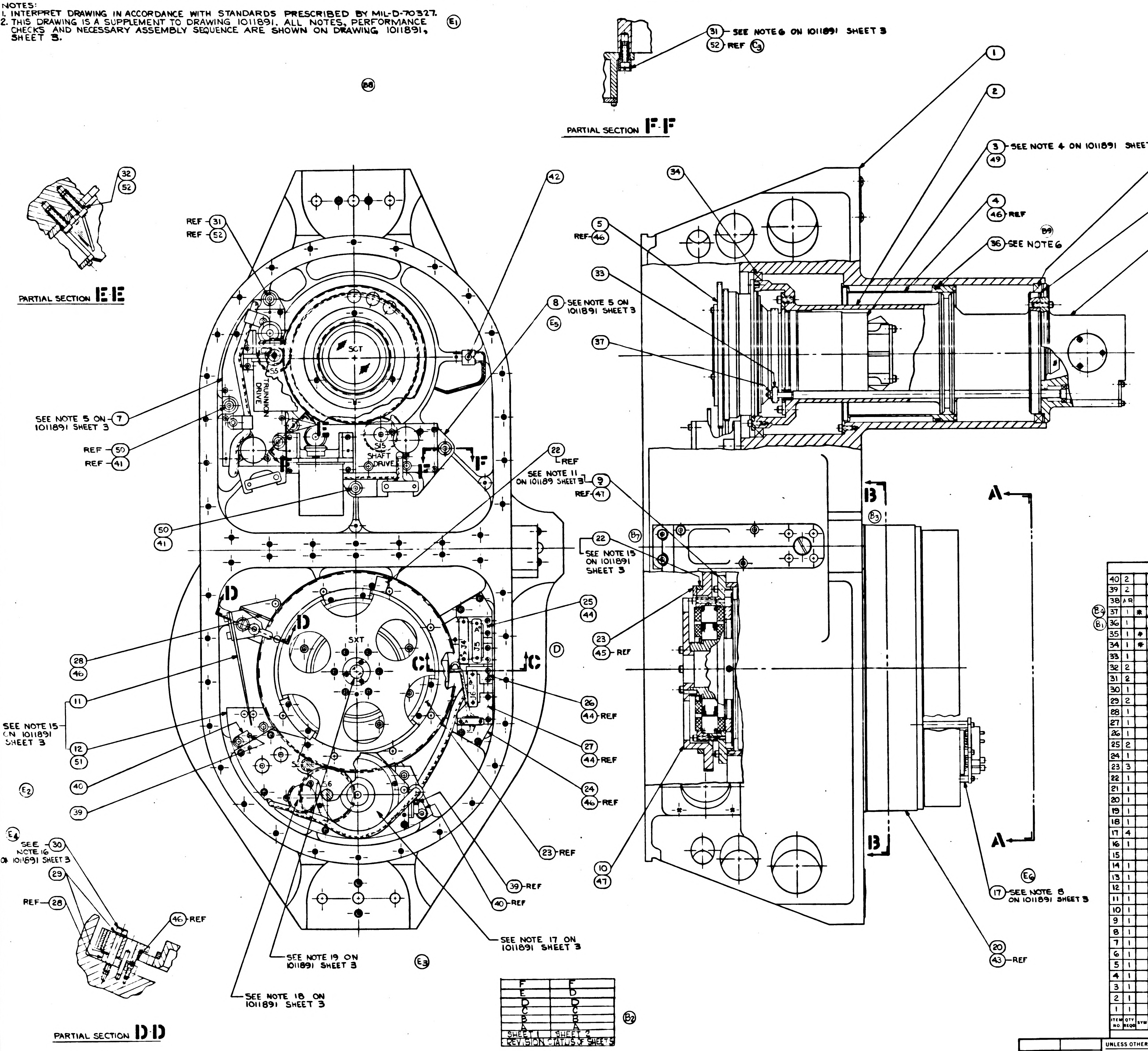
SCALE 1/1 | WEIGHT | CALC ACTUAL | SHEET 1 OF 2

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. THIS DRAWING IS A SUPPLEMENT TO DRAWING 1011891. ALL NOTES, PERFORMANCE CHECKS AND NECESSARY ASSEMBLY SEQUENCE ARE SHOWN ON DRAWING 1011891, SHEET 3. (E1)

E	0681101

REVISIONS 02625 8-16-63

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO 03061	5-9-63	
B4		REVISED PER TDRR NO. 08040		
C3		REVISED PER TDRR NO. 08459	5/14/64	
D		REVISED PER TDRR NO. 08450	5/12/64	
E6		REVISED PER TDRR NO. 08460	5/14/64	
F		REVISED PER TDRR NO. 0862.	5/19/64	



(31) SEE NOTE 6 ON 1011891 SHEET 3
(52) REF (C3)
PARTIAL SECTION F-F
(B8)
(32) (52)
PARTIAL SECTION E-E
REF (31)
REF (52)
(42)
(1)
(2)
(3) SEE NOTE 4 ON 1011891 SHEET 3
(49)
(34)
(35)
(4) (46) REF
(36) SEE NOTE 6
(B9)
(38) SEE NOTE 1 ON 1011891 SHEET 3
(6) SEE NOTE 2 ON 1011891 SHEET 3
(48)
(5) REF (46)
(33)
(37)
(8) SEE NOTE 5 ON 1011891 SHEET 3
(E5)
SCT
TRUNNION DRIVE
SHAFT DRIVE
SEE NOTE 5 ON (7) 1011891 SHEET 3
REF (50)
REF (41)
(50) (41)
(22) REF
SEE NOTE 11 ON 1011891 SHEET 3
(9) REF (47)
(22) SEE NOTE 15 ON 1011891 SHEET 3
(B7)
(B3)
B
A
D
SXT
C
(25) (44)
(D)
(23) (45) REF
(28) (46)
(11)
SEE NOTE 15 ON 1011891 SHEET 3
(12) (51)
(40)
(39)
(E2)
(26) REF
(27) (44) REF
(24) (46) REF
(23) REF
(E4) SEE NOTE 16 ON 1011891 SHEET 3 (30)
(29)
REF (28)
(46) REF
(39) REF
(40) REF
(10) (47)
SEE NOTE 17 ON 1011891 SHEET 3
SEE NOTE 19 ON 1011891 SHEET 3
SEE NOTE 18 ON 1011891 SHEET 3
(E3)
(E6)
(17) SEE NOTE 8 ON 1011891 SHEET 3
(20) (43) REF
PARTIAL SECTION D-D

F	F
E	D
D	D
C	C
B	B
A	A
SHEET 1	SHEET 2

REVISION STATUS OF SHEETS (B2)

SEE SHEET 2 FOR ITEMS 41 THRU 52

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
40	2		1011686	56386900390		RETAINER, PIN			
39	2		1011684	48386900010		PIN, THREADED			
38	AR		1011877-1 THRU 6	7938690 9481 THRU 9486		SPACER			
37 (E4)	1	*	1011363-1	74443127001		NUT, HEX, (SELF-LOCKING)			
36 (B1)	1		MS-9021-154			PACKING, PREFORMED			
35	1	*	1011606-1	30205772240		BEARING, BALL			
34	1	*	1011606-2	30205772720		BEARING, BALL			
33	1		1011825	33386900590		GEAR, SPUR (42T-96P)			
32	2		1011562	57386900840		BUSHING, LOCATING			
31	2		1011561	57386900830		BUSHING, ECCENTRIC			
30	1		1011344	45386900160		SCREW, SHOULDER			
29	2		1011353	56386900250		SPACER, SPRING HOLDER			
28	1		1011351	52386900710		BRACKET, MOUNTING, SPRING HOLDER			
27	1		1011621	56386900340		PLATE, MOUNTING, CONNECTOR			
26	1		1011620	56386900330		PLATE, MOUNTING, CONNECTOR			
25	2		1011619	56386900320		PLATE, MOUNTING, CONNECTOR			
24	1		1011622	56386900350		PLATE, BRIDGE, MOUNTING PLATES			
23	3		1011341	57386900810		PLATE, RETAINING, STOP RING			
22	1		1011342	57386900820		RING, LIMIT STOP			
21	1		1011320	52386900760		PLATE, FLEXPRINT CONDUIT			
20	1		1011616	57386901020		RING, MOUNTING, COVER			
19	1		1011321	56386900300		PLATE, MOUNTING, CONNECTOR			
18	1		1011322	56386900310		PLATE, MOUNTING, CONNECTOR			
17	4		1011323	53386900050		POST, SHOULDERED, THREADED			
16	1		1011623	52386900780		PLATE, FLEXPRINT CONDUIT			
15									
14	1		1011908	85386900910		FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
13	1		1011907	85386900900		FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
12	1		1011705	85386900790		SHAFT DRIVE GEAR BOX, ASSY OF (SXT)			
11	1		1011714	85386900390		LIMIT STOP ASSY			
10	1		1011340	85386900310		GEAR & PIN, ASSY OF			
9	1		1011906	85386900890		HOUSING, STATOR & LAMP, ASSY OF			
8	1		1011703	85386900780		SHAFT AXIS DRIVE GEAR BOX			
7	1		1011702	85386900770		SCT TRUNNION DRIVE GEARBOX, ASSY OF			
6	1		1011215	85386900210		TELESCOPE TRUNNION AXIS ASSY			
5	1		1011723	85386900480		DRIVE GEAR, CLUSTER ASSY			
4	1		1011731	85386900490		HOUSING & LAMP, ASSY OF			
3	1		1011724	85386900580		INNER TELESCOPE TUBE, ASSY OF			
2	1		1011722	85386900460		OUTER TELESCOPE TUBE ASSY			
1	1		1011889	85386900700		OPTICAL UNIT SUBASSY - STAGE I			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900710
DRAWN V. AMATO DATE 7-26-63
CHECKED 8-7-63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE II

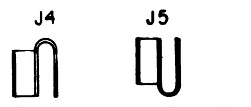
CODE IDENT NO.
SIZE E
NASA NUMBER 1011890
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 2

F 1011890

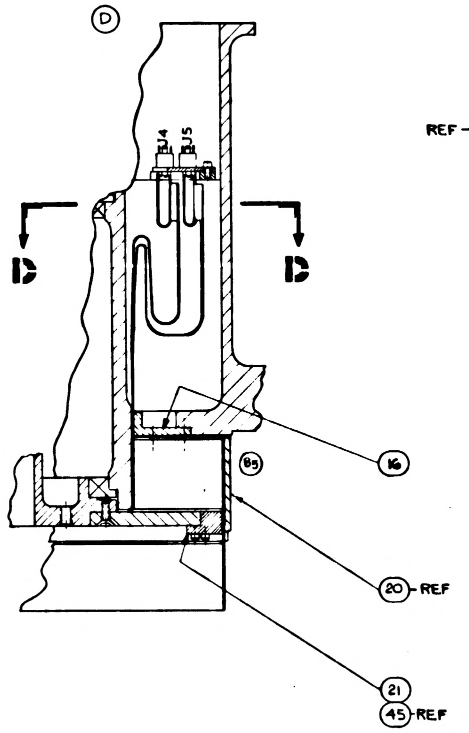
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
4		SEE SHEET #1. TDRR 03061	5-9-63
B6		REVISED PER TDRR NO. 080 41		
C3		REVISED PER TDRR NO. 08459	3/14/64	
D		REVISED PER TDRR NO. 08450	3/12/64	
F		REVISED PER TDRR NO. 08621	3/19/64	

REVISIONS C2625 8-16-63

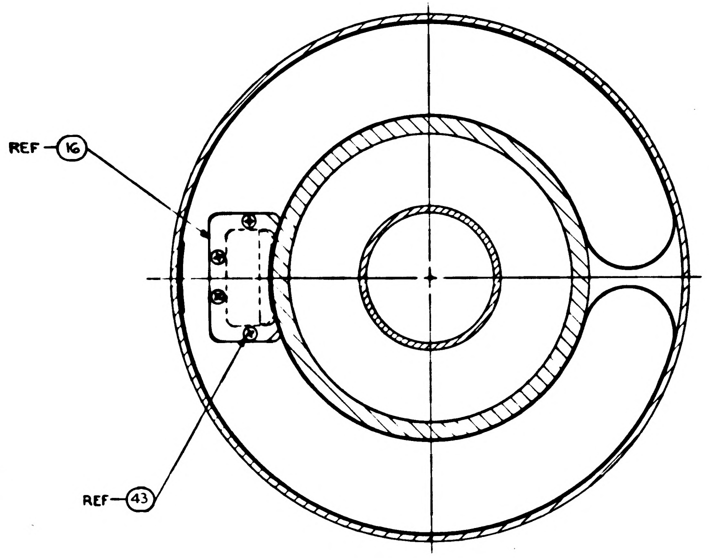
NOTES:
REFER TO SHEET 1



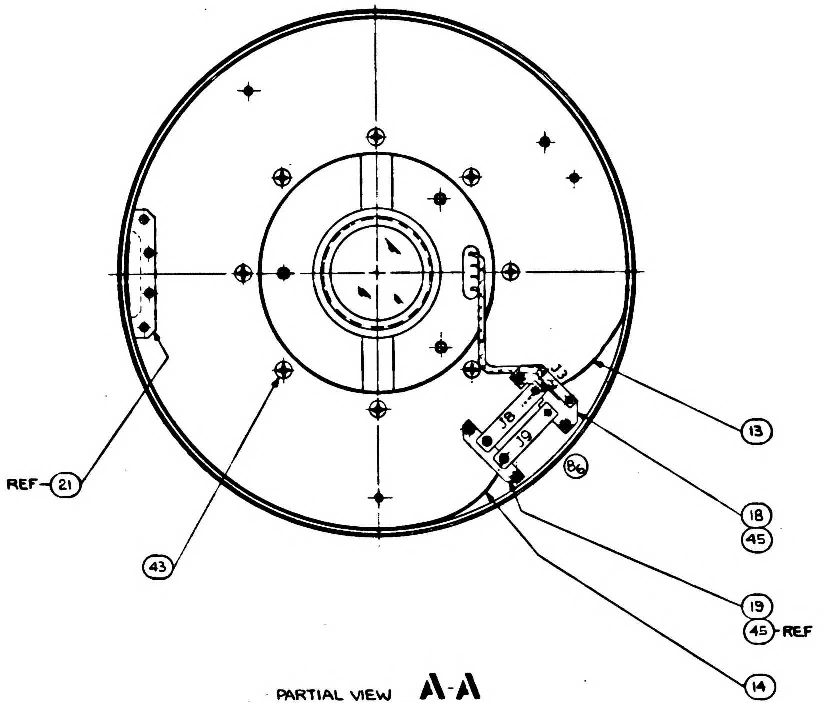
PARTIAL SECTION D-D
SCALE: NONE



PARTIAL SECTION C-C



PARTIAL SECTION B-B



PARTIAL VIEW A-A

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
52	4	NAS	1352C08LL12	74455157029		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
51	5	NAS	1352C08LL8	74455157027					
50	2	NAS	1352C08LL6	74455157026					
49	4	NAS	1352C06LL4	74455157018					
48	7	NAS	1352C04LL8	74455157015					
47	14	NAS	1352C04LL6	74455157014					
46	11	NAS	1352C04LL4	74455157013					
45	14	NAS	1352C02LL4	74455157006					
44	8	NAS	1352C02LL3	74455157005		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
43	12	NAS	1189C04P6L	74455155010		SCREW, SELF LOCKING, 100° FLAT HEAD			
42	1	MS	35249-11	74455187011		SCREW, 82° FLAT HEAD			
41	2	AN	960-C8	74468051004		WASHER, FLAT, REGULAR			
						SEE SHEET 1 FOR ITEMS 1 THRU 40			

(C1) (C2) (F)

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900710
DRAWN DATE 7-26-63
CHECKED 8-2-63
APPROVAL 8-13-63
APPROVAL 8-19-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE II

CODE IDENT NO.
SIZE E
NASA NUMBER 1011890
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 2 OF 2

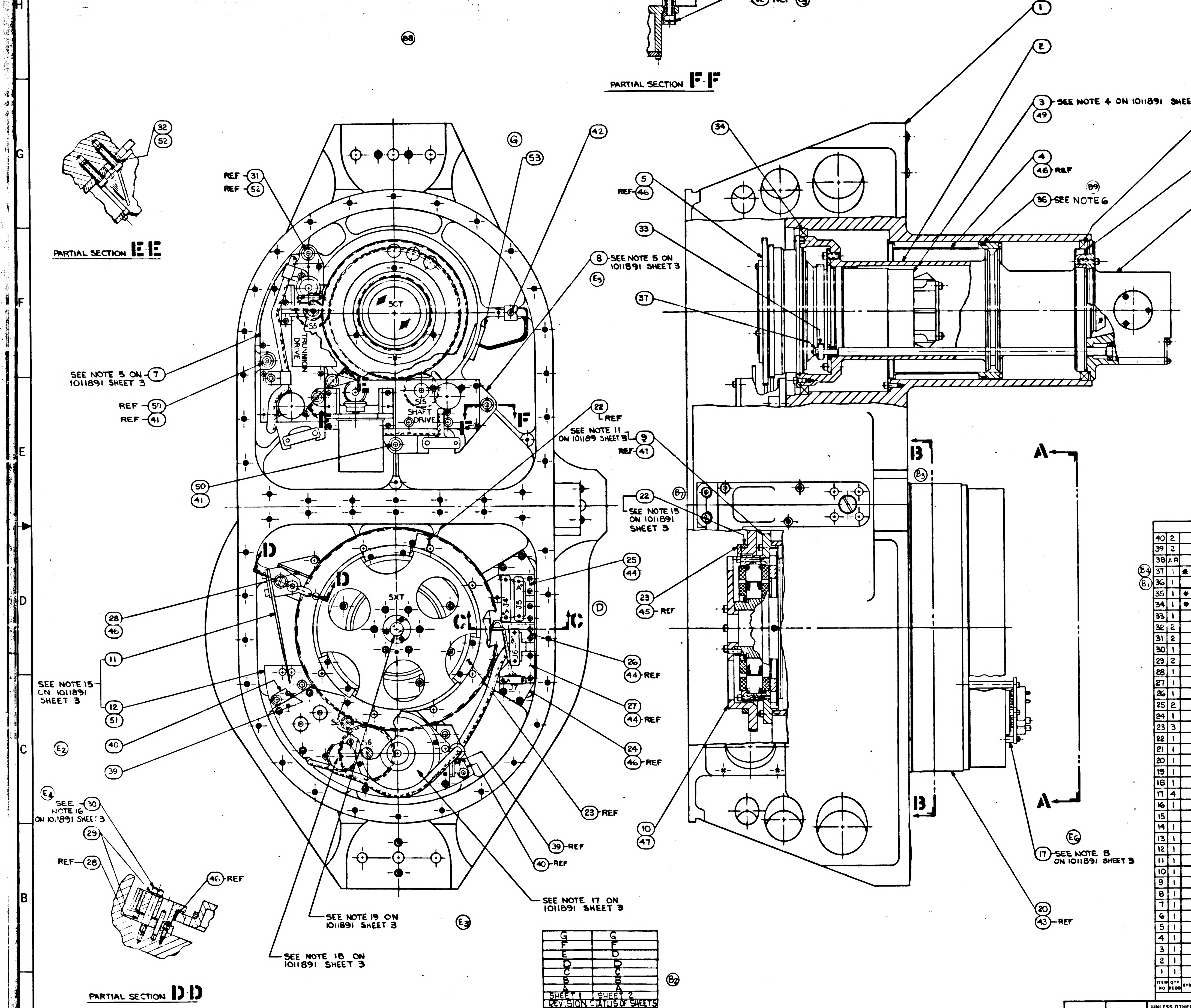
1011890

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. THIS DRAWING IS A SUPPLEMENT TO DRAWING 1011891. ALL NOTES, PERFORMANCE CHECKS AND NECESSARY ASSEMBLY SEQUENCE ARE SHOWN ON DRAWING 1011891, SHEET 3. (E1)

5 0681101

REVISIONS 02625 8-16-63

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO 03061	5-9-63	
B9		REVISED PER TDRR NO. 08040	4-21-64	
C3		REVISED PER TDRR NO. 08459	5/14/64	
D		REVISED PER TDRR NO. 08450	5/12/64	
E6		REVISED PER TDRR NO. 08460	5/19/64	
F		REVISED PER TDRR NO. 08621	5/19/64	
G		REVISED PER TDRR NO. 08622	5/19/64	


(B8)
(31) SEE NOTE 6 ON 1011891 SHEET 3
(52) REF (C3)
PARTIAL SECTION F-F
(32)
(52)
PARTIAL SECTION E-E
REF (31)
REF (52)
(G)
(53)
(42)
SCT
S5
TRUNNION DRIVE
S15
SHAFT DRIVE
F
SEE NOTE 5 ON 1011891 SHEET 3 (7)
REF (50)
REF (41)
(8) SEE NOTE 5 ON 1011891 SHEET 3
(E5)
(50)
(41)
(22) REF
SEE NOTE 11 ON 101189 SHEET 3 (9)
REF (47)
(22) SEE NOTE 15 ON 1011891 SHEET 3
(B7)
D
SXT
C
J4
J5
J6
J7
S2
S6
(D)
(25)
(44)
(23)
(45) REF
(26)
(44) REF
(27)
(44) REF
(24)
(46) REF
(23) REF
(39) REF
(40) REF
(10)
(47)
(28)
(46)
(11)
SEE NOTE 15 ON 1011891 SHEET 3
(12)
(51)
(40)
(39)
(E2)
(E4)
SEE NOTE 16 ON 1011891 SHEET 3 (30)
(29)
REF (28)
(46) REF
PARTIAL SECTION D-D
SEE NOTE 19 ON 1011891 SHEET 3
SEE NOTE 18 ON 1011891 SHEET 3
SEE NOTE 17 ON 1011891 SHEET 3
(E3)
(34)
(5)
REF (46)
(33)
(37)
(1)
(2)
(3) SEE NOTE 4 ON 1011891 SHEET 3
(49)
(4)
(46) REF
(B9)
(36) SEE NOTE 6
(35)
(38) SEE NOTE 1 ON 1011891 SHEET 3
(6) SEE NOTE 2 ON 1011891 SHEET 3
(48)
B
(B3)
A
(E6)
(17) SEE NOTE 8 ON 1011891 SHEET 3
(20)
(43) REF

G	G
F	F
E	D
D	D
C	C
B	B
A	A
SHEET 1	SHEET 2

REVISION STATUS OF SHEETS (B2)

SEE SHEET 2 FOR ITEMS 41 THRU 52

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
40	2		1011686	56386900390		RETAINER, PIN			
39	2		1011684	48386900010		PIN, THREADED			
38	AR		1011877-1/6T	7938690 0481 THRU 0485		SPACER			
(B4) 37	1	*	1011363-1	74443127001		NUT, HEX, (SELF-LOCKING)			
(B1) 36	1		MS-9021-154			PACKING, PREFORMED			
35	1	*	1011606-1	30205772240		BEARING, BALL			
34	1	*	1011606-2	30205772720		BEARING, BALL			
33	1		1011825	33386900590		GEAR, SPUR (42T-96P)			
32	2		1011562	57386900840		BUSHING, LOCATING			
31	2		1011561	57386900830		BUSHING, ECCENTRIC			
30	1		1011344	45386900160		SCREW, SHOULDER			
29	2		1011353	56386900250		SPACER, SPRING HOLDER			
28	1		1011351	52386900710		BRACKET, MOUNTING, SPRING HOLDER			
27	1		1011621	56386900340		PLATE, MOUNTING, CONNECTOR			
26	1		1011620	56386900330		PLATE, MOUNTING, CONNECTOR			
25	2		1011619	56386900320		PLATE, MOUNTING, CONNECTOR			
24	1		1011622	56386900350		PLATE, BRIDGE, MOUNTING PLATES			
23	3		1011341	57386900810		PLATE, RETAINING, STOP RING			
22	1		1011342	57386900820		RING, LIMIT STOP			
21	1		1011320	52386900760		PLATE, FLEXPRINT CONDUIT			
20	1		1011616	57386901020		RING, MOUNTING, COVER			
19	1		1011321	56386900300		PLATE, MOUNTING, CONNECTOR			
18	1		1011322	56386900310		PLATE, MOUNTING, CONNECTOR			
17	4		1011323	53386900050		POST, SHOULDERED, THREADED			
16	1		1011623	52386900780		PLATE, FLEXPRINT CONDUIT			
15									
14	1		1011908	85386900910		FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
13	1		1011907	85386900900		FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
12	1		1011705	85386900790		SHAFT DRIVE GEAR BOX, ASSY OF (SXT)			
11	1		1011714	85386900390		LIMIT STOP ASSY			
10	1		1011340	85386900310		GEAR & PIN, ASSY OF			
9	1		1011906	85386900890		HOUSING, STATOR & LAMP, ASSY OF			
8	1		1011703	85386900780		SHAFT AXIS DRIVE GEAR BOX			
7	1		1011702	85386900770		SCT TRUNNION DRIVE GEARBOX, ASSY OF			
6	1		1011215	85386900210		TELESCOPE TRUNNION AXIS ASSY			
5	1		1011723	85386900480		DRIVE GEAR, CLUSTER ASSY			
4	1		1011731	85386900490		HOUSING & LAMP, ASSY OF			
3	1		1011724	85386900580		INNER TELESCOPE TUBE, ASSY OF			
2	1		1011722	85386900460		OUTER TELESCOPE TUBE ASSY			
1	1		1011889	85386900700		OPTICAL UNIT SUBASSY - STAGE I			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900710
DRAWN V. AMATO DATE 7-26-63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE II

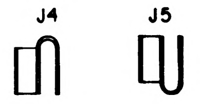
CODE IDENT NO.
SIZE E
NASA NUMBER 1011890
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 2

1011890

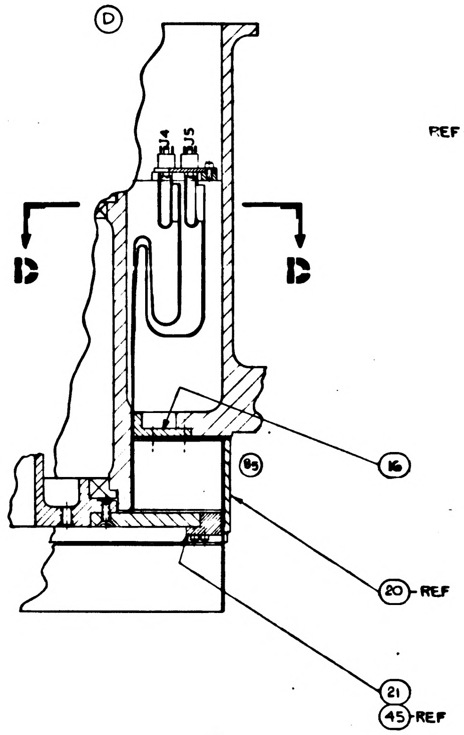
5 0681101

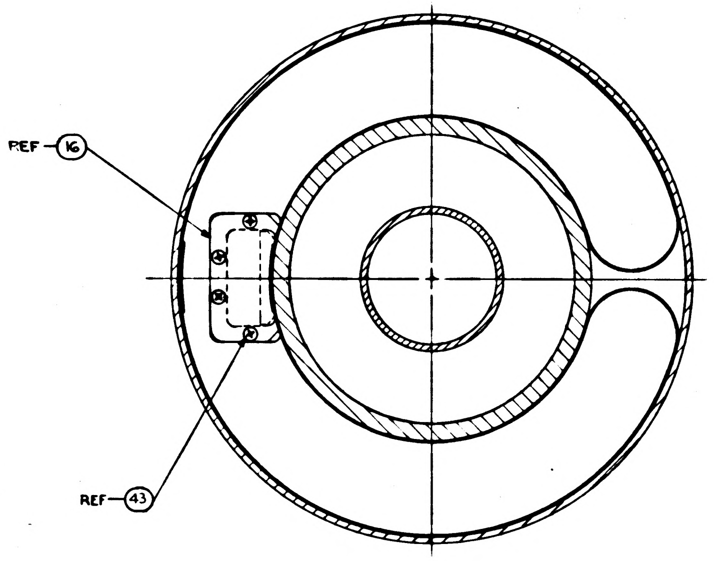
NOTES:
REFER TO SHEET 1

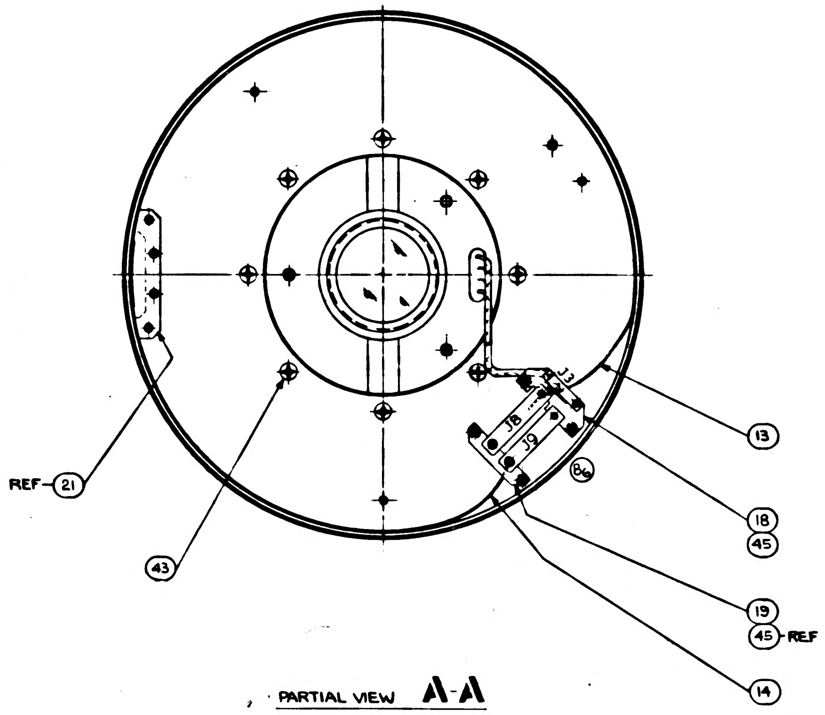
REVISIONS 02625 8-16-63					
	SYM	ZONE	DESCRIPTION	DATE	APPROVAL
(A)	A 4		SEE SHEET #1. TDRR 03061	5-9-63 10-15-63	GR
(B)	B6		REVISED PER TDRR NO 08040	4-28-64	
(C)	C3		REVISED PER TDRR NO. 08459	5/14/64	
(D)	D		REVISED PER TDRR NO. 08450	5/12/64	
(M)	F		REVISED PER TDRR NO. 08621	5/19/64	
	G		REVISED PER TDRR NO. 08622	5/19/64	



PARTIAL SECTION **D-D**
SCALE: NONE







PARTIAL SECTION **B-B**

PARTIAL VIEW **A-A**

PARTIAL SECTION **C-C**

	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
(G)	53	1		1012164	26386900080		GROMMET			
(C1)	52	4	NAS	1352C08LL12	74455157029		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
(C2)	51	5	NAS	1352C08LL8	74455157027		↑			
	50	2	NAS	1352C08LL6	74455157026					
	49	4	NAS	1352C06LL4	74455157018					
	48	7	NAS	1352C04LL8	74455157015					
	47	14	NAS	1352C04LL6	74455157014					
	46	11	NAS	1352C04LL4	74455157013					
	45	14	NAS	1352C02LL4	74455157006		↓			
	44	8	NAS	1352C02LL3	74455157005		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
	43	12	NAS	1189C04P6L	74455155010		SCREW, SELF LOCKING, 100° FLAT HEAD			
(F)	42	1	MS	35249-11	74455187011		SCREW, 82° FLAT HEAD			
	41	2	AN	960-C8	74468051004		WASHER, FLAT, REGULAR			
							SEE SHEET 1 FOR ITEMS 1 THRU 40			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900710

DRAWN DATE 7-25-63
CHECKED 8-8-63
APPROVAL 8-13-63
APPROVAL 8-19-63
NASA APPROVAL W. G. Wilkins 8-1-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE II

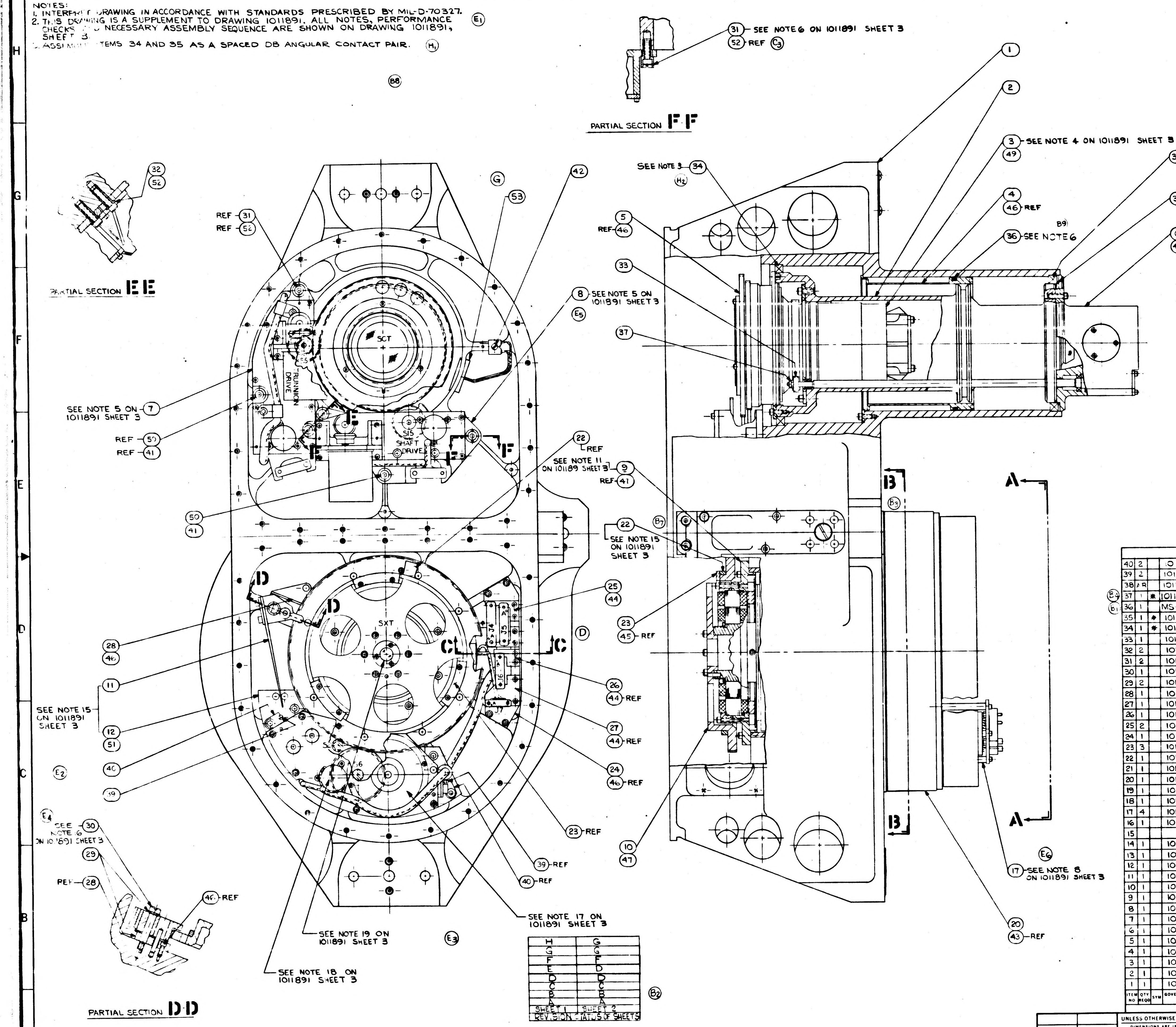
CODE IDENT NO.
SIZE E
NASA NUMBER 1011890
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 2 OF 2

1011890

H 0681101

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. THIS DRAWING IS A SUPPLEMENT TO DRAWING 1011891. ALL NOTES, PERFORMANCE CHECKS AND NECESSARY ASSEMBLY SEQUENCE ARE SHOWN ON DRAWING 1011891, SHEET 3. (E1)
3. ASSEMBLE ITEMS 34 AND 35 AS A SPACED DB ANGULAR CONTACT PAIR. (H1)

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
		REVISIONS 02625	8-6-63	
A4		REVISED PER TDRR NO 08061	5-?-63	
B9		REVISED PER TDRR NO. 08040	4-21-64	
C3		REVISED PER TDRR NO. 08459	5/14/64	
D		REVISED PER TDRR NO. 08450	5/12/64	
E6		REVISED PER TDRR NO. 08460	5/14	
F		REVISED PER TDRR NO. 08621	5/19/64	
G		REVISED PER TDRR NO. 08622	5/19/64	
H3		REVISED PER TDRR NO. 12852	9/23/64	


(31) SEE NOTE 6 ON 1011891 SHEET 3
(52) REF (C3)
PARTIAL SECTION F-F
(B8)
(32)
(52)
PARTIAL SECTION E-E
REF (31)
REF (52)
(G)
(53)
(42)
SCT
TRUNNION DRIVE
SXT SHAFT DRIVE
SEE NOTE 5 ON 1011891 SHEET 3 (7)
REF (52)
REF (41)
(50)
(41)
(8) SEE NOTE 5 ON 1011891 SHEET 3
(E5)
(22) REF
SEE NOTE 11 ON 1011891 SHEET 3
(9) REF (41)
(22) SEE NOTE 15 ON 1011891 SHEET 3
(B7)
SXT
D
C
F
E
(25)
(44)
(D)
(28)
(46)
(11)
SEE NOTE 15 ON 1011891 SHEET 3
(12)
(51)
(40)
(39)
(E2)
(26) (44) REF
(27) (44) REF
(24) (46) REF
(23) REF
(39) REF
(40) REF
(E4) SEE NOTE 6 ON 1011891 SHEET 3 (30)
(29)
REF (28)
(46) REF
SEE NOTE 17 ON 1011891 SHEET 3
SEE NOTE 19 ON 1011891 SHEET 3
SEE NOTE 18 ON 1011891 SHEET 3
(E3)
PARTIAL SECTION D-D
(B2)
SEE NOTE 3 (34)
(H2)
(5)
REF (46)
(33)
(37)
(1)
(2)
(3) SEE NOTE 4 ON 1011891 SHEET 3
(49)
(4)
(46) REF
(36) SEE NOTE 6
B9
(35) SEE NOTE 3
(H3)
(38) SEE NOTE 1 ON 1011891 SHEET 3
(6) SEE NOTE 2 ON 1011891 SHEET 3
(48)
B
(B5)
A
(23)
(45) REF
(10)
(47)
B
A
(E6)
(17) SEE NOTE 8 ON 1011891 SHEET 3
(20)
(43) REF

H	G
G	G
F	F
E	D
D	D
C	C
B	B
A	A
SHEET 1	SHEET 2

REVISION STATUS OF SHEETS

SEE SHEET 2 FOR ITEMS 41 THRU 52

ITEM NO	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
40	2		1011686	56386900390		RETAINER, PIN			
39	2		1011684	48386900010		PIN, THREADED			
38	AR		1011877-1T 6	7938690 0451 THRU 0456		SPACER			
37	1	*	1011363-1	7444312 7001		NUT, HEX, (SELF-LOCKING)			
36	1		MS 9021-154			PACKING, PREFORMED			
35	1	*	1011606-1	30205772240		BEARING, BALL			
34	1	*	1011606-2	30205772720		BEARING, BALL			
33	1		1011825	33386900590		GEAR, SPUR (42T-96P)			
32	2		1011562	57386900840		BUSHING, LOCATING			
31	2		1011561	57386900830		BUSHING, ECCENTRIC			
30	1		1011344	45386900160		SCREW, SHOULDER			
29	2		1011353	56386900250		SPACER, SPRING HOLDER			
28	1		1011351	52386900710		BRACKET, MOUNTING, SPRING HOLDER			
27	1		1011621	56386900340		PLATE, MOUNTING, CONNECTOR			
26	1		1011620	56386900330		PLATE, MOUNTING, CONNECTOR			
25	2		1011619	56386900320		PLATE, MOUNTING, CONNECTOR			
24	1		1011622	56386900350		PLATE, BRIDGE, MOUNTING PLATES			
23	3		1011341	57386900810		PLATE, RETAINING, STOP RING			
22	1		1011342	57386900820		RING, LIMIT STOP			
21	1		1011320	52386900760		PLATE, FLEXPRINT CONDUIT			
20	1		1011616	57386901020		RING, MOUNTING, COVER			
19	1		1011321	56386900300		PLATE, MOUNTING, CONNECTOR			
18	1		1011322	56386900310		PLATE, MOUNTING, CONNECTOR			
17	4		1011323	53386900050		POST, SHOULDERED THREADED			
16	1		1011623	52386900780		PLATE, FLEXPRINT CONDUIT			
15									
14	1		1011908	85386900910		FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
13	1		1011907	85386900900		FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
12	1		1011705	85386900790		SHAFT DRIVE GEAR BOX, ASSY OF (SXT)			
11	1		1011714	85386900390		LIMIT STOP ASSY			
10	1		1011340	85386900310		GEAR & PIN, ASSY OF			
9	1		1011906	85386900890		HOUSING, STATOR & LAMP, ASSY OF			
8	1		1011703	85386900780		SHAFT AXIS DRIVE GEAR BOX			
7	1		1011702	85386900770		SCT TRUNNION DRIVE GEARBOX, ASSY OF			
6	1		1011215	85386900210		TELESCOPE TRUNNION AXIS ASSY			
5	1		1011723	85386900480		DRIVE GEAR, CLUSTER ASSY			
4	1		1011731	85386900490		HOUSING & LAMP, ASSY OF			
3	1		1011724	85386900580		INNER TELESCOPE TUBE, ASSY OF			
2	1		1011722	85386900460		OUTER TELESCOPE TUBE ASSY			
1	1		1011889	85386900700		OPTICAL UNIT SUBASSY - STAGE I			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900710
DRAWN V. AMATO DATE 7-26-63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE II

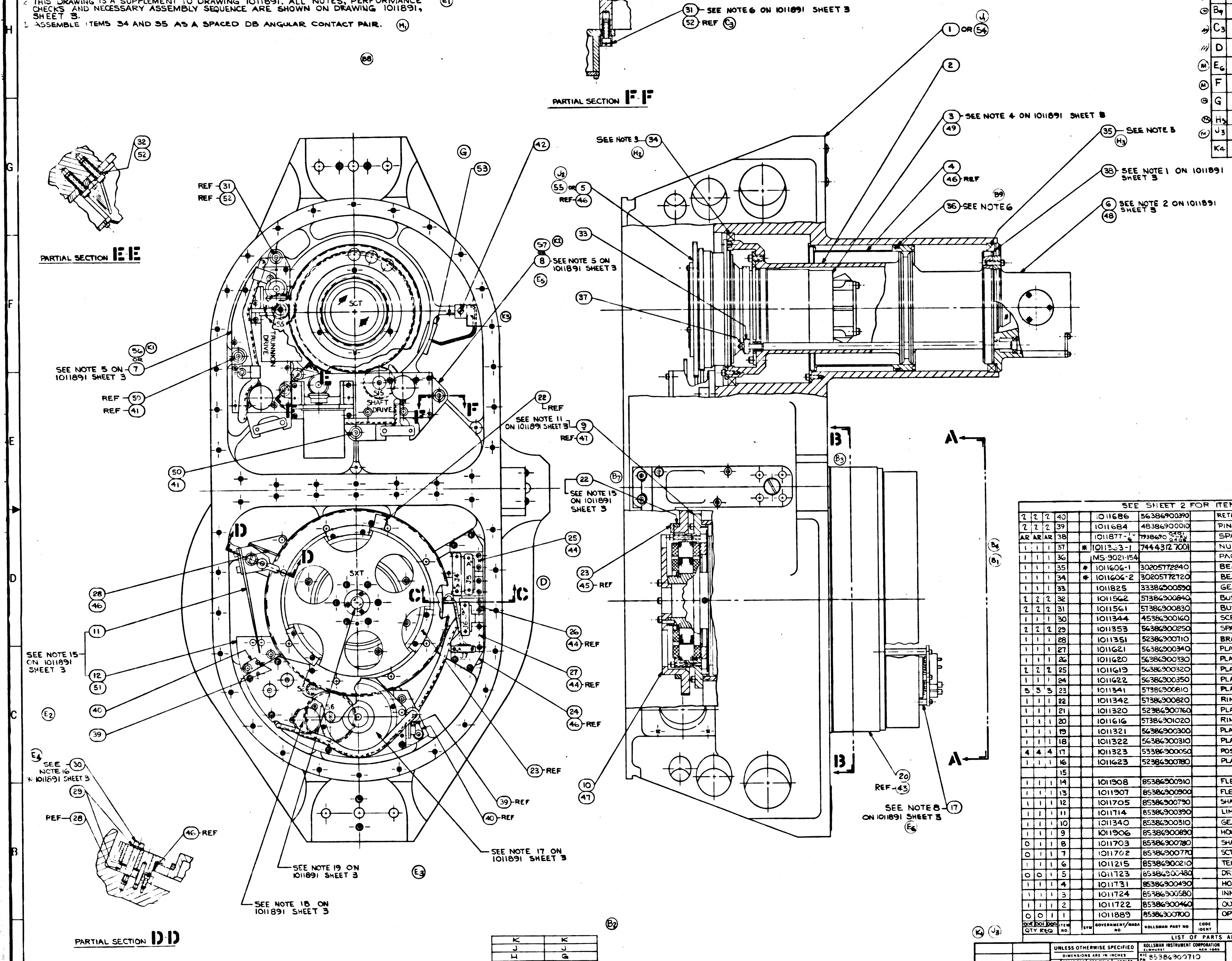
CODE IDENT NO.
SIZE E
NASA NUMBER 1011890
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 2

1011890

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. THIS DRAWING IS A SUPPLEMENT TO DRAWING 1011891. ALL NOTES, PERFORMANCE CHECKS AND NECESSARY ASSEMBLY SEQUENCE ARE SHOWN ON DRAWING 1011891, SHEET 3. (E1)
3. ASSEMBLE ITEMS 34 AND 35 AS A SPACED DB ANGULAR CONTACT PAIR. (H1)

K 0681101

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS 02625 8-?-63				
A4		REVISED PER TDRR NO 03361	5-9-63	
B4		REVISED PER TDRR NO. 08040		
C3		REVISED PER TDRR NO. 08459	5/14/64	
D		REVISED PER TDRR NO. 08450	5/12/64	
E6		REVISED PER TDRR NO. 08460	5/14/64	
F		REVISED PER TDRR NO. 08621	5/19/6	
G		REVISED PER TDRR NO. 08622	5/19	
H3		REVISED PER TDRR No. 12852		
J3		REVISED PER TDRR NO. 13451	10/4/64	
K4		REVISED PER TDRR NO. 15548	1/6 5	



PARTIAL SECTION F-F
31 SEE NOTE 6 ON 1011891 SHEET 3
52 REF C3
PARTIAL SECTION E-E
32
52
1 OR 54
J1
2
3 SEE NOTE 4 ON 1011891 SHEET 3
49
4
46 REF
36 SEE NOTE 6
B9
35 SEE NOTE 3
H3
38 SEE NOTE 1 ON 1011891 SHEET 3
6 SEE NOTE 2 ON 1011891 SHEET 3
48
SEE NOTE 3 34
H2
J2
55 OR 5
REF 46
33
37
57 K3
8 SEE NOTE 5 ON 1011891 SHEET 3
E5
G
53
42
REF 31
REF 52
SCT
TRUNNION DRIVE
S5
SHAFT DRIVE
F
K3
SEE NOTE 5 ON 7 1011891 SHEET 3
56 OR K1
REF 50
REF 41
50
41
22 REF
SEE NOTE 11 ON 1011891 SHEET 3
9
REF 47
22
SEE NOTE 15 ON 1011891 SHEET 3
B7
B
B3
A
B4
B1
D
SXT
C
25
44
28
46
11
SEE NOTE 15 ON 1011891 SHEET 3
12
51
40
39
E2
26
44 REF
27
44 REF
24
46 REF
23
45 REF
23 REF
10
47
20
REF 43
SEE NOTE 8 ON 1011891 SHEET 3 17
E6
E4
SEE NOTE 16 ON 1011891 SHEET 3 30
29
REF 28
46 REF
39 REF
40 REF
SEE NOTE 17 ON 1011891 SHEET 3
SEE NOTE 19 ON 1011891 SHEET 3
SEE NOTE 18 ON 1011891 SHEET 3
E3
PARTIAL SECTION D-D
B2
B8

K	K
J	J
H	G
G	G
F	F
E	D
D	D
C	C
B	B
A	A
SHEET 1	SHEET 2
REVISION STATUS OF SHEETS	

SEE SHEET 2 FOR ITEMS 41 THRU 57

QTY REQ 002	001	000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	2	2	40			1011686	56386900390		RETAINER, PIN			
2	2	2	39			1011684	48386900010		PIN, THREADED			
AR	AR	AR	38			1011877-1-6	7938690 0481 THRU 0486		SPACER			
1	1	1	37		*	1011363-1	74443127001		NUT, HEX, (SELF-LOCKING)			
1	1	1	36			MS-9021-154			PACKING, PREFORMED			
1	1	1	35		*	1011606-1	30205772240		BEARING, BALL			
1	1	1	34		*	1011606-2	30205772720		BEARING, BALL			
1	1	1	33			1011825	33386900590		GEAR, SPUR (42T-96P)			
2	2	2	32			1011562	57386900840		BUSHING, LOCATING			
2	2	2	31			1011561	57386900830		BUSHING, ECCENTRIC			
1	1	1	30			1011344	45386900160		SCREW, SHOULDER			
2	2	2	29			1011353	56386900250		SPACER, SPRING HOLDER			
1	1	1	28			1011351	52386900710		BRACKET, MOUNTING, SPRING HOLDER			
1	1	1	27			1011621	56386900340		PLATE, MOUNTING, CONNECTOR			
1	1	1	26			1011620	56386900330		PLATE, MOUNTING, CONNECTOR			
2	2	2	25			1011619	56386900320		PLATE, MOUNTING, CONNECTOR			
1	1	1	24			1011622	56386900350		PLATE, BRIDGE, MOUNTING PLATES			
3	3	3	23			1011341	57386900810		PLATE, RETAINING, STOP RING			
1	1	1	22			1011342	57386900820		RING, LIMIT STOP			
1	1	1	21			1011320	52386900760		PLATE, FLEXPRINT CONDUIT			
1	1	1	20			1011616	57386901020		RING, MOUNTING, COVER			
1	1	1	19			1011321	56386900300		PLATE, MOUNTING, CONNECTOR			
1	1	1	18			1011322	56386300310		PLATE, MOUNTING, CONNECTOR			
4	4	4	17			1011323	53386900050		POST, SHOULDERED, THREADED			
1	1	1	16			1011623	52386900780		PLATE, FLEXPRINT CONDUIT			
			15									
1	1	1	14			1011908	85386900910		FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
1	1	1	13			1011907	85386900900		FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
1	1	1	12			1011705	85386900790		SHAFT DRIVE GEAR BOX, ASSY OF (SXT)			
1	1	1	11			1011714	85386900390		LIMIT STOP ASSY			
1	1	1	10			1011340	85386900310		GEAR & PIN, ASSY OF			
1	1	1	9			1011906	85386900890		HOUSING, STATOR & LAMP, ASSY OF			
0	1	1	8			1011703	85386900780		SHAFT AXIS DRIVE GEAR BOX			
0	1	1	7			1011702	85386900770		SCT TRUNNION DRIVE GEARBOX, ASSY OF			
1	1	1	6			1011215	85386900210		TELESCOPE TRUNNION AXIS ASSY			
0	0	1	5			1011723	85386900480		DRIVE GEAR, CLUSTER ASSY			
1	1	1	4			1011731	85386900490		HOUSING & LAMP, ASSY OF			
1	1	1	3			1011724	85386900580		INNER TELESCOPE TUBE, ASSY OF			
1	1	1	2			1011722	85386900460		OUTER TELESCOPE TUBE ASSY			
0	0	1	1			1011889	85386900100		OPTICAL UNIT SUBASSY - STAGE I			

LIST OF PARTS AND MATERIALS

(K4) (J3)

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

NEXT ASSY	USED ON
1011891	1011000
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900710
DRAWN V. AMATO DATE 7-26-63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE II

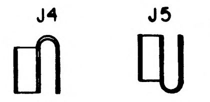
CODE IDENT NO.
SIZE E
NASA NUMBER 1011890
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 2

	0681101

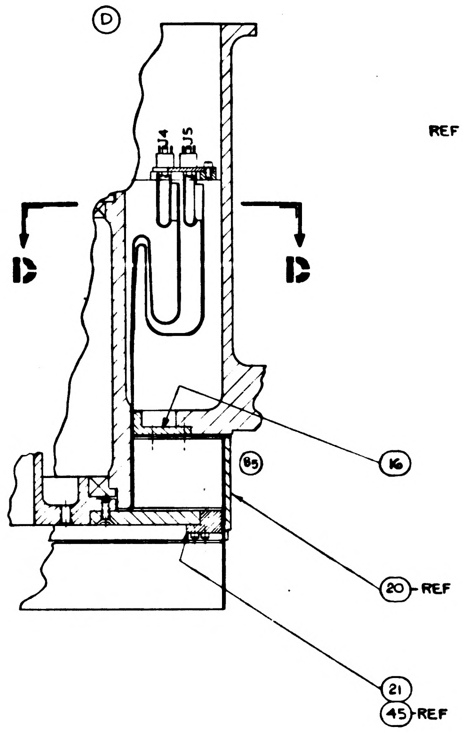
REVISIONS 02625 8-16-63

	SYM	ZONE	DESCRIPTION	DATE	APPROVAL
(M)	A 4		SEE SHEET #1. TORR 0 35[illegible]	5-9-63 1-29-[illegible]	
(M)	B6		REVISED PER TDRR NO. CEC 40	4-28-64	
(M)	C3		REVISED PER TORR NO. 08459	5/14/64	
(M)	D		REVISED PER TORR NO. 08450	5/12/64	
(M)	F		REVISED PER TORR NO. 08621	5/19/64	
(M)	G		REVISED PER TORR NO. 08622	5/19/64	
(M)	J		REVISED PER TORR No. 13451	10/14/64	
	K		REVISED PER TORR NO 5548	1/4/65	

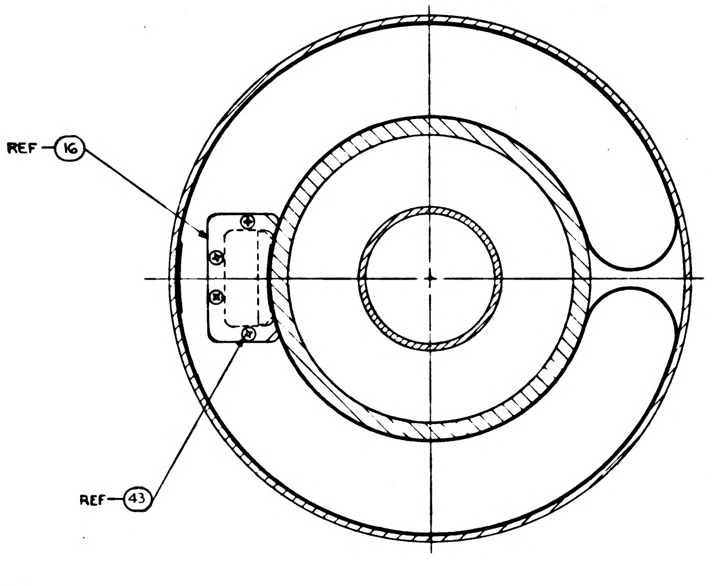
NOTES:
REFER TO SHEET 1



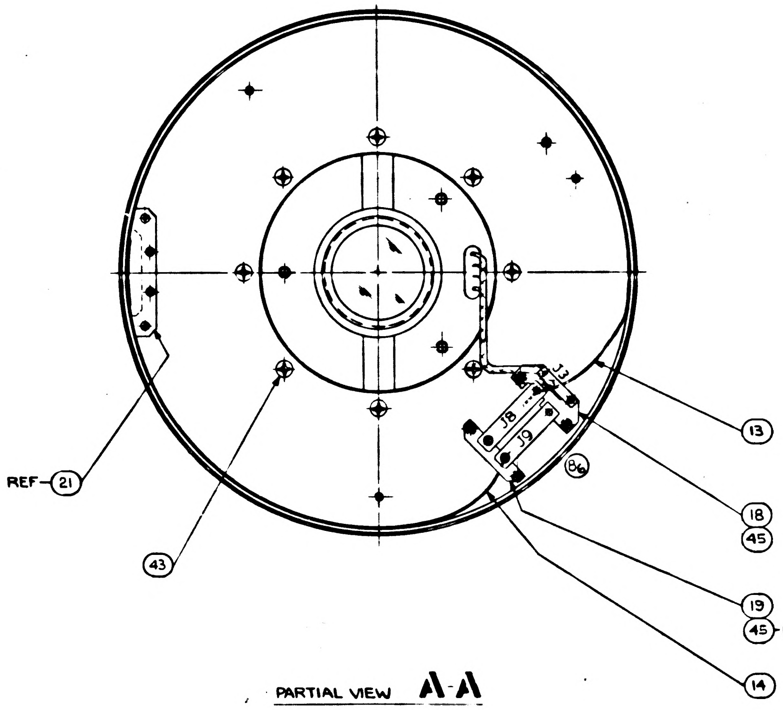
PARTIAL SECTION D-D
SCALE: NONE



PARTIAL SECTION C-C



PARTIAL SECTION B-B



PARTIAL VIEW A-A

LIST OF PARTS AND MATERIALS

	QTY REQ 002	QTY REQ 001	QTY REQ 000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
	1	0	0	57			1011703-001			SHAFT AXIS DRIVE GEARBOX SXT			
	1	0	0	56			1011702-001			SCT-TRUNNION DRIVE GEARBOX ASSY			
(J)	1	1	0	55			1011723-001			DRIVE GEAR CLUSTER ASSEMBLY			
(G)	1	1	0	54			1011889-001			OPTICAL UNIT SUBASSY - STAGE I			
	1	1	1	53			1012164	26386900080		GROMMET			
(C1)	4	4	4	52		NAS	1352C08LL12	74455157029		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
(C2)	5	5	5	51		NAS	1352C08LL8	74455157027					
	2	2	2	50		NAS	1352C08LL6	74455157026					
	4	4	4	49		NAS	1352C06LL4	74455157018					
	7	7	7	48		NAS	1352C04LL8	74455157015					
	14	14	14	47		NAS	1352C04LL6	74455157014					
	11	11	11	46		NAS	1352C04LL4	74455157013					
	14	14	14	45		NAS	1352C02LL4	74455157006					
	8	8	8	44		NAS	1352C02LL3	74455157005		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
	12	12	12	43		NAS	1189C04P6L	74455155010		SCREW, SELF LOCKING, 100° FLAT HEAD			
(F)	1	1	1	42		MS	35249-11	74455187011		SCREW, 82° FLAT HEAD			
	2	2	2	41		AN	960-C8	74468051004		WASHER, FLAT, REGULAR			
										SEE SHEET 1 FOR ITEMS 1 THRU 40			
(K)													

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900710
DRAWN DATE 7-26-63
CHECKED 8-2-63
APPROVAL 8-2-63
APPROVAL 8-2-63
NASA APPROVAL W J Kline
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE II

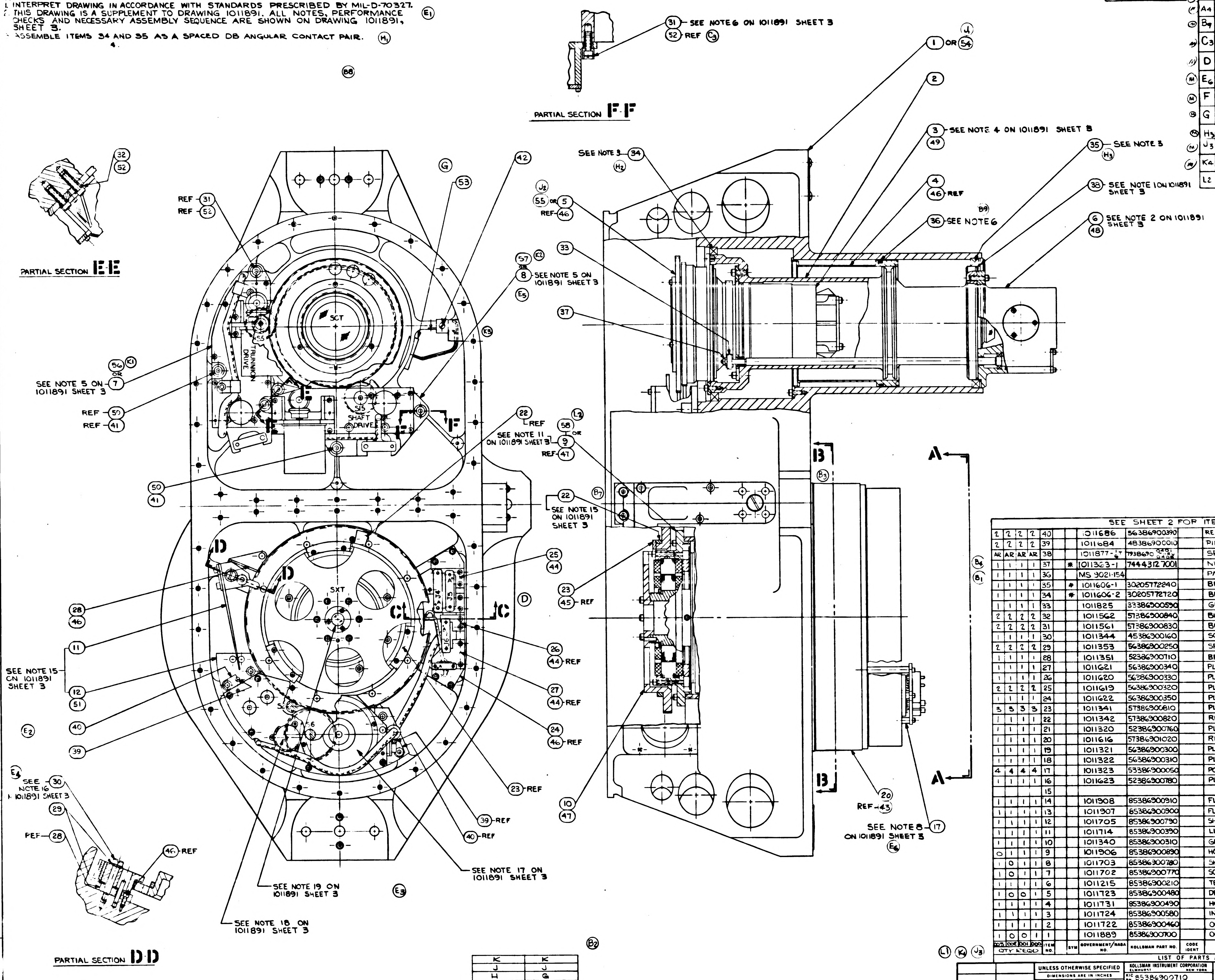
CODE IDENT NO.
SIZE E
NASA NUMBER 1011890
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 2 OF 2

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. THIS DRAWING IS A SUPPLEMENT TO DRAWING 1011891. ALL NOTES, PERFORMANCE CHECKS AND NECESSARY ASSEMBLY SEQUENCE ARE SHOWN ON DRAWING 1011891, SHEET 3. (E1)
3. ASSEMBLE ITEMS 34 AND 35 AS A SPACED DB ANGULAR CONTACT PAIR. (H1)
4.

7	0681101

REVISIONS 02625 8-16-63

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO 03061	5-9-63	
B4		REVISED PER TDRR NO. 08040	[illegible]	
C3		REVISED PER TDRR NO. 08459	[illegible] 64	
D		REVISED PER TDRR NO. 08450	[illegible]/64	
E6		REVISED PER TDRR NO. 08460	[illegible]/64	
F		REVISED PER TDRR NO. 08621	[illegible]	
G		REVISED PER TDRR NO. 08622	3/19	
H3		REVISED PER TDRR No 12852	[illegible]	
J3		REVISED PER TDRR NO. 13451	[illegible]/64	
K4		REVISED PER TDRR NO. 15348	[illegible]	
L2		REVISED PER TDRR NO. 15861	[illegible]	



(B8)
PARTIAL SECTION F-F
31 SEE NOTE 6 ON 1011891 SHEET 3
52 REF (C3)
1 OR 54 (J1)
2
3 SEE NOTE 4 ON 1011891 SHEET 3
49
SEE NOTE 3 34 (H2)
35 SEE NOTE 3 (H3)
4
46 REF
(B9)
36 SEE NOTE 6
38 SEE NOTE 1 ON 1011891 SHEET 3
6 SEE NOTE 2 ON 1011891 SHEET 3
48
32
52
PARTIAL SECTION E-E
REF 31
REF 52
(G)
53
42
(J2)
55 OR 5
REF 46
57 (K1)
8 SEE NOTE 5 ON 1011891 SHEET 3
(E5)
33
37
SCT
TRUNNION DRIVE
SIS SHAFT DRIVE
(K3)
56 (K1) OR 7
SEE NOTE 5 ON 1011891 SHEET 3
REF 50
REF 41
22 REF
SEE NOTE 11 ON 1011891 SHEET 3
(L2)
58 OR 9
REF 41
50
41
B
(B3)
A
A
(B7)
22
SEE NOTE 15 ON 1011891 SHEET 3
D
D
SXT
C
C
(D)
25
44
23
45 REF
(B4)
(B1)
28
46
11
SEE NOTE 15 ON 1011891 SHEET 3
12
51
40
39
(E2)
26
44 REF
27
44 REF
24
46 REF
23 REF
39 REF
40 REF
10
47
20
REF 43
SEE NOTE 8 17 ON 1011891 SHEET 3
(E6)
B
B
(E4)
SEE NOTE 16 30 ON 1011891 SHEET 3
29
REF 28
46 REF
SEE NOTE 19 ON 1011891 SHEET 3
SEE NOTE 17 ON 1011891 SHEET 3
(E3)
SEE NOTE 18 ON 1011891 SHEET 3
PARTIAL SECTION D-D
(B2)

SEE SHEET 2 FOR ITEMS 41 THRU 57

003	002	001	000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	2	2	2	40			1011686	56386900390		RETAINER, PIN			
2	2	2	2	39			1011684	48386900010		PIN, THREADED			
AR	AR	AR	AR	38			1011877-1 T 6	7938690 0481 THRU 0486		SPACER			
1	1	1	1	37		*	1011363-1	74443127001		NUT, HEX, (SELF-LOCKING)			
1	1	1	1	36			MS 9021-154			PACKING, PREFORMED			
1	1	1	1	35		*	1011606-1	30205772240		BEARING, BALL			
1	1	1	1	34		*	1011606-2	30205772720		BEARING, BALL			
1	1	1	1	33			1011825	33386900590		GEAR, SPUR (42T-96P)			
2	2	2	2	32			1011562	57386900840		BUSHING, LOCATING			
2	2	2	2	31			1011561	57386900830		BUSHING, ECCENTRIC			
1	1	1	1	30			1011344	45386900160		SCREW, SHOULDER			
2	2	2	2	29			1011353	56386900250		SPACER, SPRING HOLDER			
1	1	1	1	28			1011351	52386900710		BRACKET, MOUNTING, SPRING HOLDER			
1	1	1	1	27			1011621	56386900340		PLATE, MOUNTING, CONNECTOR			
1	1	1	1	26			1011620	56386900330		PLATE, MOUNTING, CONNECTOR			
2	2	2	2	25			1011619	56386900320		PLATE, MOUNTING, CONNECTOR			
1	1	1	1	24			1011622	56386900350		PLATE, BRIDGE, MOUNTING PLATES			
3	3	3	3	23			1011341	57386900810		PLATE, RETAINING, STOP RING			
1	1	1	1	22			1011342	57386900820		RING, LIMIT STOP			
1	1	1	1	21			1011320	52386900760		PLATE, FLEXPRINT CONDUIT			
1	1	1	1	20			1011616	57386901020		RING, MOUNTING, COVER			
1	1	1	1	19			1011321	56386900300		PLATE, MOUNTING, CONNECTOR			
1	1	1	1	18			1011322	56386900310		PLATE, MOUNTING, CONNECTOR			
4	4	4	4	17			1011323	53386900050		POST, SHOULDERED, THREADED			
1	1	1	1	16			1011623	52386900780		PLATE, FLEXPRINT CONDUIT			
				15									
1	1	1	1	14			1011908	85386900910		FLEXPRINT & CONNECTOR, ASSY OF (SX)			
1	1	1	1	13			1011907	85386900900		FLEXPRINT & CONNECTOR, ASSY OF (SX)			
1	1	1	1	12			1011705	85386900790		SHAFT DRIVE GEAR BOX, ASSY OF (SX)			
1	1	1	1	11			1011714	85386900390		LIMIT STOP ASSY			
1	1	1	1	10			1011340	85386900310		GEAR & PIN, ASSY OF			
0	1	1	1	9			1011906	85386900890		HOUSING, STATOR & LAMP, ASSY OF			
1	0	1	1	8			1011703	85386900780		SHAFT AXIS DRIVE GEAR BOX			
1	0	1	1	7			1011702	85386900770		SCT TRUNNION DRIVE GEARBOX, ASSY OF			
1	1	1	1	6			1011215	85386900210		TELESCOPE TRUNNION AXIS ASSY			
1	0	0	1	5			1011723	85386900480		DRIVE GEAR, CLUSTER ASSY			
1	1	1	1	4			1011731	85386900490		HOUSING & LAMP, ASSY OF			
1	1	1	1	3			1011724	85386900580		INNER TELESCOPE TUBE, ASSY OF			
1	1	1	1	2			1011722	85386900460		OUTER TELESCOPE TUBE ASSY			
1	0	0	1	1			1011889	85386900700		OPTICAL UNIT SUBASSY - STAGE I			

QTY REQD

LIST OF PARTS AND MATERIALS

(L1) (K4) (J3)

K	K
J	J
H	G
G	G
F	F
E	D
D	D
C	C
B	B
A	A
SHEET 1	SHEET 2

REVISION STATUS OF SHEETS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900710
DRAWN V. AMATO DATE 7-26-63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE II

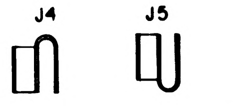
CODE IDENT NO.
SIZE E
NASA NUMBER 1011890
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 2

7 0681101

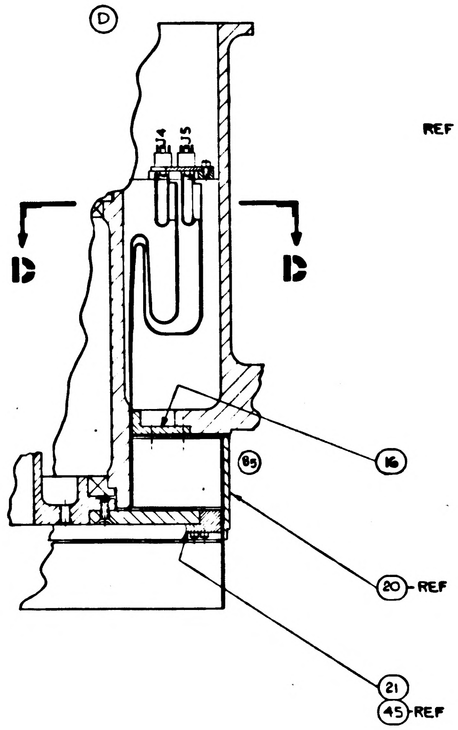
NOTES:
REFER TO SHEET 1

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A 4		SEE SHEET #1 TDRR 0300	5-9-63	
B6		REVISED PER TDRR NO. 0EC 40		
C3		REVISED PER TDRR NO. 08459	3/14/64	
D		REVISED PER TDRR NO. 08450	3/12/64	
F		REVISED PER TDRR NO. 08621	3/19/64	
G		REVISED PER TDRR NO. 08622	3/19/64	
J		REVISED PER TDRR No. 13451		
K		REVISED PER TDRR NO 15548	1/4/65	
L		REVISED PER TDRR NO 15861	4/22/65	

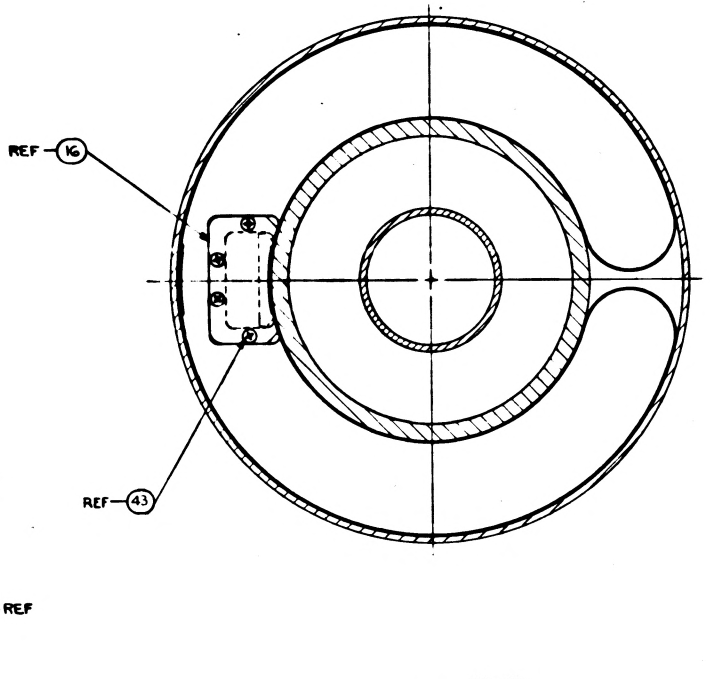
REVISIONS 02625 8-16-63



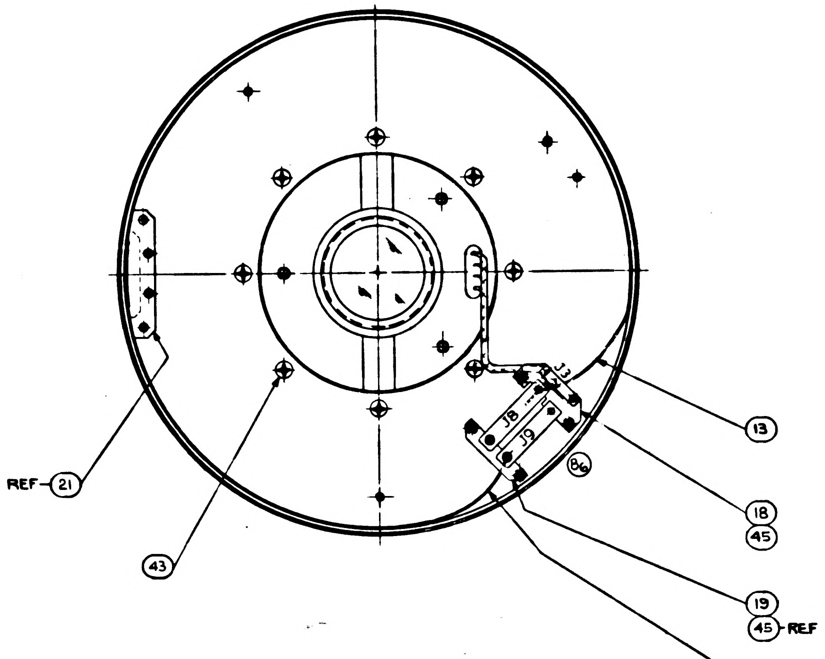
PARTIAL SECTION D-D
SCALE: NONE



PARTIAL SECTION C-C



PARTIAL SECTION B-B



PARTIAL VIEW A-A

005	002	001	000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
1	0	0	0	58			1011906-001			HOUSING, STAT. + LAMP ASSY			
0	1	0	0	57			1011703-001			SHAFT AXIS DRIVE GEARBOX SXT			
0	1	0	0	56			1011702-001			SCT-TRUNNION DRIVE GEARBOX ASSY			
0	1	1	0	55			1011723-001			DRIVE GEAR CLUSTER ASSEMBLY			
0	1	1	0	54			1011889-001			OPTICAL UNIT SUBASSY - STAGE I			
1	1	1	1	53			1012164	26386900080		GROMMET			
4	4	4	4	52		NAS	1352C08LL12	74455157029		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
5	5	5	5	51		NAS	1352C08LL8	74455157027					
2	2	2	2	50		NAS	1352C08LL6	74455157026					
4	4	4	4	49		NAS	1352C06LL4	74455157018					
7	7	7	7	48		NAS	1352C04LL8	74455157015					
14	14	14	14	47		NAS	1352C04LL6	74455157014					
11	11	11	11	46		NAS	1352C04LL4	74455157013					
14	14	14	14	45		NAS	1352C02LL4	74455157006					
8	8	8	8	44		NAS	1352C02LL3	74455157005		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
12	12	12	12	43		NAS	1189C04P6L	74455155010		SCREW, SELF LOCKING, 100° FLAT HEAD			
1	1	1	1	42		MS	35249-11	74455187011		SCREW, 82° FLAT HEAD			
2	2	2	2	41		AN	960-C8	74468051004		WASHER, FLAT, REGULAR			
										SEE SHEET 1 FOR ITEMS 1 THRU 40			

QTY REQD

LIST OF PARTS AND MATERIALS

J G E1 E2 F L K

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900710

DRAWN DATE 7-26-63
CHECKED 8-2-63
APPROVAL 8-2-63
APPROVAL
NASA APPROVAL W. J. Klein
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE II

CODE IDENT NO.
SIZE E
NASA NUMBER 1011890
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 2 OF 2

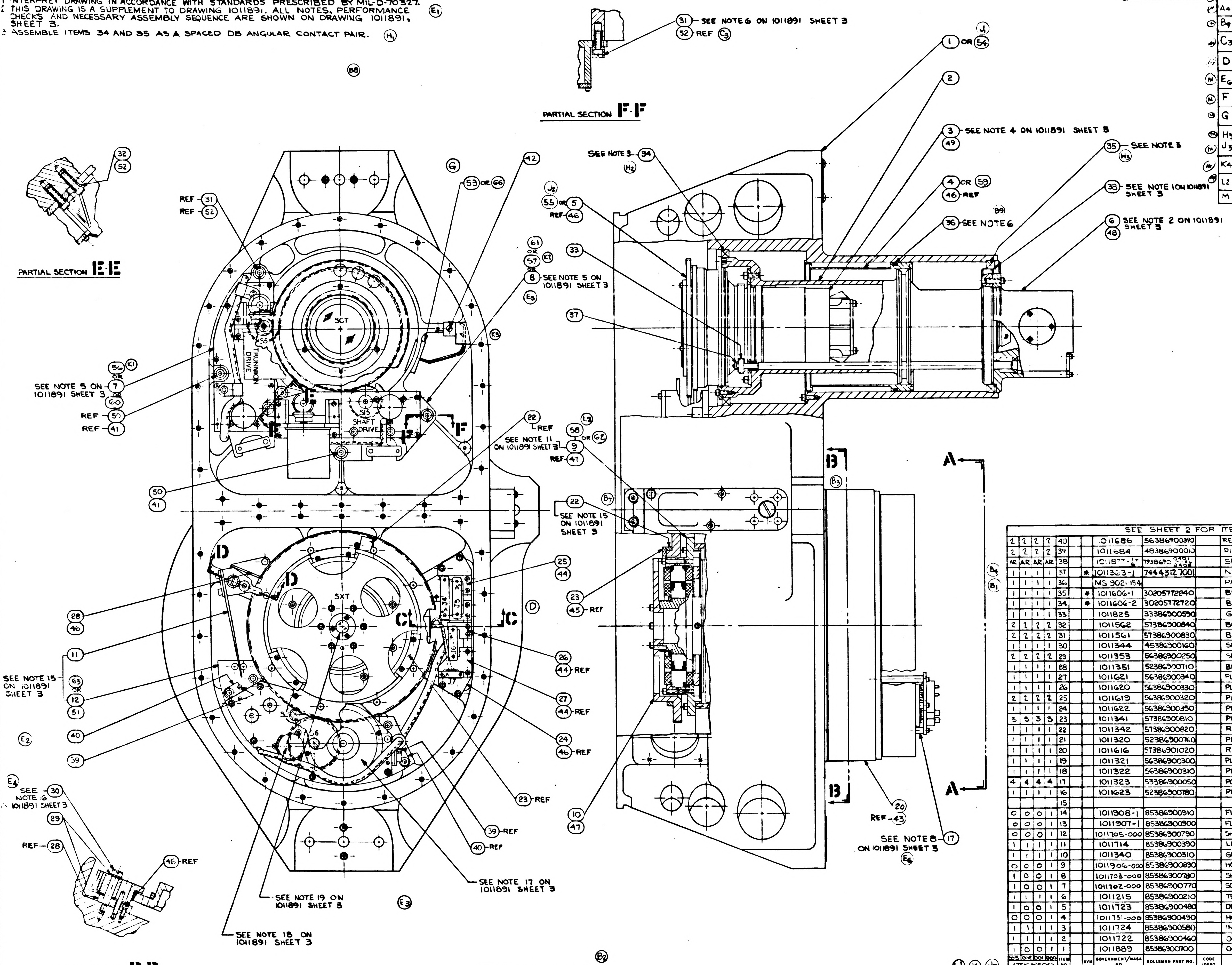
NEXT ASSY	USED ON
1011891	1011000

APPLICATION

NOTES:
1 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2 THIS DRAWING IS A SUPPLEMENT TO DRAWING 1011891. ALL NOTES, PERFORMANCE CHECKS AND NECESSARY ASSEMBLY SEQUENCE ARE SHOWN ON DRAWING 1011891, SHEET 3. (E1)
3 ASSEMBLE ITEMS 34 AND 35 AS A SPACED DB ANGULAR CONTACT PAIR. (H1)

W 0681101

SYM	ZONE	REVISIONS DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO 03061	5-9-63	
B9		REVISED PER TDRR NO. 08040	4-21-64	
C3		REVISED PER TDRR NO. 08459	5/14/64	
D		REVISED PER TDRR NO. 08450	5/ /64	
E6		REVISED PER TDRR NO. 08460	5/ /64	
F		REVISED PER TDRR NO. 08621	/6	
G		REVISED PER TDRR NO. 08622	3/19	
H3		REVISED PER TDRR No. 12852		
J3		REVISED PER TDRR NO. 13451	10/ /64	
K4		REVISED PER TDRR NO. 15548	4/6/65	
L2		REVISED PER TDRR NO. 15861	1/5/65	
M		REVISED PER TDRR No. 16884	2/26/66	



31 SEE NOTE 6 ON 1011891 SHEET 3
52 REF C3
PARTIAL SECTION F-F
1 OR 54
2
3 SEE NOTE 4 ON 1011891 SHEET 3
49
35 SEE NOTE 3 (H3)
SEE NOTE 3 34 (H2)
4 OR 59
46 REF
36 SEE NOTE 6
38 SEE NOTE 1 ON 1011891 SHEET 3
6 SEE NOTE 2 ON 1011891 SHEET 3
48
55 OR 5
REF 46
33
37
32
52
PARTIAL SECTION E-E
REF 31
REF 52
53 OR 66
42
61 OR 57
8 SEE NOTE 5 ON 1011891 SHEET 3
SCT
TRUNNION DRIVE
SHAFT DRIVE
SEE NOTE 5 ON 1011891 SHEET 3 7 OR 60
56
REF 50
REF 41
50
41
22 REF
SEE NOTE 11 ON 1011891 SHEET 3
58 OR 62
9
REF 47
22 SEE NOTE 15 ON 1011891 SHEET 3
A
B
SXT
D
C
28
46
11
SEE NOTE 15 ON 1011891 SHEET 3
63 OR 12
51
40
39
25
44
23
45 REF
26
44 REF
27
44 REF
24
46 REF
23 REF
39 REF
40 REF
10
47
20
REF 43
SEE NOTE 8 ON 1011891 SHEET 3 17
SEE NOTE 6 ON 1011891 SHEET 3 30
29
REF 28
46 REF
SEE NOTE 17 ON 1011891 SHEET 3
SEE NOTE 19 ON 1011891 SHEET 3
SEE NOTE 18 ON 1011891 SHEET 3

PARTIAL SECTION D-D

SHEET 1	SHEET 2
K	K
J	J
H	G
G	G
F	F
E	D
D	D
C	C
B	B
A	A

REVISION STATUS OF SHEETS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

SEE SHEET 2 FOR ITEMS 41 THRU 66

QTY REQD 003	QTY REQD 002	QTY REQD 001	QTY REQD 000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	2	2	2	40			1011686	56386900390		RETAINER, PIN			
2	2	2	2	39			1011684	48386900010		PIN, THREADED			
AR	AR	AR	AR	38			1011877-1T	7938690		SPACER			
1	1	1	1	37		*	1011363-1	74443127001		NUT, HEX, (SELF-LOCKING)			
1	1	1	1	36			MS 9021-154			PACKING, PREFORMED			
1	1	1	1	35		*	1011606-1	30205772240		BEARING, BALL			
1	1	1	1	34		*	1011606-2	30205772720		BEARING, BALL			
1	1	1	1	33			1011825	33386900590		GEAR, SPUR (42T-96P)			
2	2	2	2	32			1011562	57386900840		BUSHING, LOCATING			
2	2	2	2	31			1011561	57386900830		BUSHING, ECCENTRIC			
1	1	1	1	30			1011344	45386900160		SCREW, SHOULDER			
2	2	2	2	29			1011353	56386900250		SPACER, SPRING HOLDER			
1	1	1	1	28			1011351	52386900710		BRACKET, MOUNTING, SPRING HOLDER			
1	1	1	1	27			1011621	56386900340		PLATE, MOUNTING, CONNECTOR			
1	1	1	1	26			1011620	56386900330		PLATE, MOUNTING, CONNECTOR			
2	2	2	2	25			1011619	56386900320		PLATE, MOUNTING, CONNECTOR			
1	1	1	1	24			1011622	56386900350		PLATE, BRIDGE, MOUNTING PLATES			
3	3	3	3	23			1011341	57386900810		PLATE, RETAINING, STOP RING			
1	1	1	1	22			1011342	57386900820		RING, LIMIT STOP			
1	1	1	1	21			1011320	52386900760		PLATE, FLEXPRINT CONDUIT			
1	1	1	1	20			1011616	57386901020		RING, MOUNTING, COVER			
1	1	1	1	19			1011321	56386900300		PLATE, MOUNTING, CONNECTOR			
1	1	1	1	18			1011322	56386900310		PLATE, MOUNTING, CONNECTOR			
4	4	4	4	17			1011323	53386900050		POST, SHOULDERED, THREADED			
1	1	1	1	16			1011623	52386900780		PLATE, FLEXPRINT CONDUIT			
				15									
0	0	0	1	14			1011908-1	85386900910		FLEXPRINT & CONNECTOR, ASSY OF (SX			
0	0	0	1	13			1011907-1	85386900900		FLEXPRINT & CONNECTOR, ASSY OF (SX			
0	0	0	1	12			1011705-000	85386900790		SHAFT DRIVE GEAR BOX, ASSY OF (SX			
1	1	1	1	11			1011714	85386900390		LIMIT STOP ASSY			
1	1	1	1	10			1011340	85386900310		GEAR & PIN, ASSY OF			
0	0	0	1	9			1011906-000	85386900890		HOUSING, STATOR & LAMP, ASSY OF			
1	0	0	1	8			1011703-000	85386900780		SHAFT AXIS DRIVE GEAR BOX			
1	0	0	1	7			1011702-000	85386900770		SCT TRUNNION DRIVE GEARBOX, ASSY OF			
1	1	1	1	6			1011215	85386900210		TELESCOPE TRUNNION AXIS ASSY			
1	0	0	1	5			1011723	85386900480		DRIVE GEAR, CLUSTER ASSY			
0	0	0	1	4			1011731-000	85386900490		HOUSING & LAMP, ASSY OF			
1	1	1	1	3			1011724	85386900580		INNER TELESCOPE TUBE, ASSY OF			
1	1	1	1	2			1011722	85386900460		OUTER TELESCOPE TUBE ASSY			
1	0	0	1	1			1011889	85386900700		OPTICAL UNIT SUBASSY - STAGE I			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900710
DRAWN V. AMATO DATE 7-26-63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

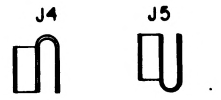
TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE II

CODE IDENT NO. SIZE E NASA NUMBER 1011890
SCALE 1/1 WEIGHT CALC ACTUAL SHEET 1 OF 2

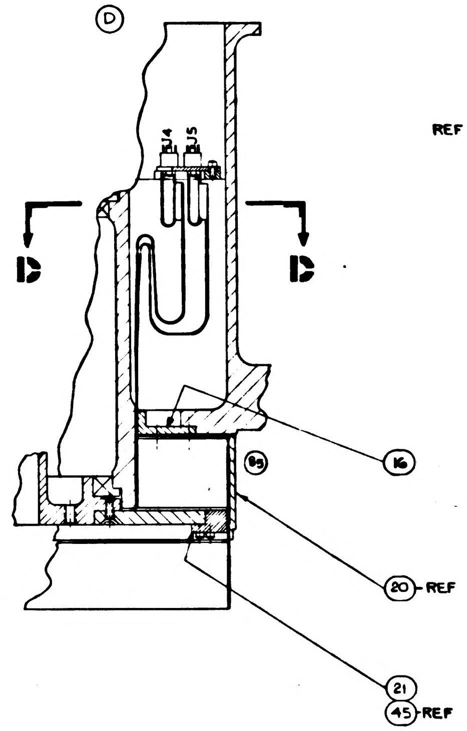
N 0681101

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
△ 4		SEE SHEET #1 TDRR 0366	5-9-63	
B6		REVISED PER TDRR NO. 08040	4-28-64	
C3		REVISED PER TDRR NO. 08459	5/14/64	
D		REVISED PER TDRR NO. 08450	5/12/64	
F		REVISED PER TDRR NO. 08621	5/19/64	
G		REVISED PER TDRR NO. 08622	5/19/64	
J		REVISED PER TDRR No 13451	1/7/64	
K		REVISED PER TDRR NO. 5548	1/4/65	
L		REVISED PER TDRR NO. 15861	4/22/65	
M		REVISED PER TDRR No. 16884	[illegible]	

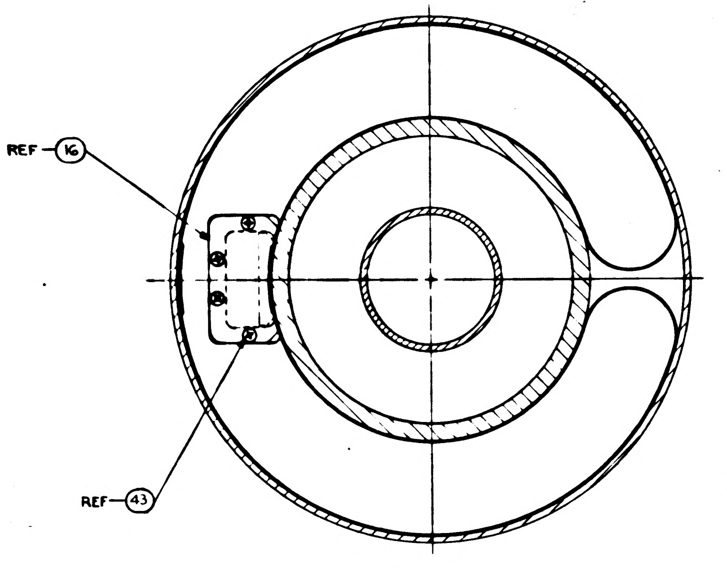
NOTES:
REFER TO SHEET 1



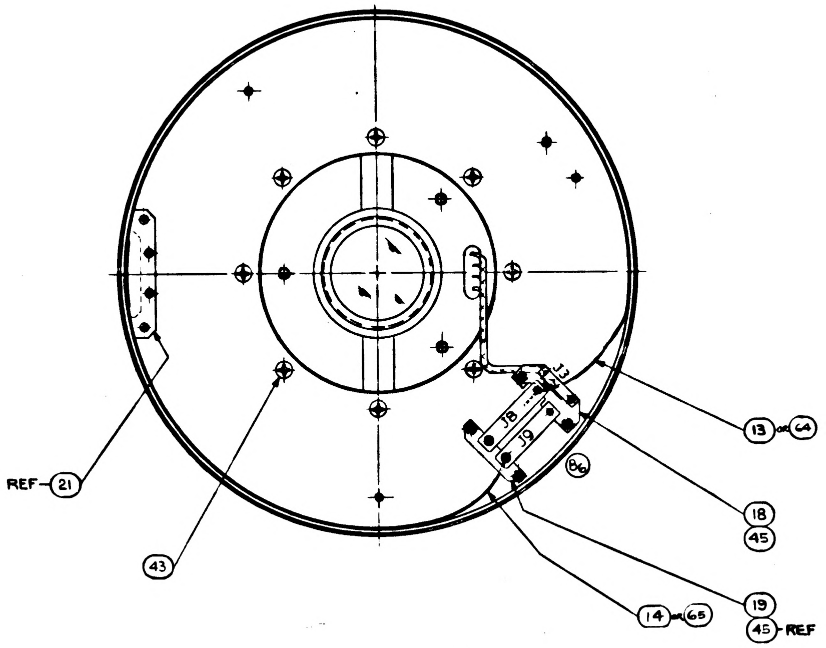
PARTIAL SECTION D-D
SCALE: NONE



PARTIAL SECTION C-C



PARTIAL SECTION B-B



PARTIAL VIEW A-A

	003	002	001	000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
	1	1	1	0	66			1012164-2			GROMMET			
	1	1	1	0	65			1011908-3			FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
	1	1	1	0	64			1011907-2			FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
	1	1	1	0	63			1011705-001			SHAFT DRIVE GEARBOX, ASSY OF (SXT)			
	0	1	1	0	62			1011906-002			HOUSING, STATOR & LAMP, ASSY OF			
	0	0	1	0	61			1011703-002			SHAFT AXIS DRIVE GEAR BOX			
	0	0	1	0	60			1011702-002			SCT TRUNNION DRIVE GEAR BOX ASSY			
	1	1	1	0	59			1011731-001			HOUSING & LAMP, ASSY OF			
	1	0	0	0	58			1011906-001			HOUSING, STAT. & LAMP ASSY			
	0	1	0	0	57			1011703-001			SHAFT AXIS DRIVE GEARBOX SXT			
	0	1	0	0	56			1011702-001			SCT-TRUNNION DRIVE GEARBOX ASSY			
(J)	0	1	1	0	55			1011723-001			DRIVE GEAR CLUSTER ASSEMBLY			
(G)	0	1	1	0	54			1011889-001			OPTICAL UNIT SUBASSY - STAGE I			
(C1)	0	0	0	1	53			1012164-1	26386900080		GROMMET			
(C2)	4	4	4	4	52		NAS	1352C08LL12	74455157029		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
	5	5	5	5	51		NAS	1352C08LL8	74455157027					
	2	2	2	2	50		NAS	1352C08LL6	74455157026					
	4	4	4	4	49		NAS	1352C06LL4	74455157018					
	7	7	7	7	48		NAS	1352C04LL8	74455157015					
	14	14	14	14	47		NAS	1352C04LL6	74455157014					
	11	11	11	11	46		NAS	1352C04LL4	74455157013					
	14	14	14	14	45		NAS	1352C02LL4	74455157006					
	8	8	8	8	44		NAS	1352C02LL3	74455157005		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
	12	12	12	12	43		NAS	1189C04P6L	74455155010		SCREW, SELF LOCKING, 100° FLAT HEAD			
(F)	1	1	1	1	42		MS	35249-11	74455187011		SCREW, 82° FLAT HEAD			
	2	2	2	2	41		AN	960-C8	74468051004		WASHER, FLAT, REGULAR			
											SEE SHEET 1 FOR ITEMS 1 THRU 40			
(L)(K)	QTY REQD													

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900710

DRAWN DATE 7-26-63
CHECKED 8-8-63
APPROVAL 8-13-63
APPROVAL 8-1-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE II

CODE IDENT NO.
SIZE E
NASA NUMBER 1011890
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 2 OF 2

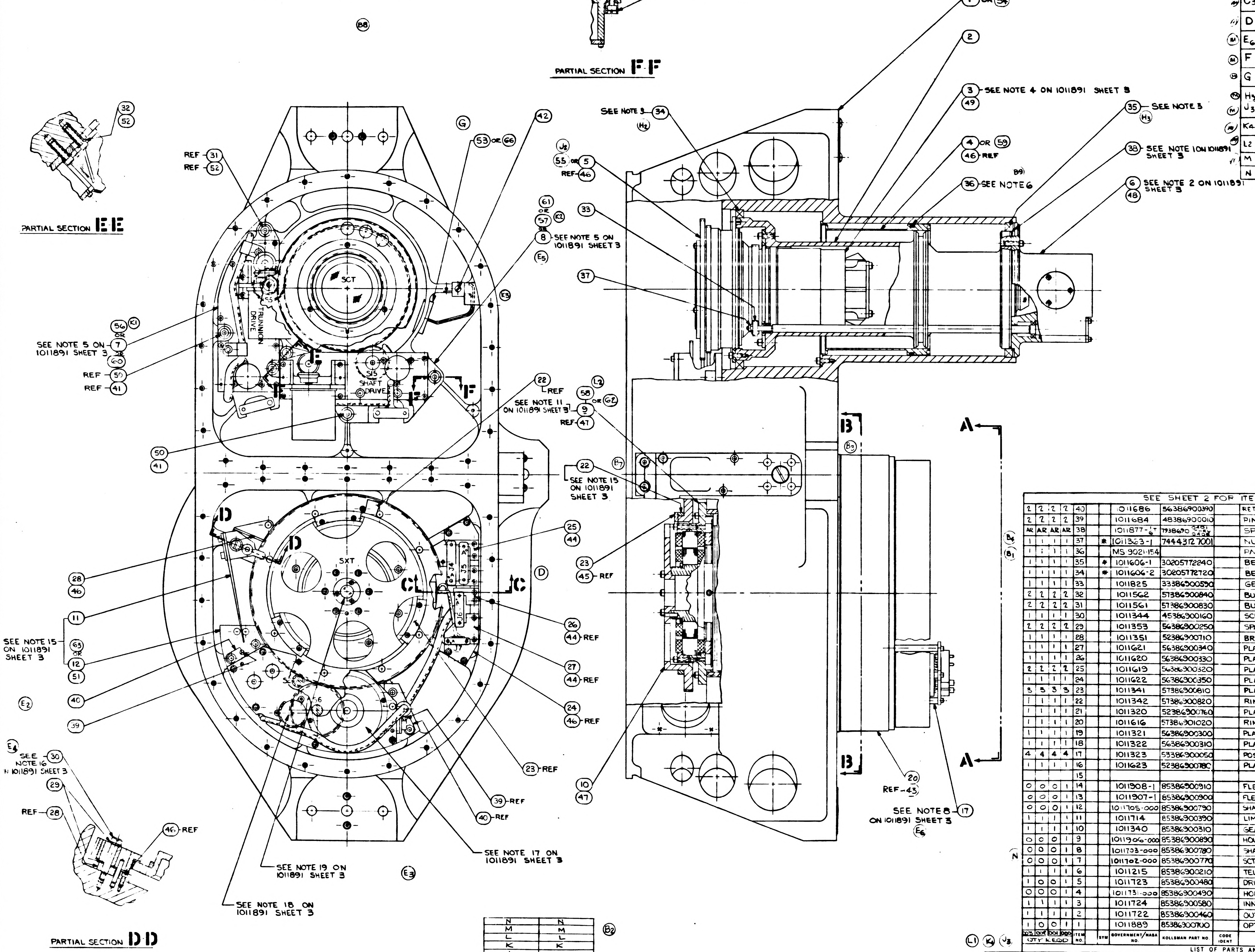
1011890 M

NOTES:

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

THIS DRAWING IS A SUPPLEMENT TO DRAWING 1011891. ALL NOTES, PERFORMANCE CHECKS AND NECESSARY ASSEMBLY SEQUENCE ARE SHOWN ON DRAWING 1011891, SHEET 3. (E1)

ASSEMBLE ITEMS 34 AND 35 AS A SPACED DB ANGULAR CONTACT PAIR. (H1)



PARTIAL SECTION F-F
(31)- SEE NOTE 6 ON 1011891 SHEET 3
(52) REF (C5)
PARTIAL SECTION E-E
(32)
(52)
REF (31)
REF (52)
(53) OR (66)
(42)
(G)
(1) OR (54)
(2)
(3) SEE NOTE 4 ON 1011891 SHEET 3
(49)
SEE NOTE 3 (34)
(55) OR (5)
REF (46)
(33)
(37)
(4) OR (59)
(46) REF
(36) SEE NOTE 6
(35) SEE NOTE 3
(38) SEE NOTE 1 ON 1011891 SHEET 3
(6) SEE NOTE 2 ON 1011891 SHEET 3
(48)
(61) OR (57)
(8) SEE NOTE 5 ON 1011891 SHEET 3
SCT
TRUNNION DRIVE
SHAFT DRIVE
F
(56) OR (7) SEE NOTE 5 ON 1011891 SHEET 3
(60)
REF (59)
REF (41)
(50)
(41)
(22) REF
SEE NOTE 11 ON 1011891 SHEET 3
(58) OR (62)
(9)
REF (47)
(22) SEE NOTE 15 ON 1011891 SHEET 3
B
A
SXT
D
C
(28)
(46)
(11)
SEE NOTE 15 ON 1011891 SHEET 3
(63) OR (12)
(51)
(40)
(39)
(25)
(44)
(23)
(45) REF
(26)
(44) REF
(27)
(44) REF
(24)
(46) REF
(23) REF
(39) REF
(40) REF
(10)
(47)
(20)
REF (43)
SEE NOTE 8 ON 1011891 SHEET 3 (17)
SEE NOTE 16 ON 1011891 SHEET 3 (30)
(29)
REF (28)
(46) REF
SEE NOTE 19 ON 1011891 SHEET 3
SEE NOTE 17 ON 1011891 SHEET 3
SEE NOTE 18 ON 1011891 SHEET 3
PARTIAL SECTION D-D

N	0681101

REVISIONS 32625

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO	5-9-63	
B4		REVISED PER TDRR NO. 08040		
C3		REVISED PER TDRR NO. 08459	5/14/64	
D		REVISED PER TDRR NO. 08450	5/12/64	
E6		REVISED PER TDRR NO. 08460	5/14/64	
F		REVISED PER TDRR NO. 08621	5/19/64	
G		REVISED PER TDRR NO. 08622	5/19/64	
H3		REVISED PER TDRR NO. 12852		
J3		REVISED PER TDRR NO. 13451	10/4/64	
K4		REVISED PER TDRR NO. 15548	1/6/65	
L2		REVISED PER TDRR NO. 15861	1/27/65	
M		REVISED PER TDRR NO. 16884	2/24/65	
N		REVISED PER TDRR NO. 2294	7/24/65	

SEE SHEET 2 FOR ITEMS 41 THRU 66

QTY REQD 003	QTY REQD 002	QTY REQD 001	QTY REQD 000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	2	2	2	40			1011686	56386900390		RETAINER, PIN			
2	2	2	2	39			1011684	48386900010		PIN, THREADED			
AR	AR	AR	AR	38			1011877-1 THRU 6	7938690 2481 THRU 2486		SPACER			
1	1	1	1	37		*	1011363-1	74443127001		NUT, HEX, (SELF-LOCKING)			
1	1	1	1	36			MS 9021-154			PACKING, PREFORMED			
1	1	1	1	35		*	1011606-1	30205772240		BEARING, BALL			
1	1	1	1	34		*	1011606-2	30205772720		BEARING, BALL			
1	1	1	1	33			1011825	33386900590		GEAR, SPUR (42T-96P)			
2	2	2	2	32			1011562	57386900840		BUSHING, LOCATING			
2	2	2	2	31			1011561	57386900830		BUSHING, ECCENTRIC			
1	1	1	1	30			1011344	45386900160		SCREW, SHOULDER			
2	2	2	2	29			1011353	56386900250		SPACER, SPRING HOLDER			
1	1	1	1	28			1011351	52386900710		BRACKET, MOUNTING, SPRING HOLDER			
1	1	1	1	27			1011621	56386900340		PLATE, MOUNTING, CONNECTOR			
1	1	1	1	26			1011620	56386900330		PLATE, MOUNTING, CONNECTOR			
2	2	2	2	25			1011619	56386900320		PLATE, MOUNTING, CONNECTOR			
1	1	1	1	24			1011622	56386900350		PLATE, BRIDGE, MOUNTING PLATES			
3	3	3	3	23			1011341	57386900810		PLATE, RETAINING, STOP RING			
1	1	1	1	22			1011342	57386900820		RING, LIMIT STOP			
1	1	1	1	21			1011320	52386900760		PLATE, FLEXPRINT CONDUIT			
1	1	1	1	20			1011616	57386901020		RING, MOUNTING, COVER			
1	1	1	1	19			1011321	56386900300		PLATE, MOUNTING, CONNECTOR			
1	1	1	1	18			1011322	56386900310		PLATE, MOUNTING, CONNECTOR			
4	4	4	4	17			1011323	53386900050		POST, SHOULDERED, THREADED			
1	1	1	1	16			1011623	52386900780		PLATE, FLEXPRINT CONDUIT			
				15									
0	0	0	1	14			1011908-1	85386900910		FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
0	0	0	1	13			1011907-1	85386900900		FLEXPRINT & CONNECTOR, ASSY OF (SX)			
0	0	0	1	12			1011705-000	85386900790		SHAFT DRIVE GEAR BOX, ASSY OF (SX)			
1	1	1	1	11			1011714	85386900390		LIMIT STOP ASSY			
1	1	1	1	10			1011340	85386900310		GEAR & PIN, ASSY OF			
0	0	0	1	9			1011906-000	85386900890		HOUSING, STATOR & LAMP, ASSY OF			
0	0	0	1	8			1011703-000	85386900780		SHAFT AXIS DRIVE GEAR BOX			
0	0	0	1	7			1011702-000	85386900770		SCT TRUNNION DRIVE GEARBOX, ASSY			
1	1	1	1	6			1011215	85386900210		TELESCOPE TRUNNION AXIS ASSY			
1	0	0	1	5			1011723	85386900480		DRIVE GEAR, CLUSTER ASSY			
0	0	0	1	4			1011731-000	85386900490		HOUSING & LAMP, ASSY OF			
1	1	1	1	3			1011724	85386900580		INNER TELESCOPE TUBE, ASSY OF			
1	1	1	1	2			1011722	85386900460		OUTER TELESCOPE TUBE ASSY			
1	0	0	1	1			1011889	85386900700		OPTICAL UNIT SUBASSY - STAGE I			

LIST OF PARTS AND MATERIALS

(L1) (K4) (J3)

SHEET 1	SHEET 2
N	N
M	M
L	L
K	K
J	J
H	G
G	G
F	F
E	D
D	D
C	C
B	B
A	A

REVISION STATUS OF SHEETS (B2)

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900710
DRAWN V. AMATO DATE 7-26-63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

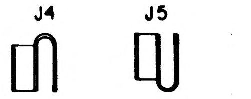
TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE II

CODE IDENT NO.
SIZE E
NASA NUMBER 1011890
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 2

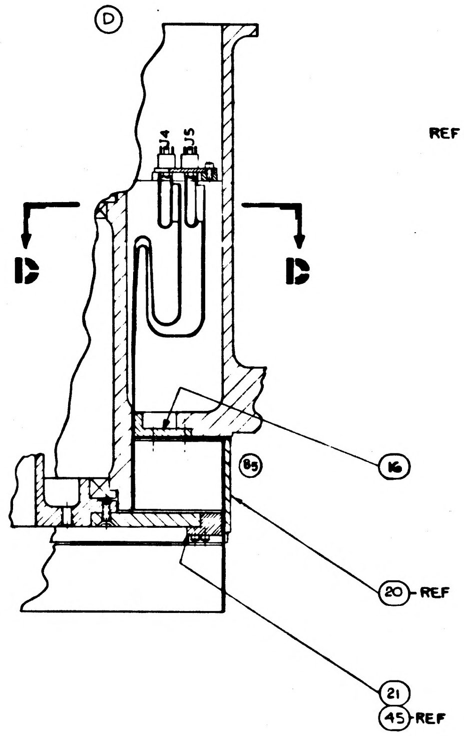
NOTES:
REFER TO SHEET 1

N 0681101

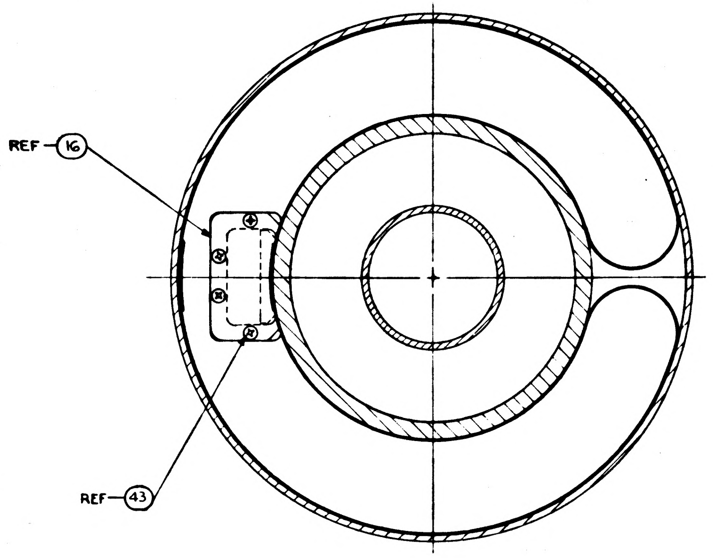
REVISIONS 02625 5-16-67				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A 4		SEE SHEET #1. TDRR C3061	5-9-63	
B6		REVISED PER TDRR NO 08040	4-28-64	
C3		REVISED PER TDRR NO. 08459	3/14/64	
D		REVISED PER TDRR NO. 08450	3/12/64	
F		REVISED PER TDRR NO. 08621	5/19/64	
G		REVISED PER TDRR NO. 08622	5/19/64	
J		REVISED PER TDRR NO. 13451	10/24/64	
K		REVISED PER TDRR NO 15548	1/4/65	
L		REVISED PER TDRR NO. 15861	4/22/65	
M		REVISED PER TDRR No. 6884		
N		REVISED PER TDRR No. 2294	7/30/	



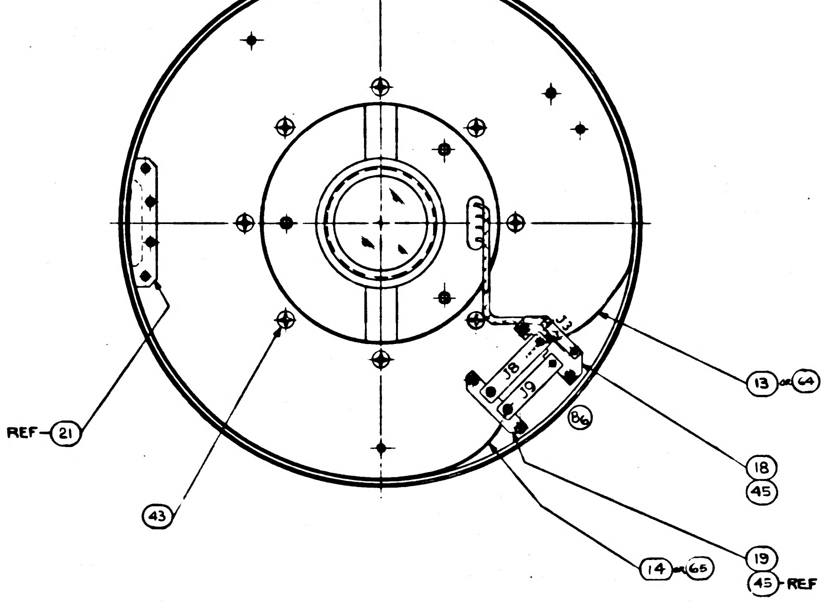
PARTIAL SECTION D-D
SCALE: NONE



PARTIAL SECTION C-C



PARTIAL SECTION B-B



PARTIAL VIEW A-A

003	002	001	000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
1	1	1	0	66			1012164-2			GROMMET			
1	1	1	0	65			1011908-3			FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
1	1	1	0	64			1011907-2			FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
1	1	1	0	63			1011705-001			SHAFT DRIVE GEARBOX, ASSY OF (SXT)			
0	1	1	0	62			1011906-002			HOUSING, STATOR & LAMP ASSY OF			
0	0	1	0	61			1011703-002			SHAFT AXIS DRIVE GEAR BOX			
0	0	1	0	60			1011702-002			SCT TRUNNION DRIVE GEAR BOX ASSY			
1	1	1	0	59			1011731-001			HOUSING & LAMP ASSY OF			
1	0	0	0	58			1011906-001			HOUSING, STAT. & LAMP ASSY			
1	1	0	0	57			1011703-001			SHAFT AXIS DRIVE GEARBOX SXT			
1	1	0	0	56			1011702-001			SCT-TRUNNION DRIVE GEARBOX ASSY			
0	1	1	0	55			1011723-001			DRIVE GEAR CLUSTER ASSEMBLY			
0	1	1	0	54			1011889-001			OPTICAL UNIT SUBASSY - STAGE I			
0	0	0	1	53			1012164-1	26386900080		GROMMET			
4	4	4	4	52		NAS	1352C08LL12	74455157029		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
5	5	5	5	51		NAS	1352C08LL8	74455157027					
2	2	2	2	50		NAS	1352C08LL6	74455157026					
4	4	4	4	49		NAS	1352C06LL4	74455157018					
7	7	7	7	48		NAS	1352C04LL8	74455157015					
14	14	14	14	47		NAS	1352C04LL6	74455157014					
11	11	11	11	46		NAS	1352C04LL4	74455157013					
14	14	14	14	45		NAS	1352C02LL4	74455157006					
8	8	8	8	44		NAS	1352C02LL3	74455157005		SCREW CAP SOCKET HEAD, SELF LOCKING			
12	12	12	12	43		NAS	1189C04P6L	74455155010		SCREW, SELF LOCKING, 100° FLAT HEAD			
1	1	1	1	42		MS	35249-11	74455187011		SCREW, 82° FLAT HEAD			
2	2	2	2	41		AN	960-C8	74468051004		WASHER, FLAT, REGULAR			
										SEE SHEET 1 FOR ITEMS 1 THRU 40			
QTY REQD													

LIST OF PARTS AND MATERIALS

N
J
G
C1
C2
F
L K

1011891	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ -	+ -	+ -

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900710

DRAWN DATE 7-26-63
CHECKED 2-2-63
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

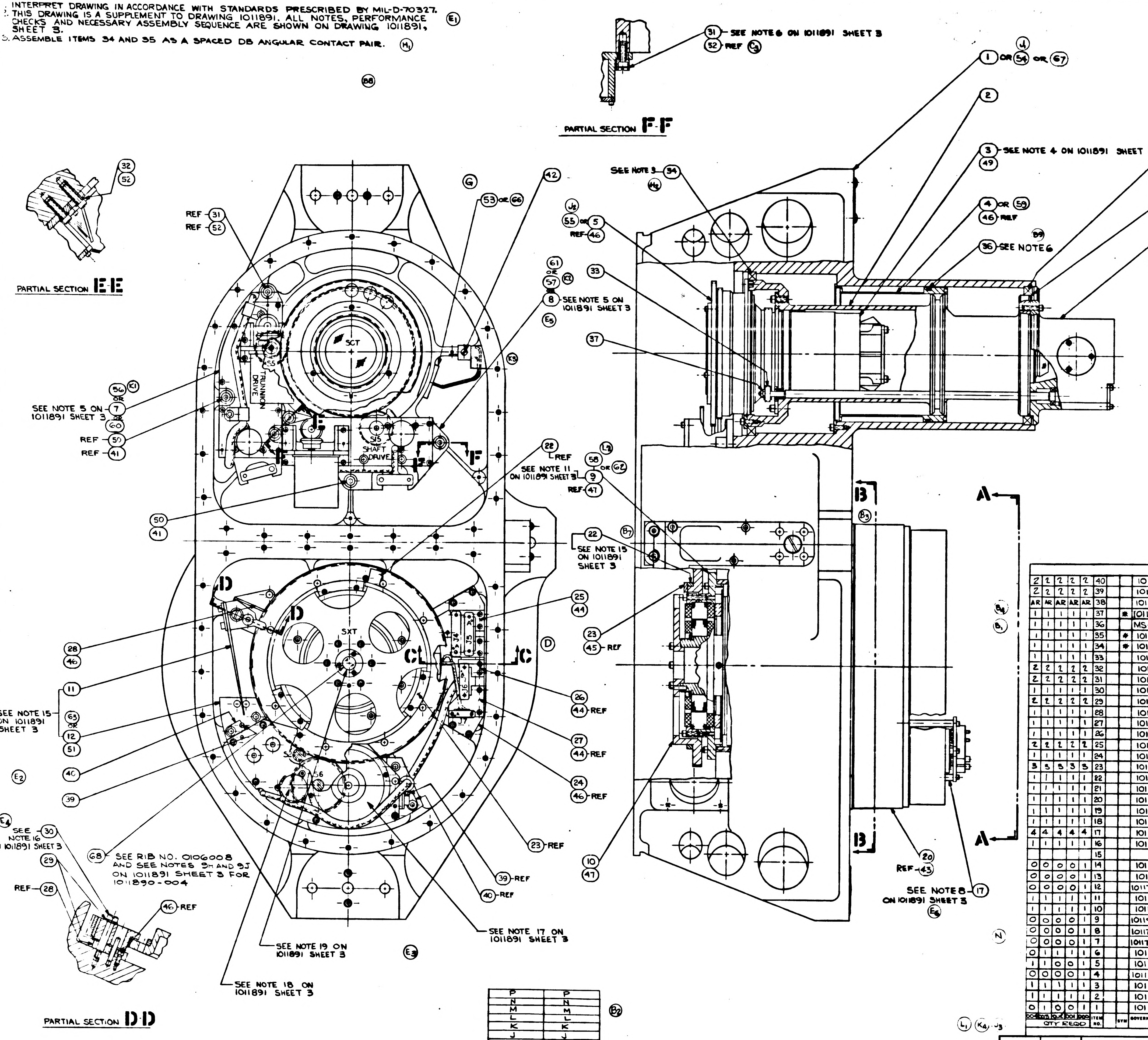
TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE II

CODE IDENT NO.
SIZE E
NASA NUMBER 1011890
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 2 OF 2

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. THIS DRAWING IS A SUPPLEMENT TO DRAWING 1011891. ALL NOTES, PERFORMANCE CHECKS AND NECESSARY ASSEMBLY SEQUENCE ARE SHOWN ON DRAWING 1011891, SHEET 3. (E1)
3. ASSEMBLE ITEMS 34 AND 35 AS A SPACED DB ANGULAR CONTACT PAIR. (H1)

d 0681101

REVISIONS 02625 8-16-63				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO 03061	5-9-63	
B9		REVISED PER TDRR NO. 08040		
C3		REVISED PER TDRR NO. 08459	5/14/64	
D		REVISED PER TDRR NO. 08450		
E6		REVISED PER TDRR NO. 08460		
F		REVISED PER TDRR NO. 08621		
G		REVISED PER TDRR NO. 08622		
H3		REVISED PER TDRR No. 12852		
J3		REVISED PER TDRR NO. 13451		
K4		REVISED PER TDRR NO. 15548		
L2		REVISED PER TDRR NO. 15861		
M		REVISED PER TDRR No. 16884		
N		REVISED PER TDRR No. 21294		
P		REVISED PER TDRR NO 22245	9/6/	


PARTIAL SECTION F-F
31 SEE NOTE 6 ON 1011891 SHEET 3
52 REF C3
PARTIAL SECTION E-E
32
52
REF 31
REF 52
53 OR 66
42
G
1 OR 54 OR 67
2
3 SEE NOTE 4 ON 1011891 SHEET 3
49
SEE NOTE 3 34
35 SEE NOTE 3
38 SEE NOTE 1 ON 1011891 SHEET 3
4 OR 59
46 REF
36 SEE NOTE 6
6 OR 69 SEE NOTE 2 ON 1011891 SHEET 3
48
55 OR 5
REF 46
33
61 OR 57
8 SEE NOTE 5 ON 1011891 SHEET 3
37
SCT
TRUNNION DRIVE
SHAFT DRIVE
SEE NOTE 5 ON 1011891 SHEET 3 7
60
REF 59
REF 41
22 REF
SEE NOTE 11 ON 1011891 SHEET 3
58 OR 62
9
REF 47
50
41
22 SEE NOTE 15 ON 1011891 SHEET 3
B
A
SXT
25
44
23
45 REF
28
46
11
SEE NOTE 15 ON 1011891 SHEET 3
65 OR 12
51
40
39
26
44 REF
27
44 REF
24
46 REF
SEE NOTE 16 ON 1011891 SHEET 3 30
29
REF 28
46 REF
68 SEE RIB NO. 0106008 AND SEE NOTES 9H AND 9J ON 1011891 SHEET 3 FOR 1011890-004
23 REF
39 REF
40 REF
10
47
20
REF 43
SEE NOTE 8 ON 1011891 SHEET 3 17
SEE NOTE 17 ON 1011891 SHEET 3
SEE NOTE 19 ON 1011891 SHEET 3
SEE NOTE 18 ON 1011891 SHEET 3
PARTIAL SECTION D-D

SEE SHEET 2 FOR ITEMS 41 THRU 69														
004	003	002	001	000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
2	2	2	2	2	40			1011686	56386900390		RETAINER, PIN			
2	2	2	2	2	39			1011684	48386900010		PIN, THREADED			
AR	AR	AR	AR	AR	38			1011877-1T 6	7938690 0481 THRU 0488		SPACER			
1	1	1	1	1	37		*	1011363-1	74443127001		NUT, HEX, (SELF-LOCKING)			
1	1	1	1	1	36			MS-9021-154			PACKING, PREFORMED			
1	1	1	1	1	35		*	1011606-1	30205772240		BEARING, BALL			
1	1	1	1	1	34		*	1011606-2	30205772720		BEARING, BALL			
1	1	1	1	1	33			1011825	33386900590		GEAR, SPUR (42T-96P)			
2	2	2	2	2	32			1011562	57386900840		BUSHING, LOCATING			
2	2	2	2	2	31			1011561	57386900830		BUSHING, ECCENTRIC			
1	1	1	1	1	30			1011344	45386900160		SCREW, SHOULDER			
2	2	2	2	2	29			1011353	56386900250		SPACER, SPRING HOLDER			
1	1	1	1	1	28			1011351	52386900710		BRACKET, MOUNTING, SPRING HOLDER			
1	1	1	1	1	27			1011621	56386900340		PLATE, MOUNTING, CONNECTOR			
1	1	1	1	1	26			1011620	56386900330		PLATE, MOUNTING, CONNECTOR			
2	2	2	2	2	25			1011619	56386900320		PLATE, MOUNTING, CONNECTOR			
1	1	1	1	1	24			1011622	56386900350		PLATE, BRIDGE, MOUNTING PLATES			
3	3	3	3	3	23			1011341	57386900810		PLATE, RETAINING, STOP RING			
1	1	1	1	1	22			1011342	57386900820		RING, LIMIT STOP			
1	1	1	1	1	21			1011320	52386900760		PLATE, FLEXPRINT CONDUIT			
1	1	1	1	1	20			1011616	57386901020		RING, MOUNTING, COVER			
1	1	1	1	1	19			1011321	56386900300		PLATE, MOUNTING, CONNECTOR			
1	1	1	1	1	18			1011322	56386900310		PLATE, MOUNTING, CONNECTOR			
4	4	4	4	4	17			1011323	53386900050		POST, SHOULDERED, THREADED			
1	1	1	1	1	16			1011623	52386900780		PLATE, FLEXPRINT CONDUIT			
					15									
0	0	0	0	1	14			1011908-1	85386900910		FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
0	0	0	0	1	13			1011907-1	85386900900		FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
0	0	0	0	1	12			1011705-000	85386900790		SHAFT DRIVE GEAR BOX, ASSY OF (SX)			
1	1	1	1	1	11			1011714	85386900390		LIMIT STOP ASSY			
1	1	1	1	1	10			1011340	85386900310		GEAR & PIN, ASSY OF			
0	0	0	0	1	9			1011906-000	85386900890		HOUSING, STATOR & LAMP, ASSY OF			
0	0	0	0	1	8			1011703-000	85386900780		SHAFT AXIS DRIVE GEAR BOX			
0	0	0	0	1	7			1011702-000	85386900770		SCT TRUNNION DRIVE GEARBOX, ASSY OF			
0	1	1	1	1	6			1011215	85386900210		TELESCOPE TRUNNION AXIS ASSY			
1	1	0	0	1	5			1011723	85386900480		DRIVE GEAR, CLUSTER ASSY			
0	0	0	0	1	4			1011731-000	85386900490		HOUSING & LAMP, ASSY OF			
1	1	1	1	1	3			1011724	85386900580		INNER TELESCOPE TUBE, ASSY OF			
1	1	1	1	1	2			1011722	85386900460		OUTER TELESCOPE TUBE ASSY			
0	1	0	0	1	1			1011889	85386900700		OPTICAL UNIT SUBASSY - STAGE I			

QTY REQD

LIST OF PARTS AND MATERIALS

SHEET 1	SHEET 2
P	P
N	N
M	M
L	L
K	K
J	J
H	G
G	G
F	F
E	D
D	D
C	C
B	B
A	A

REVISION STATUS OF SHEETS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900710
DRAWN V. AMATO DATE 7-26-63
CHECKED
APPROVAL 8-1-63
APPROVAL
NASA APPROVAL 8-7-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE II

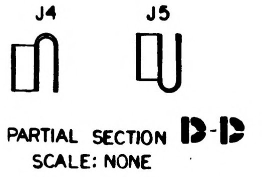
CODE IDENT NO.
SIZE E
NASA NUMBER 1011890
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 2

d 0681101

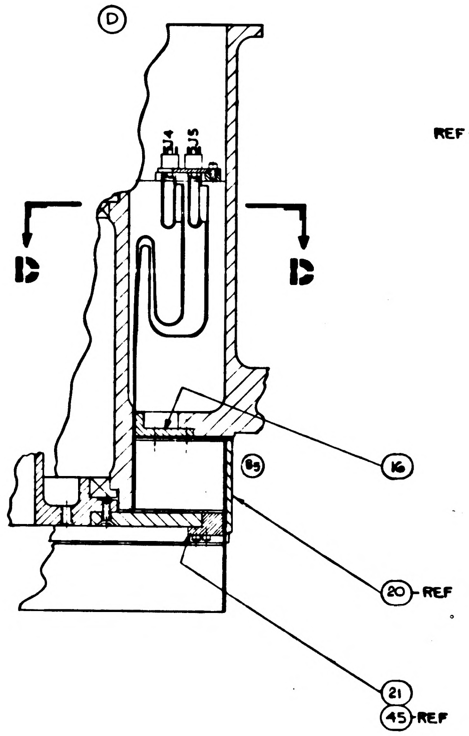
NOTES:
REFER TO SHEET 1

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A 4		SEE SHEET #1 TDRR 03061	5-9-63	
B6		REVISED PER TDRR NO. 08040		
C3		REVISED PER TDRR NO. 08459		
D		REVISED PER TDRR NO. 08450		
F		REVISED PER TDRR NO. 08621		
G		REVISED PER TDRR NO. 08622		
J		REVISED PER TDRR No. 13451		
K		REVISED PER TDRR NO. 15548	1/4/65	
L		REVISED PER TDRR NO. 15861	4/22/65	
M		REVISED PER TDRR No. 16884		
N		REVISED PER TDRR No. 21294		
P		REVISED PER TDRR No. 22245		

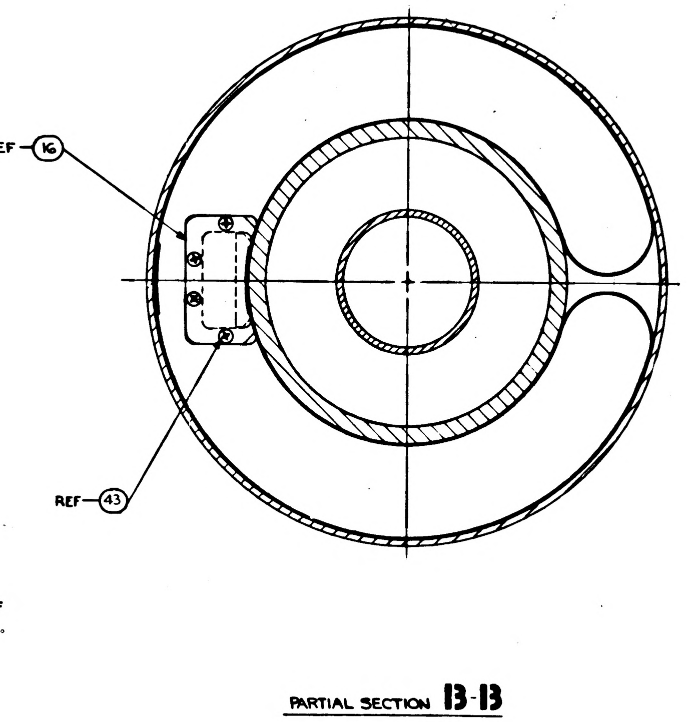
REVISIONS 02625 9-16-63



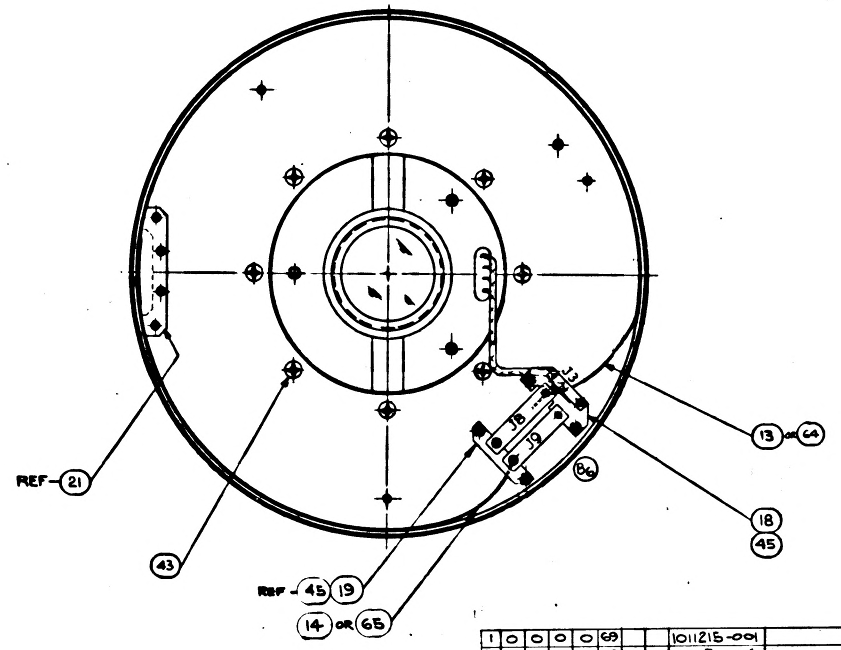
PARTIAL SECTION D-D
SCALE: NONE



PARTIAL SECTION C-C



PARTIAL SECTION B-B



PARTIAL VIEW A-A

QTY REQD 004	003	002	001	000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
1	0	0	0	0	69			1011215-001			TELESCOPE TRUNNION AXIS ASSY			
AR	0	0	0	0	68			1013004			SHIM			
1	0	0	0	0	67			1011889-002			OPTICAL UNIT SUB ASSY STAGE I			
1	1	1	1	0	66			1012164-2			GROMMET			
1	1	1	1	0	65			1011908-3			FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
1	1	1	1	0	64			1011907-2			FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
1	1	1	1	0	63			1011705-001			SHAFT DRIVE GEARBOX, ASSY OF (SXT)			
0	0	1	1	0	62			1011906-002			HOUSING, STATOR & LAMP, ASSY OF			
0	0	0	1	0	61			1011703-002			SHAFT AXIS DRIVE GEAR BOX			
0	0	0	1	0	60			1011702-002			SCT TRUNNION DRIVE GEAR BOX ASSY			
1	1	1	1	0	59			1011731-001			HOUSING & LAMP, ASSY OF			
1	1	0	0	0	58			1011906-001			HOUSING, STAT. & LAMP ASSY			
1	1	1	0	0	57			1011703-001			SHAFT AXIS DRIVE GEARBOX SXT			
1	1	1	0	0	56			1011702-001			SCT-TRUNNION DRIVE GEARBOX ASSY			
0	0	1	1	0	55			1011723-001			DRIVE GEAR CLUSTER ASSEMBLY			
0	0	1	1	0	54			1011889-001			OPTICAL UNIT SUBASSY - STAGE I			
0	0	0	0	1	53			1012164-1	26386900080		GROMMET			
4	4	4	4	4	52		NAS	1352C08LL12	74455157029		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
5	5	5	5	5	51		NAS	1352C08LL8	74455157027					
2	2	2	2	2	50		NAS	1352C08LL6	74455157026					
4	4	4	4	4	49		NAS	1352C06LL4	74455157018					
7	7	7	7	7	48		NAS	1352C04LL8	74455157015					
14	14	14	14	14	47		NAS	1352C04LL6	74455157014					
11	11	11	11	11	46		NAS	1352C04LL4	74455157013					
14	14	14	14	14	45		NAS	1352C02LL4	74455157006					
8	8	8	8	8	44		NAS	1352C02LL3	74455157005		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
12	12	12	12	12	43		NAS	1189C04P6L	74455155010		SCREW, SELF LOCKING, 100° FLAT HEAD			
1	1	1	1	1	42		MS	35249-11	74455187011		SCREW, 82° FLAT HEAD			
2	2	2	2	2	41		AN	960-C8	74468051004		WASHER, FLAT, REGULAR			
											SEE SHEET 1 FOR ITEMS 1 THRU 40			

LIST OF PARTS AND MATERIALS

N
J
G
E1
E2
F
L K

1011891	1011003
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900710
DRAWN DATE 7-26-63
CHECKED 8-8-63
APPROVAL 8-13-63
APPROVAL 8-14-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY STAGE II

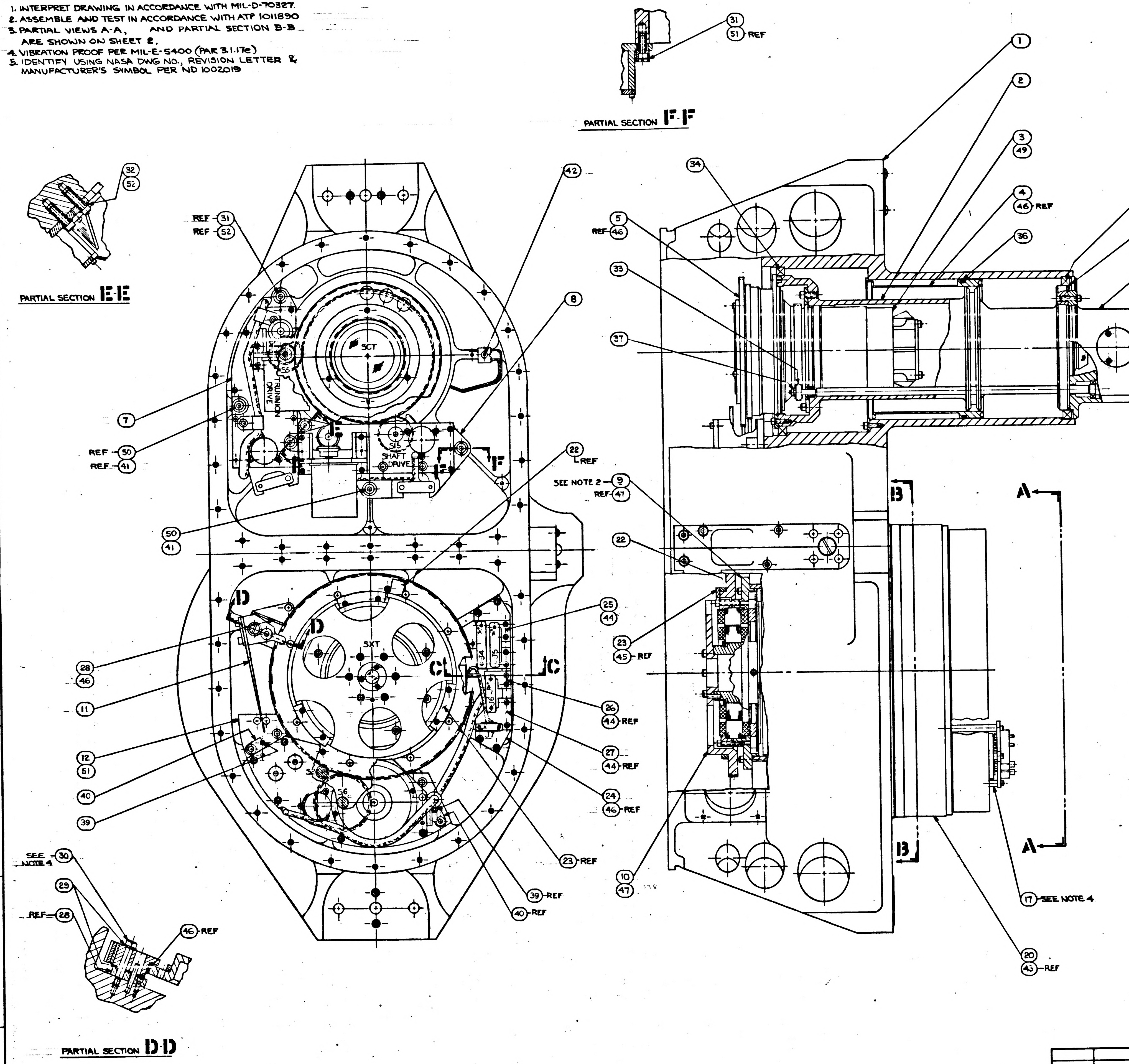
CODE IDENT NO.
SIZE E
NASA NUMBER 1011890
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 2 OF 2

0681101

REVISIONS 02625 8-16-63

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLE AND TEST IN ACCORDANCE WITH ATP 1011890
3. PARTIAL VIEWS A-A, AND PARTIAL SECTION B-B ARE SHOWN ON SHEET 2.
4. VIBRATION PROOF PER MIL-E-5400 (PAR 3.1.17e)
5. IDENTIFY USING NASA DWG NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019


PARTIAL SECTION F-F
31
51 REF
PARTIAL SECTION E-E
32
52
PARTIAL SECTION D-D
SEE NOTE 4 30
29
REF 28
46 REF
REF 31
REF 52
42
8
7
REF 50
REF 41
50
41
SCT
S5
TRUNNION DRIVE
S15
SHAFT DRIVE
F
22 REF
SEE NOTE 2 9
REF 47
D
SXT
C
J4
J5
J6
J7
S6
28
46
11
12
51
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39
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44
26
44 REF
27
44 REF
24
46 REF
23 REF
39 REF
40 REF
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49
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46 REF
36
35
38
6
48
34
5
REF 46
33
37
22
23
45 REF
10
47
B
A
17 SEE NOTE 4
20
43 REF

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

SEE SHEET 2 FOR ITEMS 41 THRU 52

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
40	2		1011686	56386900390		RETAINER, PIN			
39	2		1011684	48386900010		PIN, THREADED			
38	AR		1011877-1T/6	7938690 0481 THRU 0496		SPACER			
37	1	AN	365D-640			NUT, HEX, (SELF-LOCKING)			
36	1	*	1011768-44	74453044304		PACKING, PREFORMED			
35	1	*	1011606-1	30205772240		BEARING, BALL			
34	1	*	1011606-2	30205772720		BEARING, BALL			
33	1		1011825	33386900590		GEAR, SPUR (42T-96P)			
32	2		1011562	57386900840		BUSHING, LOCATING			
31	2		1011561	57386900830		BUSHING, ECCENTRIC			
30	1		1011344	45386900160		SCREW, SHOULDER			
29	2		1011353	56386900250		SPACER, SPRING HOLDER			
28	1		1011351	52386900710		BRACKET, MOUNTING, SPRING HOLDER			
27	1		1011621	56386900340		PLATE, MOUNTING, CONNECTOR			
26	1		1011620	56386900330		PLATE, MOUNTING, CONNECTOR			
25	2		1011619	56386900320		PLATE, MOUNTING, CONNECTOR			
24	1		1011622	56386900350		PLATE, BRIDGE, MOUNTING PLATES			
23	3		1011341	57386900810		PLATE, RETAINING, STOP RING			
22	1		1011342	57386900820		RING, LIMIT STOP			
21	1		1011320	52386900760		PLATE, FLEXPRINT CONDUIT			
20	1		1011616	57386901020		RING, MOUNTING, COVER			
19	1		1011321	56386900300		PLATE, MOUNTING, CONNECTOR			
18	1		1011322	56386900310		PLATE, MOUNTING, CONNECTOR			
17	4		1011323	53386900050		POST, SHOULDERED, THREADED			
16	1		1011623	52386900780		PLATE, FLEXPRINT CONDUIT			
15									
14	1		1011908	85386900910		FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
13	1		1011907	85386900900		FLEXPRINT & CONNECTOR, ASSY OF (SXT)			
12	1		1011912	85386900990		SHAFT DRIVE GEAR BOX & HARNESS ASSY (SXT)			
11	1		1011714	85386900390		LIMIT STOP ASSY			
10	1		1011340	85386900310		GEAR & PIN, ASSY OF			
9	1		1011906	85386900890		HOUSING, STATOR & LAMP, ASSY OF			
8	1		1011902	85386900860		SHAFT AXIS DRIVE GEAR BOX WIRING ASSY			
7	1		1011899	85386900830		SCT TRUNNION DRIVE GEARBOX & HARN. ASSY OF			
6	1		1011215	85386900210		TELESCOPE TRUNNION AXIS ASSY			
5	1		1011723	85386900480		DRIVE GEAR, CLUSTER ASSY			
4	1		1011731	85386900490		HOUSING & LAMP, ASSY OF			
3	1		1011724	85386900580		INNER TELESCOPE TUBE, ASSY OF			
2	1		1011722	85386900460		OUTER TELESCOPE TUBE ASSY			
1	1		1011889	85386900700		OPTICAL UNIT SUBASSY - STAGE I			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS + − DECIMALS + − ANGLES + −
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900710
DRAWN V. AMATO DATE 7-26-63
CHECKED 6-8-63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE II

CODE IDENT NO.
SIZE E
NASA NUMBER 1011890
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 2

1011890

MASTER

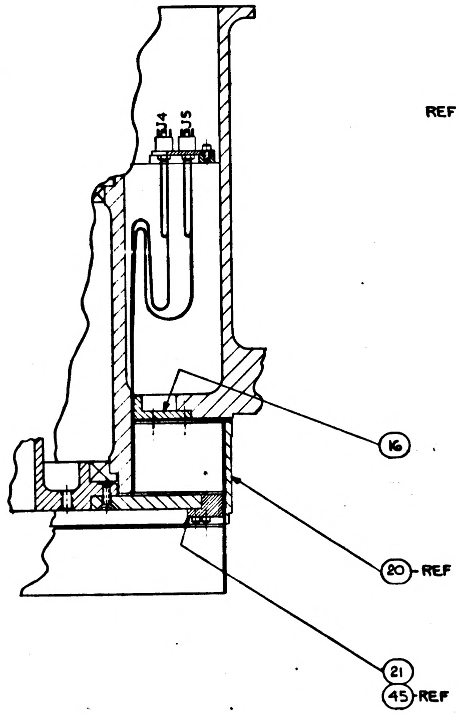
INCHES
PHOTOGRAPHIC SCALE ONLY

0681101

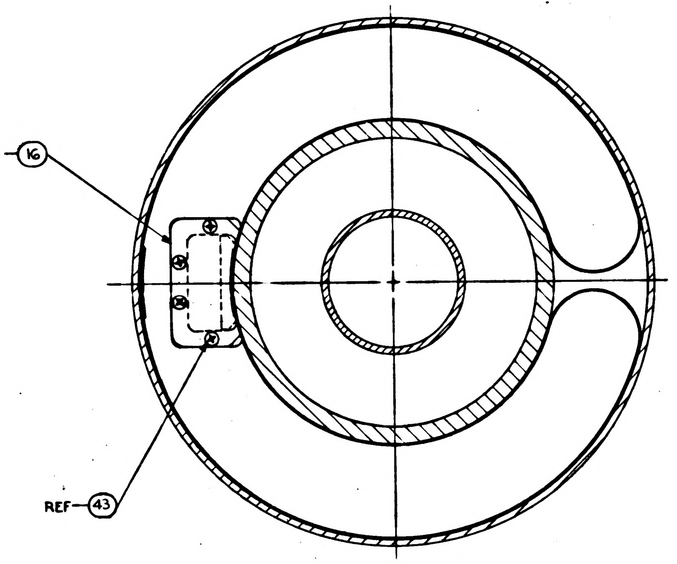
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REVISIONS 02625 8-16-63

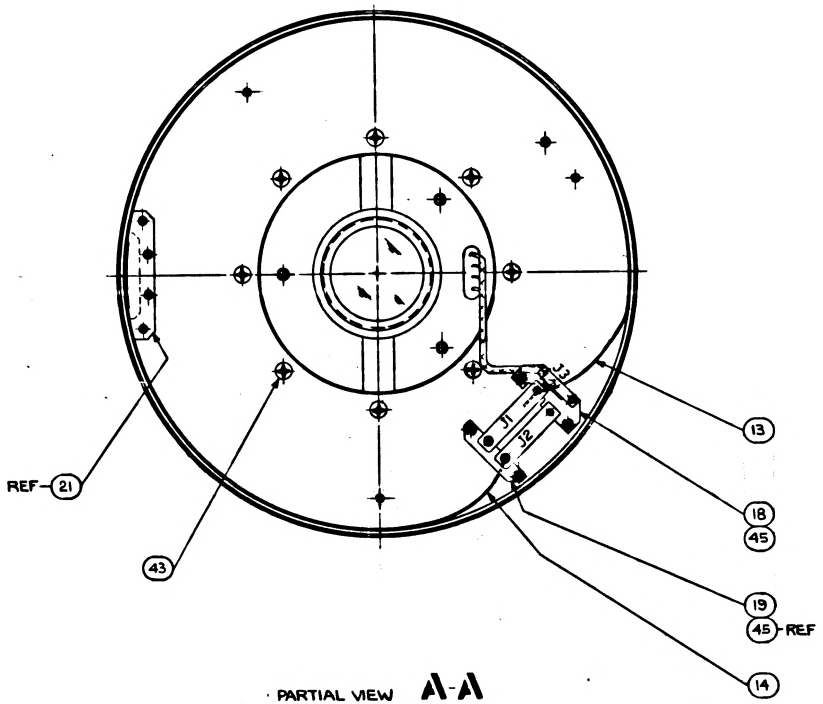
NOTES:
REFER TO SHEET 1



PARTIAL SECTION C-C



PARTIAL SECTION B-B



PARTIAL VIEW A-A

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
52	2	NAS	1352C08LL12	74455157029		SCREW, CAP, SOCKET HEAD, SELF LOCKING			
51	6	NAS	1352C08LL8	74455157027					
50	2	NAS	1352C08LL6	74455157026					
49	4	NAS	1352C06LL4	74455157018					
48	7	NAS	1352C04LL8	74455157015					
47	14	NAS	1352C04LL6	74455157014					
46	11	NAS	1352C04LL4	74455157013					
45	14	NAS	1352C02LL4	74455157006					
44	8	NAS	1352C02LL3	74455157005		SCREW, CAP. SOCKET HEAD, SELF LOCKING			
43	12	NAS	1189C04P6L	74455155010		SCREW, SELF LOCKING, 100° FLAT HEAD			
42	1	NAS	1189C02P4L	74455155002		SCREW, SELF LOCKING, 100° FLAT HEAD			
41	2	AN	960-C8	74468051004		WASHER, FLAT, REGULAR			
						SEE SHEET 1 FOR ITEMS 1 THRU 40			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900710
DRAWN DATE 7-26-63
CHECKED 8-8-63
APPROVAL 8-13-63
APPROVAL 8-14-63
NASA APPROVAL W. J. 63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE II

CODE IDENT NO.
SIZE E
NASA NUMBER 1011890
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 2 OF 2

1011890

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLE AND TEST IN ACCORDANCE WITH A.T.P 1011891.
3. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019

A 1681101

REVISIONS 02625 8-16-63

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
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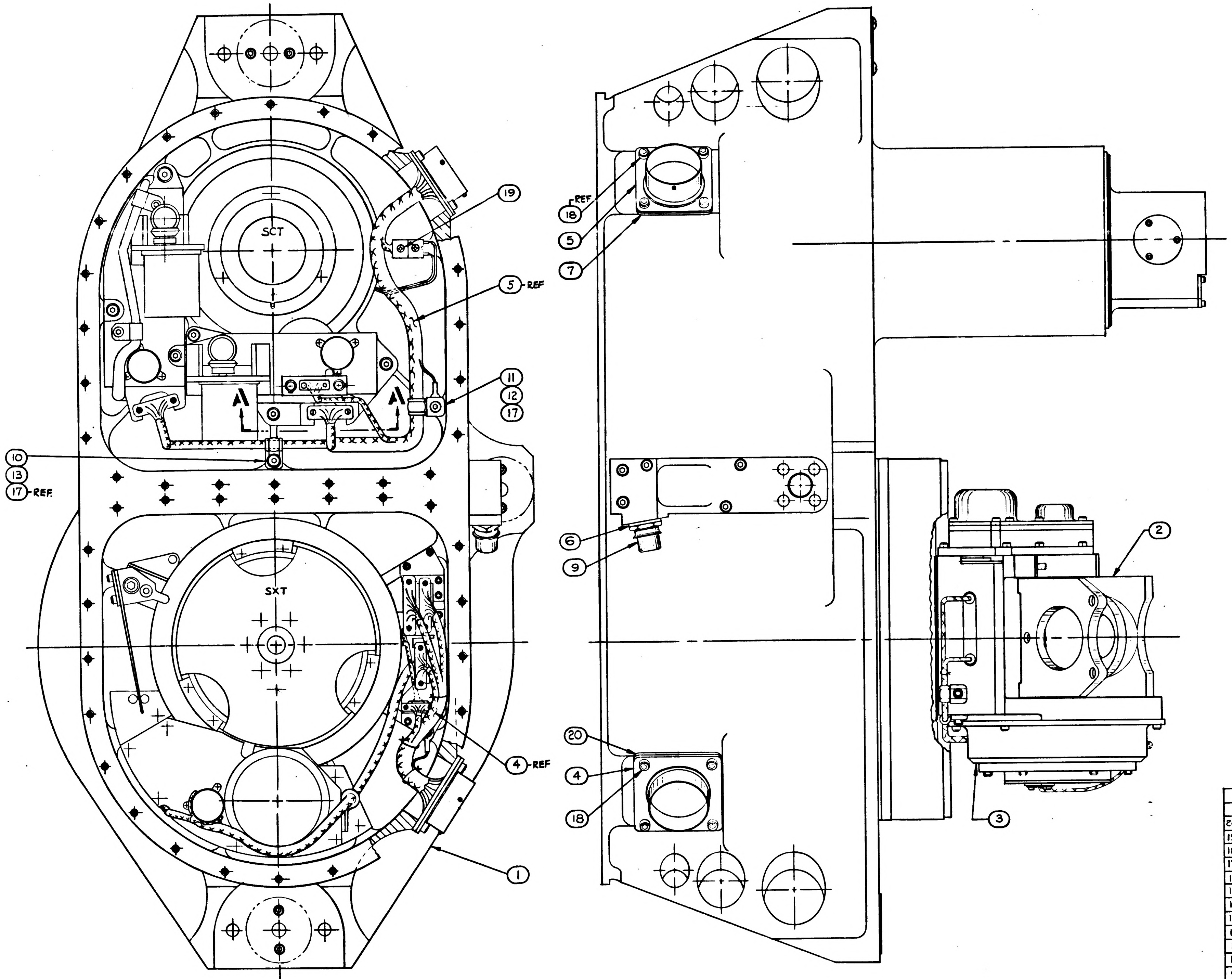
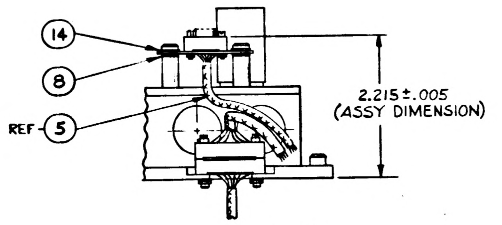




PARTIAL SECTION A-A

A	A
SHEET 1	SHEET 2

REVISION STATUS OF SHEETS

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
20	1	*	1011599-10	74453034010		PACKING, PREFORMED, RETAINED			
19	1		NAS1189C02P4L	74455155002		SCREW, SELF LOCKING, 100° FLAT HEAD			
18	8		NAS1352C06LL5	74455157018		SCREW, CAP, SOC. HEAD, SELF LOCKING			
17	2		NAS1352C06LL6	74455157019		SCREW, CAP, SOC. HEAD, SELF LOCKING			
16	1		NAS1351C3LL10	74455156040		SCREW, CAP, SOC. HEAD, SELF LOCKING			
15	3		NAS1351C3LL12	74455156041		SCREW, CAP, SOC. HEAD, SELF LOCKING			
14	2		MS16624-15			RING, RETAINING, EXTERNAL, BASIC			
13	1		MS15795-305			WASHER, FLAT			
12	1	*	1011918-2			WASHER, CABLE CLAMP			
11	1	*	1000220-6			CLAMP, CABLE			
10	1	*	1000220-4			CLAMP, CABLE			
9	1	*	1000135			COUPLING HALF, QUICK DISCONNECT (SCD)			
8	AR		1011885	45386900170		SHIM			
7	1	*	1011599-9	74453034009		PACKING, PREFORMED, RETAINED			
6	1	*	1011597-13	74453033013		PACKING, PREFORMED, RETAINED			
5	1		1011713	80386900020		SCT BASE HARNESS ASSY			
4	1		1011896	80386900030		SXT BASE HARNESS ASSY			
3	1		1011909	85386900920		RESOLVER AND CONNECTOR ASSY OF			
2	1		1011701	85386900760		SEXTANT INDEX HEAD ASSY			
1	1		1011890	85386900710		OPTICAL UNIT SUBASSY - STAGE II			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 386900720

DRAWN T. Borsato DATE 7-9-63
CHECKED 8-2-63
APPROVAL 8-13-63
APPROVAL Swaco 8-15-63
NASA APPROVAL W.J. Kline 8-16-63
MIT APPROVAL 16 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

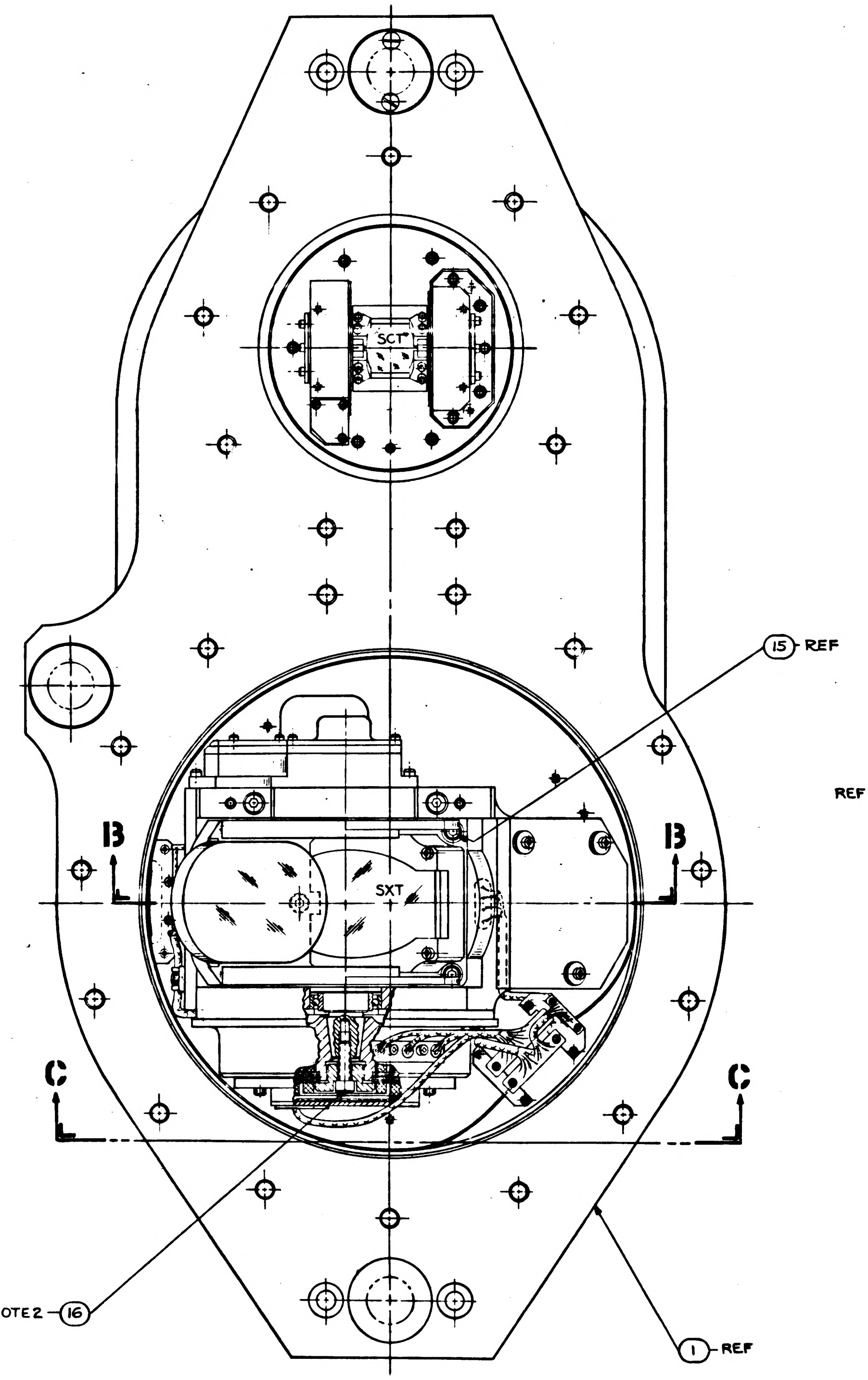
TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE II

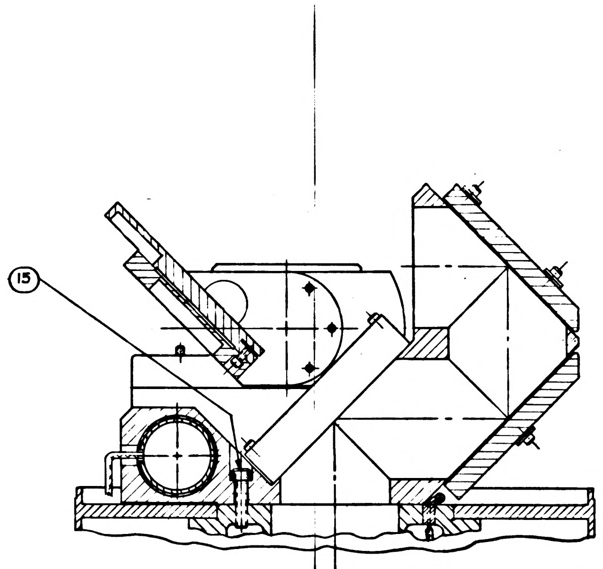
CODE IDENT NO.
SIZE E
NASA NUMBER 1011891
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 2

NOTES:
SEE SHEET 1 OF 2.

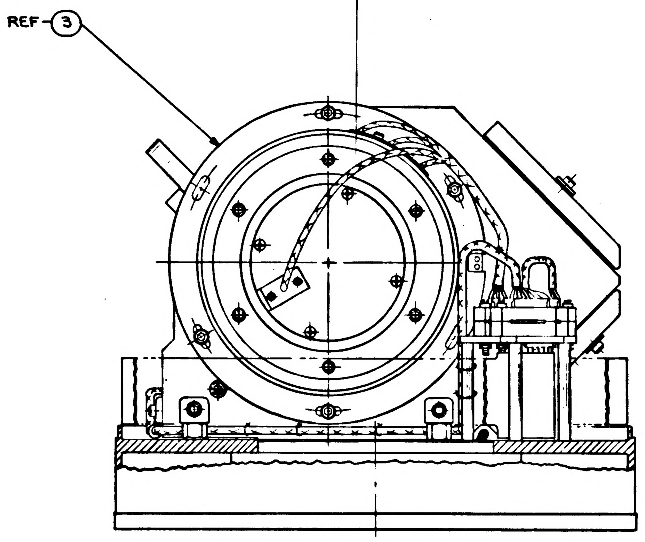
A 1011891

REVISIONS 02625 8-16-63				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		SEE SHEET NO. 1 TDRR 03812	10 Oct 63	GK





PARTIAL SECTION B-B



PARTIAL VIEW C-C

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900720
DRAWN Borowski DATE 7-9-63
CHECKED 8-12-63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL W.J. 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE III

CODE IDENT NO.
SIZE E
NASA NUMBER 1011891
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 2 OF

1011891

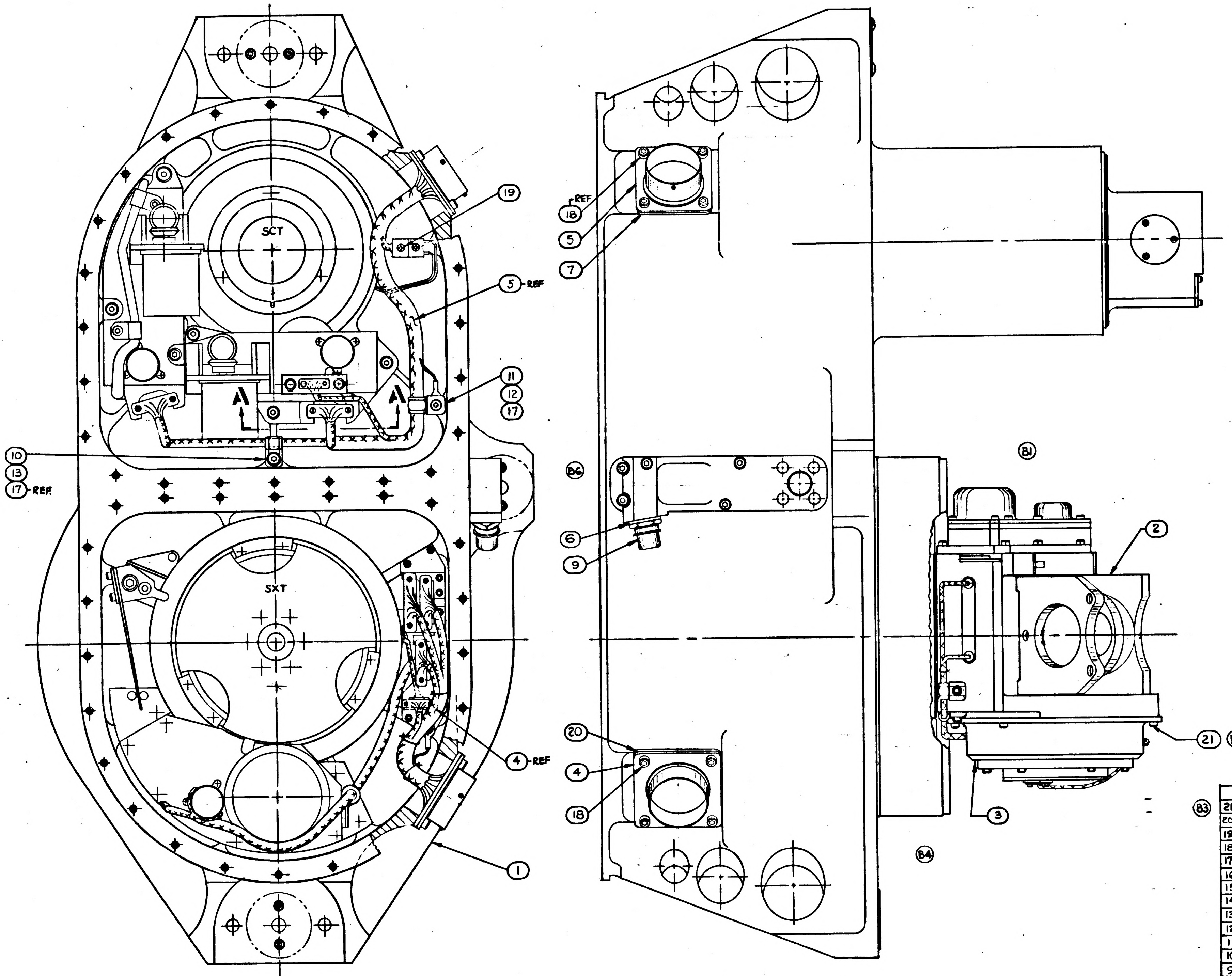
INCHES
PHOTOGRAPHIC SCALE ONLY

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLE AND TEST IN ACCORDANCE WITH A.T.P 1011891.
3. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019

B	1681101

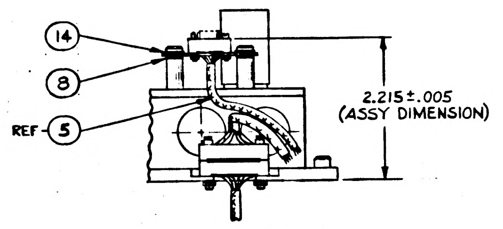
REVISIONS 02625 8-16-63

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO. 03812	10 Oct 63	WK
B6		REVISED PER TDRR NO. 06505	25 FEB 64	WK



B	B
SHEET 1	SHEET 2

REVISION STATUS OF SHEETS



PARTIAL SECTION A-A

MASTER

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
21	4		NAS1352C04LL4	74455157013		SCREW, CAP, SOC. HD. SELF LOCKING			
20	1	*	1011599-10	74453034010		PACKING, PREFORMED, RETAINED			
19	1		NAS1189C02P4L	74455155002		SCREW, SELF LOCKING, 100° FLAT HEAD			
18	8		NAS1352C06LL5	7445515 7018		SCREW, CAP, SOC. HEAD, SELF LOCKING			
17	2		NAS1352C06LL6	7445515 7019		SCREW, CAP, SOC. HEAD, SELF LOCKING			
16	1		NAS1351C3LL10	7445515 6040		SCREW, CAP, SOC. HEAD, SELF LOCKING			
15	3		NAS1351C3LL12	7445515 6041		SCREW, CAP, SOC. HEAD, SELF LOCKING			
14	2		MS16624-15			RING, RETAINING, EXTERNAL, BASIC			
13	1		MS15795-305			WASHER, FLAT			
12	1	*	1011918-2			WASHER, CABLE CLAMP			
11	1	*	1000220-6			CLAMP, CABLE			
10	1	*	1000220-4			CLAMP, CABLE			
9	1	*	1000135			COUPLING HALF, QUICK DISCONNECT (SCD)			
8	AR		1011885	45386900170		SHIM			
7	1	*	1011599-9	74453034009		PACKING, PREFORMED, RETAINED			
6	1	*	1011597-13	74453033013		PACKING, PREFORMED, RETAINED			
5	1		1011713	80386900020		SCT BASE HARNESS ASSY			
4	1		1011896	80386900030		SXT BASE HARNESS ASSY			
3	1		1011909	85386900920		RESOLVER AND CONNECTOR ASSY OF			
2	1		1011701	85386900760		SEXTANT INDEX HEAD ASSY			
1	1		1011890	85386900710		OPTICAL UNIT SUBASSY - STAGE II			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 38690 0720

DRAWN DATE 7-9-63
CHECKED 8-12-63
APPROVAL 8-13-63
APPROVAL Siraco 8-15-63
NASA APPROVAL W.J. 8-19-63
MIT APPROVAL 16 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE III

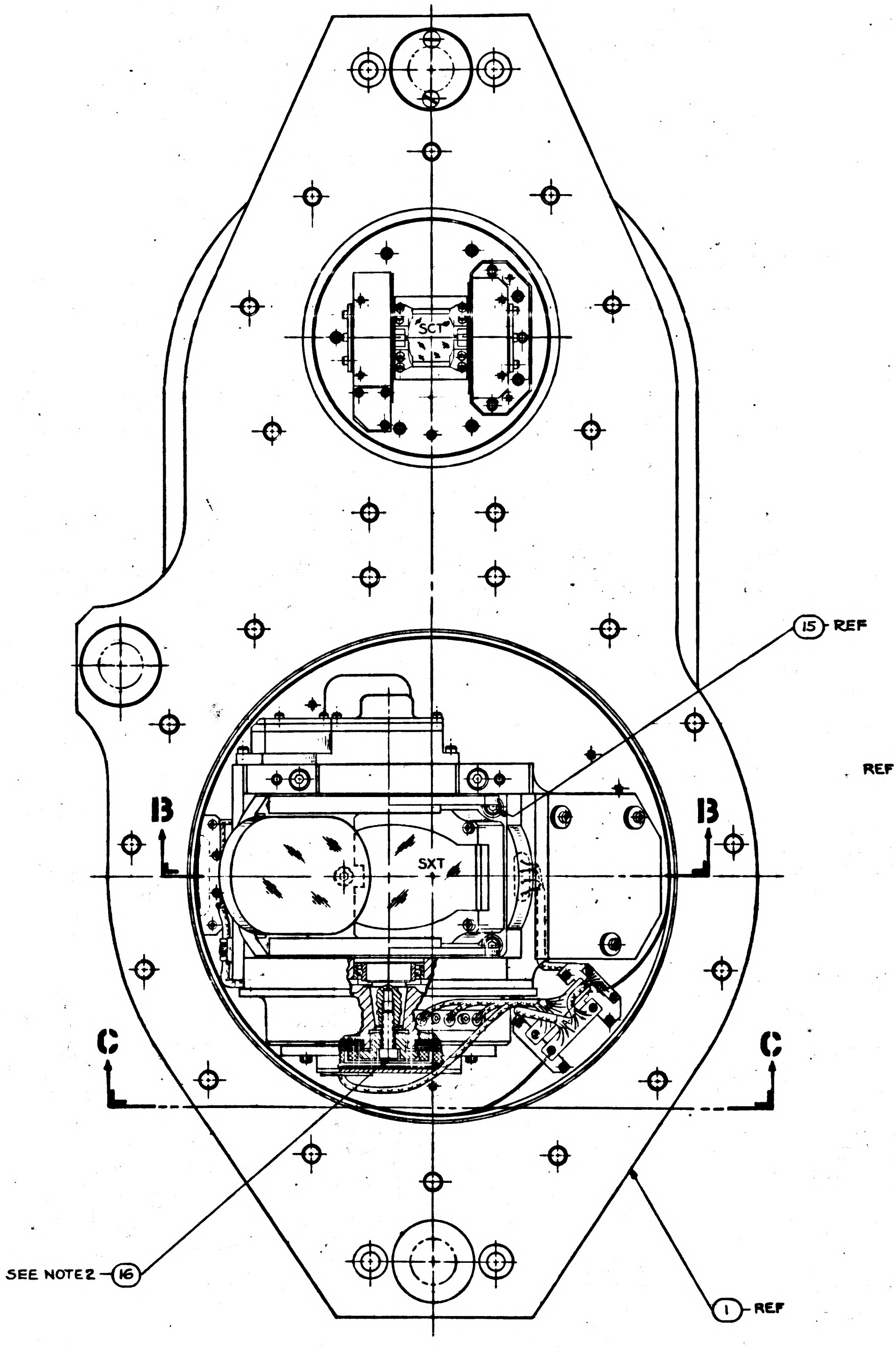
CODE IDENT NO.
SIZE E
NASA NUMBER 1011891
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET OF 2

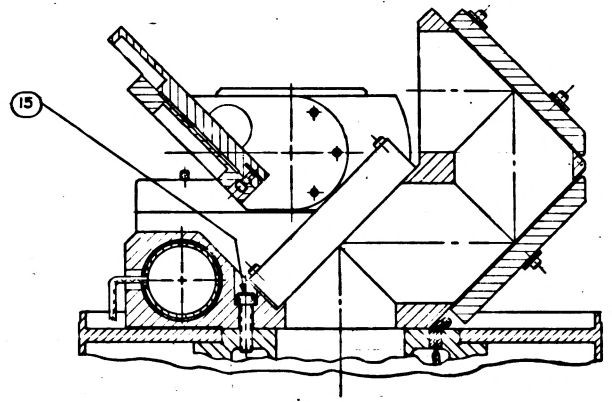
B	1681101

REVISIONS 02625 8-16-67

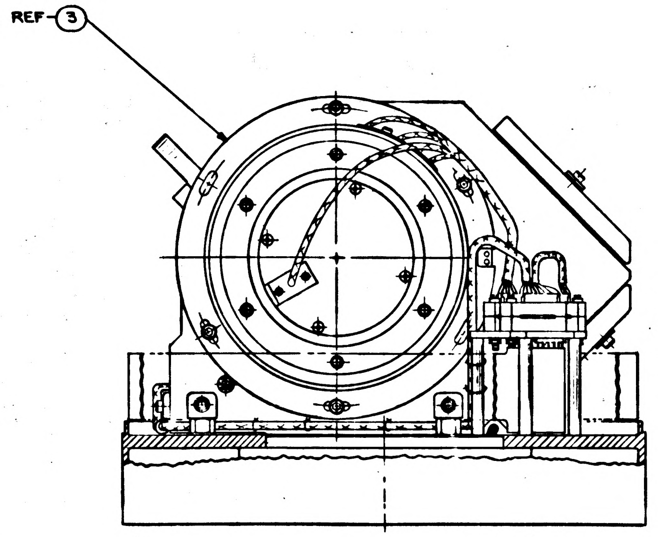
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		SEE SHEET NO. 1 TDRR 03812	10 Oct 63	GC
B6		REVISED PER TDRR NO. 06505	25 FEB 64	WK

NOTES:
SEE SHEET 1 OF 2.





PARTIAL SECTION B-B



PARTIAL VIEW C-C

B5

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT W

LIST OF PARTS AND MATERIALS

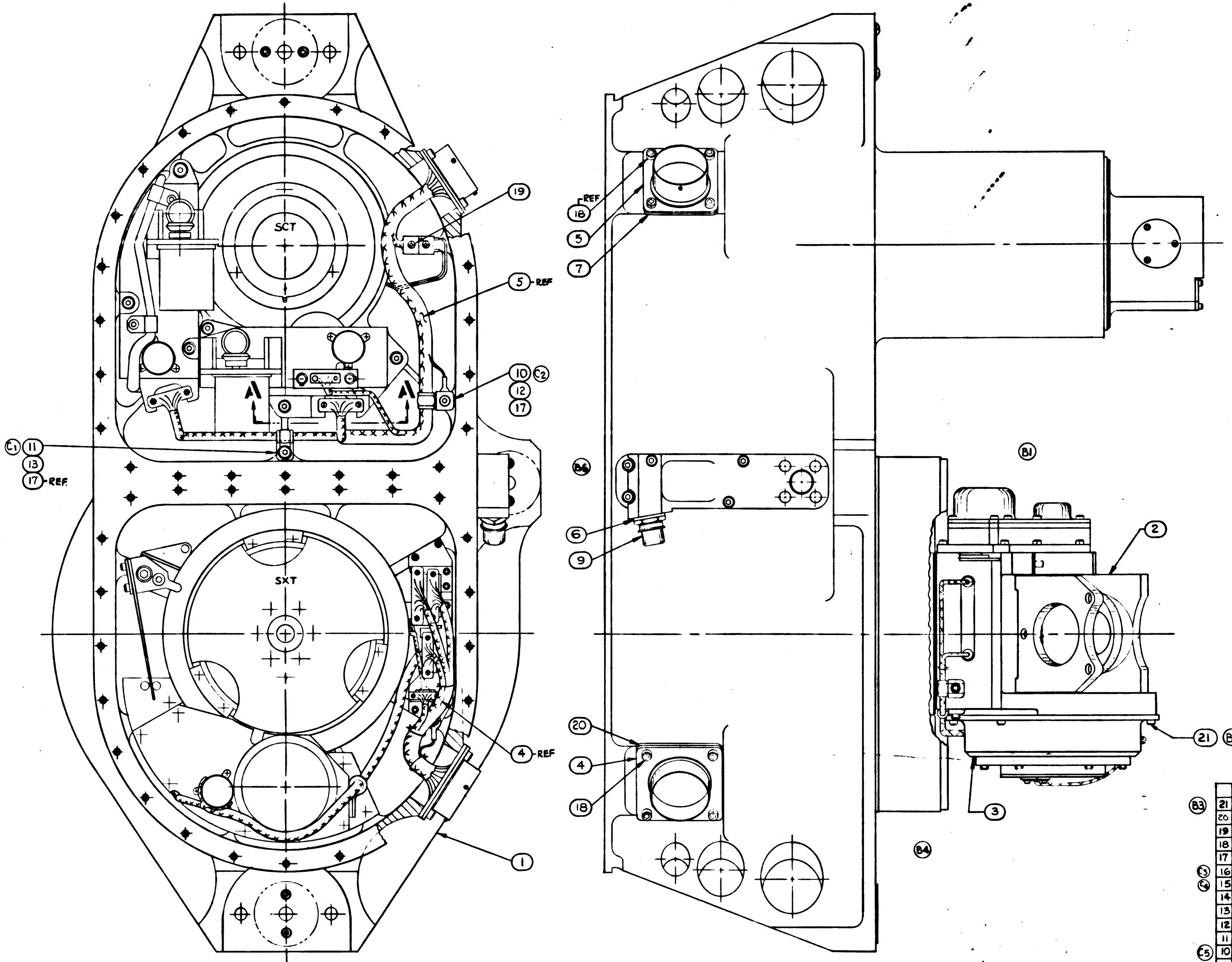
1011000 NEXT ASSY	1011000 USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOL ON: FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	KOLLSMAN INSTRUMENT CORPORATION ELMHURST NEW YORK KIC PN 85 38690 0720	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
APPLICATION		MATERIAL	DRAWN DATE 7-9-63 CHECKED D. Cohen 8-12-63 APPROVAL 8-11-63 APPROVAL 8-15-63	TITLE OPTICAL UNIT SUBASSEMBLY STAGE III
		CONTRACT	NASA APPROVAL 8-16-67 MIT APPROVAL	CODE IDENT NO. SIZE E NASA NUMBER 1011891 SCALE 1/1 WEIGHT CALC ACTUAL SHEET 2 OF 2

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLE AND TEST IN ACCORDANCE WITH A.T.P 1011891.
3. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019

C	1681101

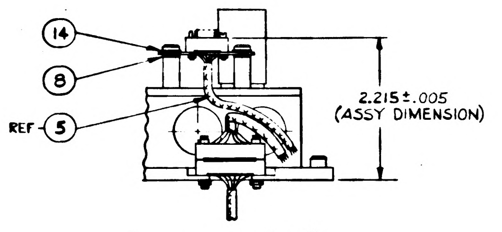
REVISIONS 02635 8-16-63

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO 03812	10 Oct 63	WK
B6		REVISED PER TDRR NO. 06505	25 FEB 64	WK
C9		REVISED PER TDRR NO 08041	4-20-64	



	C	C
	B	B
	A	A
	SHEET 1	SHEET 2
REVISION STATUS OF SHEETS		

B2



PARTIAL SECTION A-A

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
21	4		NAS1352C04LL4	74455157013		SCREW, CAP, SOC. HD. SELF LOCKING			
20	1	*	1011599-10	74453034010		PACKING, PREFORMED, RETAINED			
19	1		NAS1189C02P4L	74455155002		SCREW, SELF LOCKING, 100° FLAT HEAD			
18	8		NAS1352C06LL5	74455157018		SCREW, CAP, SOC. HEAD, SELF LOCKING			
17	2		NAS1352C06LL6	74455157019		SCREW, CAP, SOC. HEAD, SELF LOCKING			
16	4		NAS1351C3LL10	74455156040		SCREW, CAP, SOC. HEAD, SELF LOCKING			
15									
14	2		MS16624-15			RING, RETAINING, EXTERNAL, BASIC			
13	1		MS15795-305			WASHER, FLAT			
12	1	*	1011918-2			WASHER, CABLE CLAMP			
11	1	*	1000220-6			CLAMP, CABLE			
10	1	*	1000220-8			CLAMP, CABLE			
9	1	*	1000135			COUPLING HALF, QUICK DISCONNECT (SCD)			
8	AR		1011885	45386900170		SHIM			
7	1	*	1011599-9	74453034009		PACKING, PREFORMED, RETAINED			
6	1	*	1011597-13	74453033013		PACKING, PREFORMED, RETAINED			
5	1		1011713	80386900020		SCT BASE HARNESS ASSY			
4	1		1011896	80386900030		SXT BASE HARNESS ASSY			
3	1		1011909	85386900920		RESOLVER AND CONNECTOR ASSY OF			
2	1		1011701	85386900760		SEXTANT INDEX HEAD ASSY			
1	1		1011890	85386900710		OPTICAL UNIT SUBASSY - STAGE II			

LIST OF PARTS AND MATERIALS

1011000	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 386900720
DRAWN Boroski DATE 7-9-63
CHECKED 8-2-63
APPROVAL 8-13-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL 16 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE III

CODE IDENT NO. SIZE E NASA NUMBER 1011891
SCALE 1/1 WEIGHT CALC ACTUAL SHEET 1 OF 2

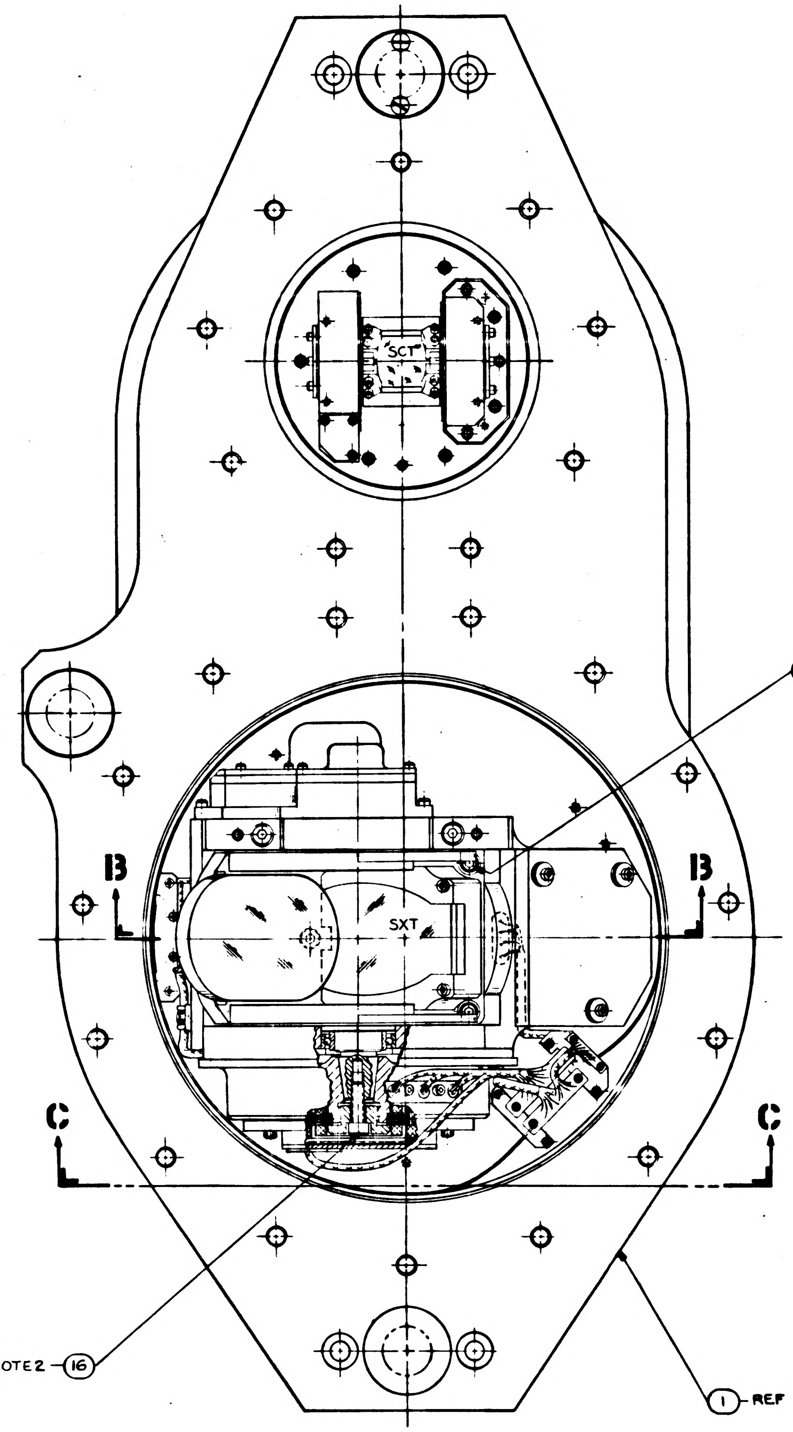
1011891

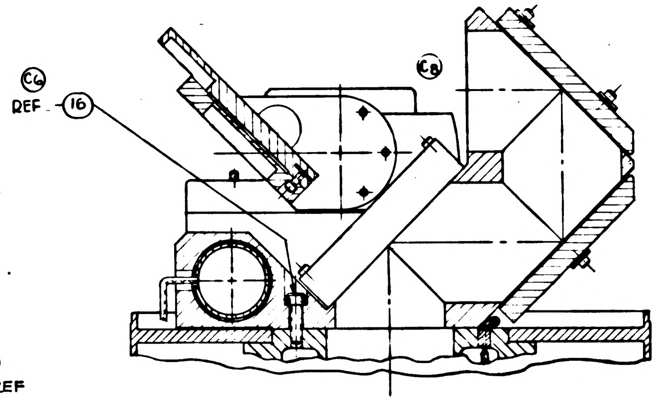
NOTES:
SEE SHEET 1 OF 2.

C	1681101

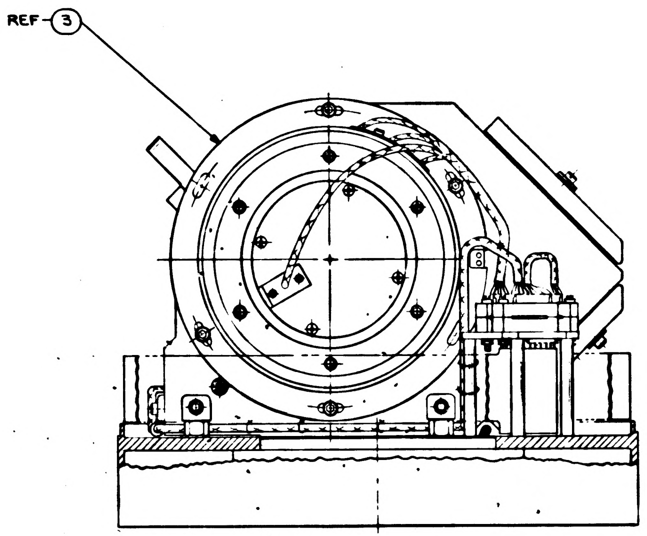
REVISIONS 02625 F-6-63

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		SEE SHEET NO. 1 TDRR 03812	10 Oct 63	GK
B6		REVISED PER TDRR NO. 06505	25 FEB 64	WK
C9		REVISED PER TDRR NO. 08041	4-28-64	





PARTIAL SECTION B-B



PARTIAL VIEW C-C

B5

1011891

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 386900720
DRAWN DATE 7-9-63
CHECKED 8-12-63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 5-6-64
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE III

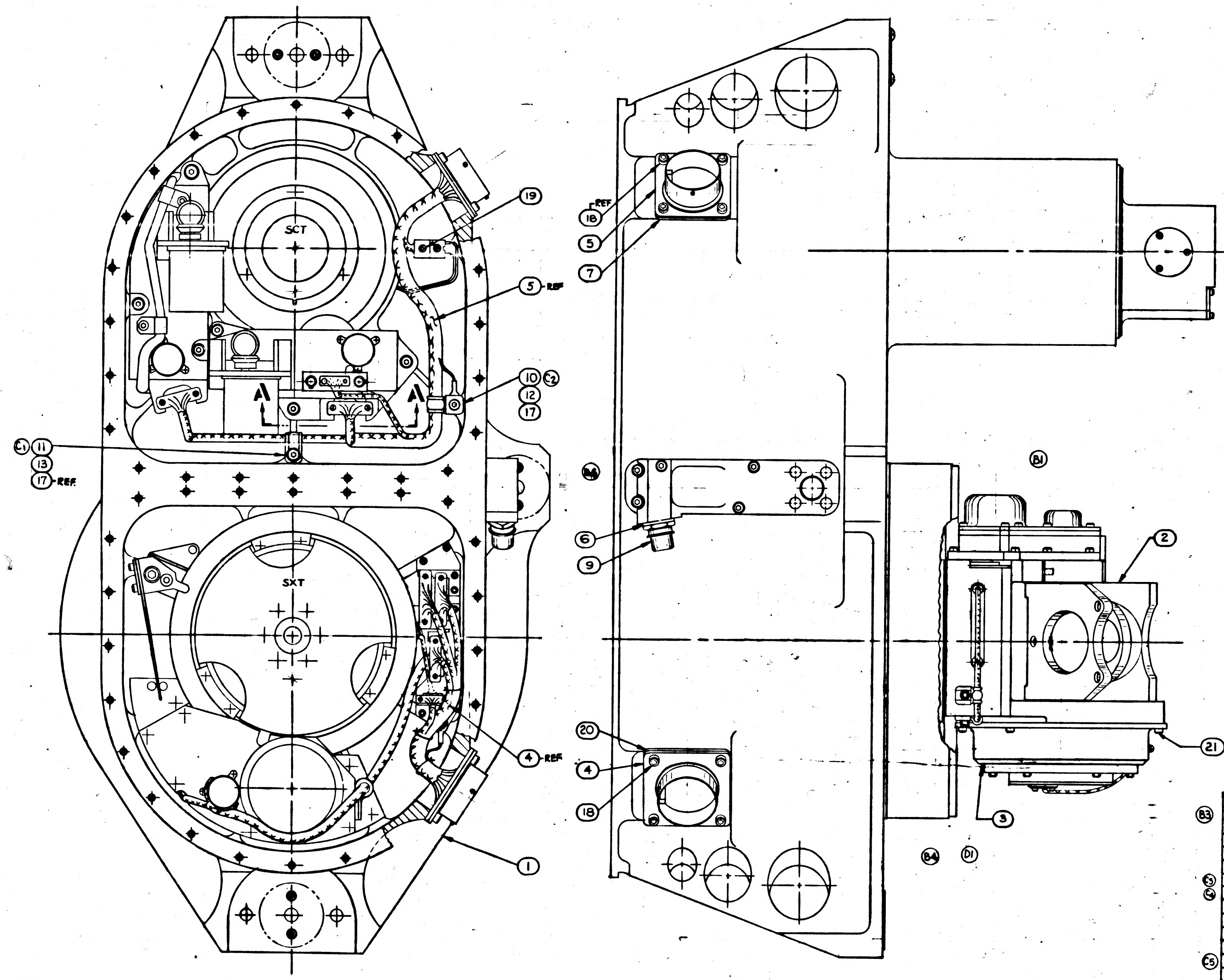
CODE IDENT NO.
SIZE E
NASA NUMBER 1011891
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 2 OF 2

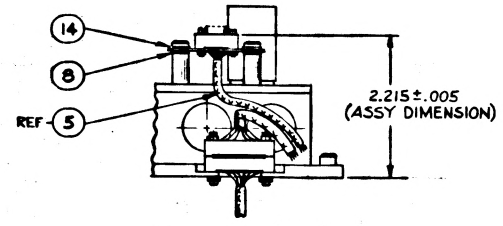
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLE AND TEST IN ACCORDANCE WITH A.T.P. 1011891.
3. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019

D	1681101

REVISIONS 02628 8-16-63

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO 03812	10 Oct 63	WK
B6		REVISED PER TDRR NO. 06505	25 FEB 64	WK
C9		REVISED PER TDRR NO 08041	4-20-64	
D3		REVISED PER TDRR NO. 08600	5-19-64	





PARTIAL SECTION A·A

D	D
C	C
B	B
A	A
SHEET 1	SHEET 2

REVISION STATUS OF SHEETS

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
21	4		NAS1352C04LL4	74455157015		SCREW, CAP, SOC. HD. SELF LOCKING			
20	1	*	1011599-10	74453034010		PACKING, PREFORMED, RETAINED			
19	1		NAS1189C02P4L	74455155002		SCREW, SELF LOCKING, 100° FLAT HEAD			
18	8		NAS1352C06LL5	74455157018		SCREW, CAP, SOC. HEAD, SELF LOCKING			
17	2		NAS1352C06LL6	74455157019		SCREW, CAP, SOC. HEAD, SELF LOCKING			
16	4		NAS1351C3LL10	74455156040		SCREW, CAP, SOC. HEAD, SELF LOCKING			
15									
14	2		MS16624-15			RING, RETAINING, EXTERNAL, BASIC			
13	1		MS15795-305			WASHER, FLAT			
12	1	*	1011918-2			WASHER, CABLE CLAMP			
11	1	*	1000220-6			CLAMP, CABLE			
10	1	*	1000220-8			CLAMP, CABLE			
9	1	*	1000135			COUPLING HALF, QUICK DISCONNECT (SCD)			
8	AR		1011885	45386900170		SHIM			
7	1	*	1011599-9	74453034009		PACKING, PREFORMED, RETAINED			
6	1	*	1011597-13	[illegible]		PACKING, PREFORMED, RETAINED			
5	1		1011713	80386900020		SCT BASE HARNESS ASSY			
4	1		1011896	80386900030		SXT BASE HARNESS ASSY			
3	1		1011909	85386900920		RESOLVER AND CONNECTOR ASSY OF			
2	1		1011701	85386900760		SEXTANT INDEX HEAD ASSY			
1	1		1011890	85386900710		OPTICAL UNIT SUBASSY - STAGE II			

LIST OF PARTS AND MATERIALS

MASTER

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ −	+ −	+ −

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900720

DRAWN Brodkin DATE 7-9-63
CHECKED 10 Gallagher 8-12-63
APPROVAL 8-15-63
APPROVAL Siraco 8-15-63
NASA APPROVAL 8 Aug 63
MIT APPROVAL 16 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY, STAGE III

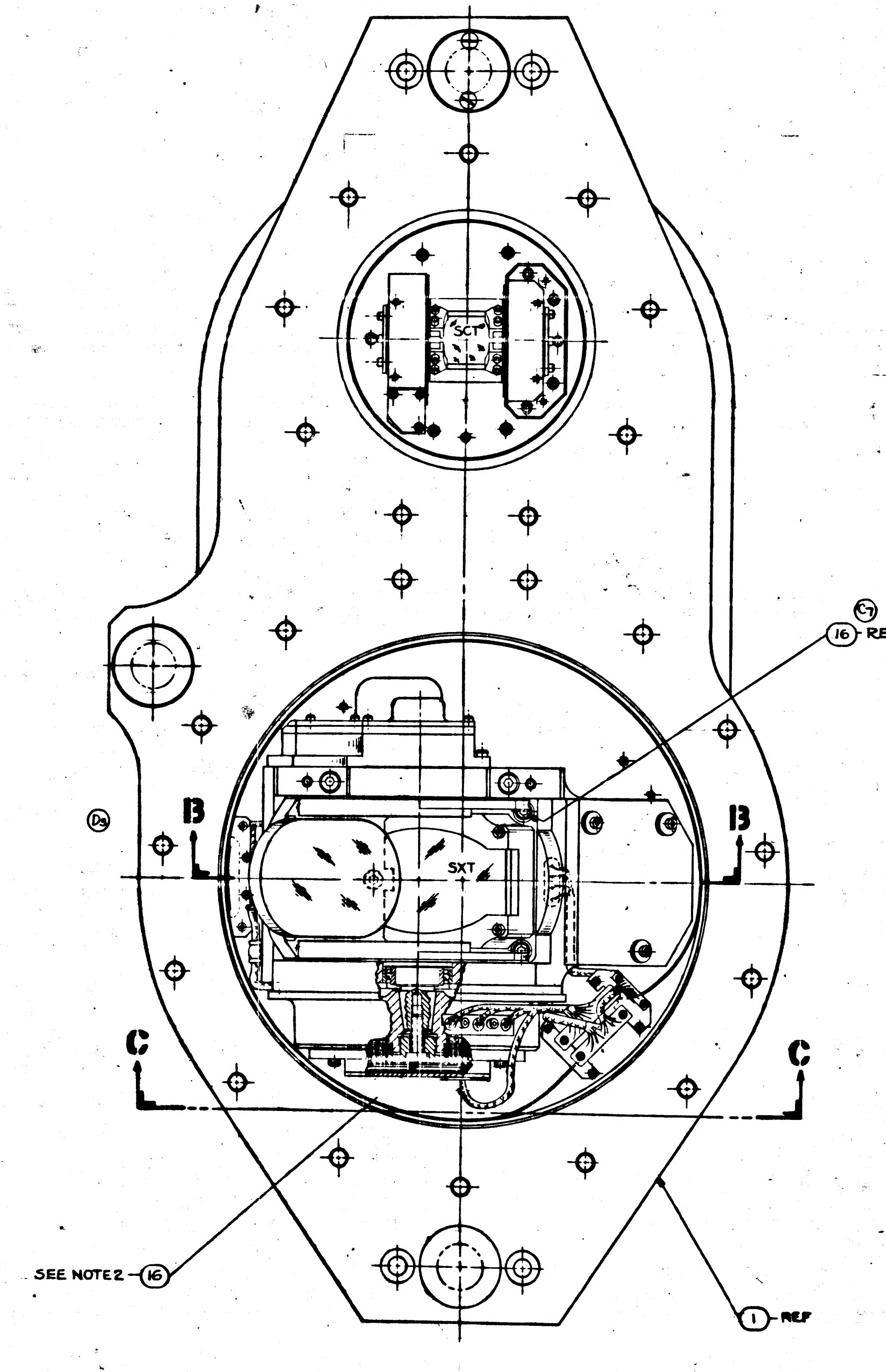
CODE IDENT NO.
SIZE E
NASA NUMBER 1011891
SCALE 1/1
WEIGHT
CALC ACTUAL
SHEET 1 OF 2

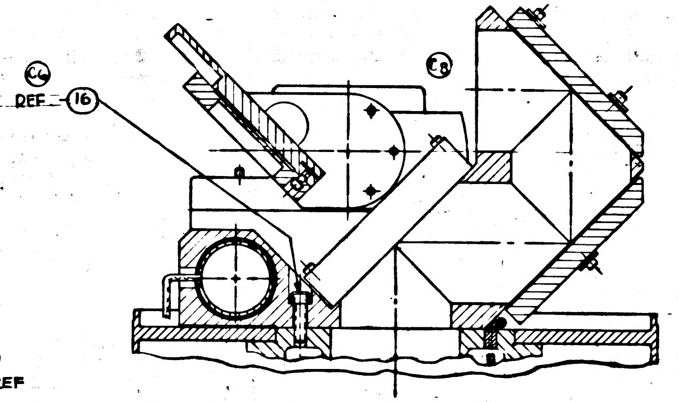
1011891

NOTES:
SEE SHEET 1 OF 2.

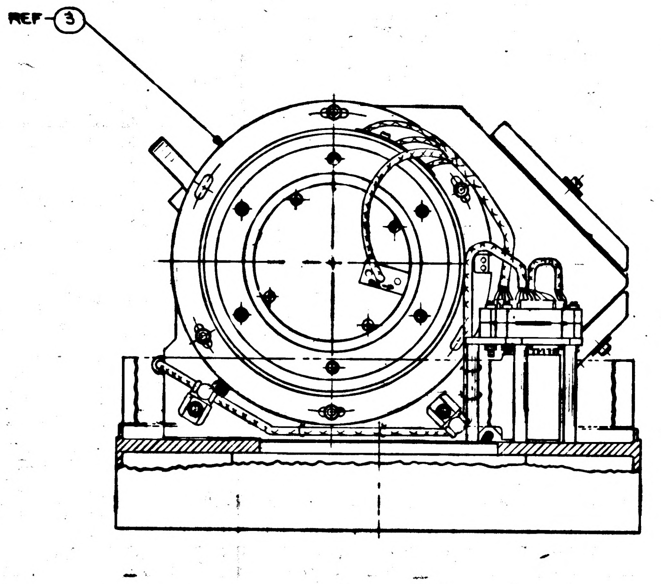
d	1681101

REVISIONS 02625 8-16-63				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		SEE SHEET NO. 1 TDRR 03512	10 Oct 63	GK
B6		REVISED PER TDRR NO. 06505	FEB 64	WK
C9		REVISED PER TDRR NO. 08041	3-23-64	
D3		REVISED PER TDRR NO. 08600	5-13-64	





PARTIAL SECTION B-B



PARTIAL VIEW C-C

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 386900720
DRAWN DATE 7-9-63
CHECKED 8-12-63
APPROVAL 8-1?-63
APPROVAL 8-15-63
NASA APPROVAL W. J. 5-?-67
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE III

CODE IDENT NO.
SIZE E
NASA NUMBER 1011891
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 2 OF 2

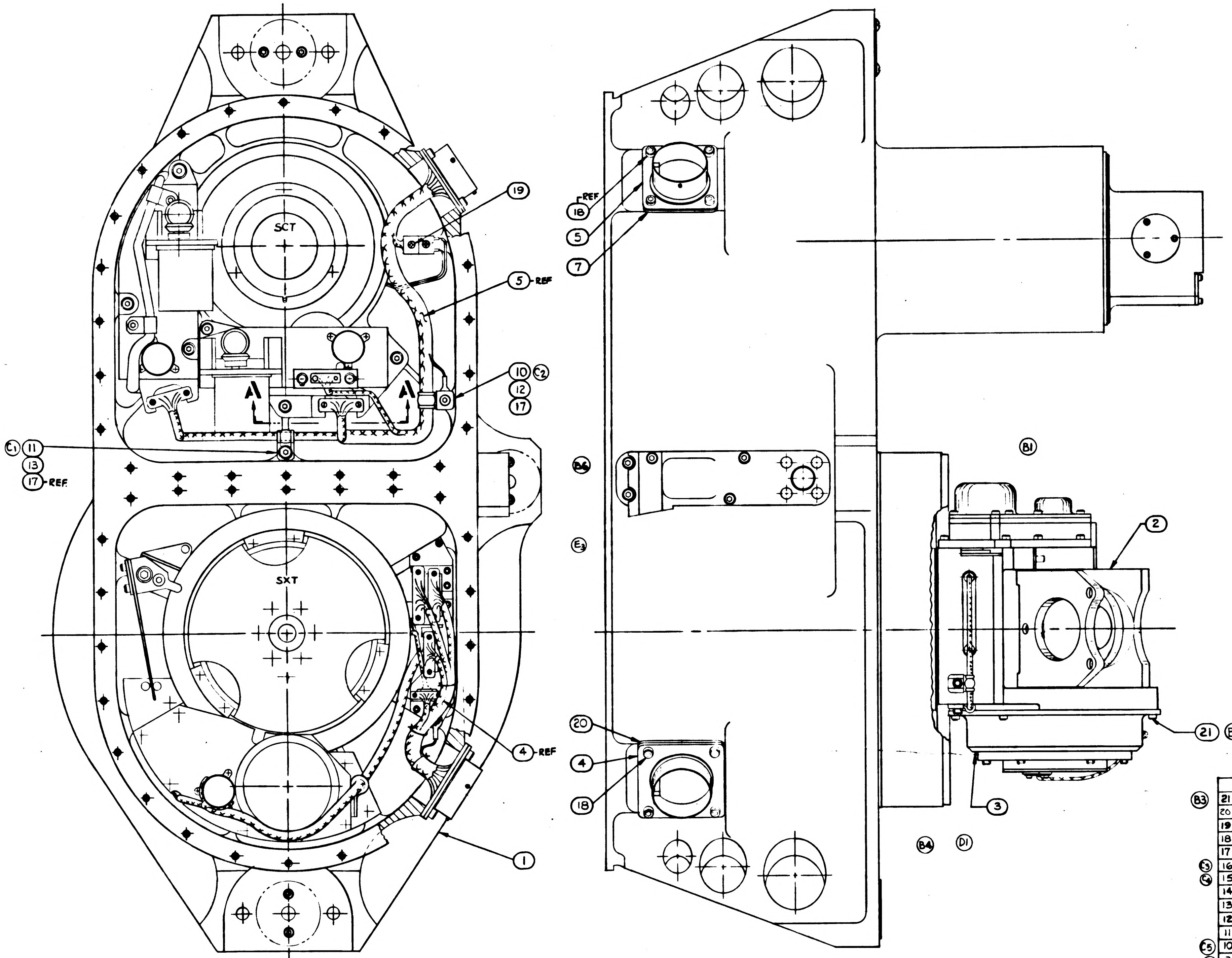
1011891

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLE AND TEST IN ACCORDANCE WITH A.T.P 1011891.
3. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND 1002019

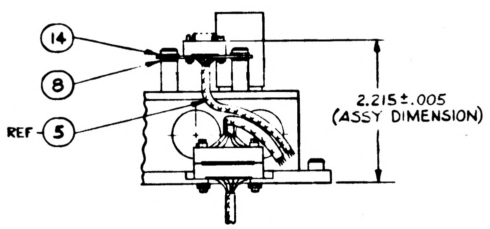
3 | 1681101

REVISIONS 02625 8-16-63

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO. 03812	10 Oct 63	WK
B6		REVISED PER TDRR NO. 06505	25 FEB 64	WK
C9		REVISED PER TDRR NO 08041	4-20-64	
D3		REVISED PER TDRR NO. 08600	5-19-64	
E3		REVISED PER TDRR NO. 08599	5-19-64	



E	D
D	D
C	C
B	B
A	A
SHEET 1	SHEET 2
REVISION STATUS OF SHEETS	



PARTIAL SECTION A-A

	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
B3	21	4		NAS1352C04LL4	74455157013		SCREW, CAP, SOC. HD. SELF LOCKING			
	20	1	*	1011599-10	74453034010		PACKING, PREFORMED, RETAINED			
	19	1		NAS1189C02P4L	74455155002		SCREW, SELF LOCKING, 100° FLAT HEAD			
	18	8		NAS1352C06LL5	74455157018		SCREW, CAP, SOC. HEAD, SELF LOCKING			
	17	2		NAS1352C06LL6	74455157019		SCREW, CAP, SOC. HEAD, SELF LOCKING			
C3	16	4		NAS1351C3LL10	74455156040		SCREW, CAP, SOC. HEAD, SELF LOCKING			
C4	15									
	14	2		MS16624-15			RING, RETAINING, EXTERNAL, BASIC			
	13	1		MS15795-305			WASHER, FLAT			
	12	1	*	1011918-2			WASHER, CABLE CLAMP			
	11	1	*	1000220-6			CLAMP, CABLE			
C5	10	1	*	1000220-8			CLAMP, CABLE			
E2	9									
	8	AR		1011885	45386900170		SHIM			
	7	1	*	1011599-9	74453034009		PACKING, PREFORMED, RETAINED			
E1	6									
	5	1		1011713	80386900020		SCT BASE HARNESS ASSY			
	4	1		1011896	80386900030		SXT BASE HARNESS ASSY			
	3	1		1011909	85386900920		RESOLVER AND CONNECTOR ASSY OF			
	2	1		1011701	85386900760		SEXTANT INDEX HEAD ASSY			
	1	1		1011890	85386900710		OPTICAL UNIT SUBASSY - STAGE II			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 386900720
DRAWN DATE 7-9-63
CHECKED 8-2-63
APPROVAL 8-13-63
APPROVAL 8-13-63
NASA APPROVAL W.J. 8-13-63
MIT APPROVAL 16 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE III

CODE IDENT NO. | SIZE E | NASA NUMBER 1011891
SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 2

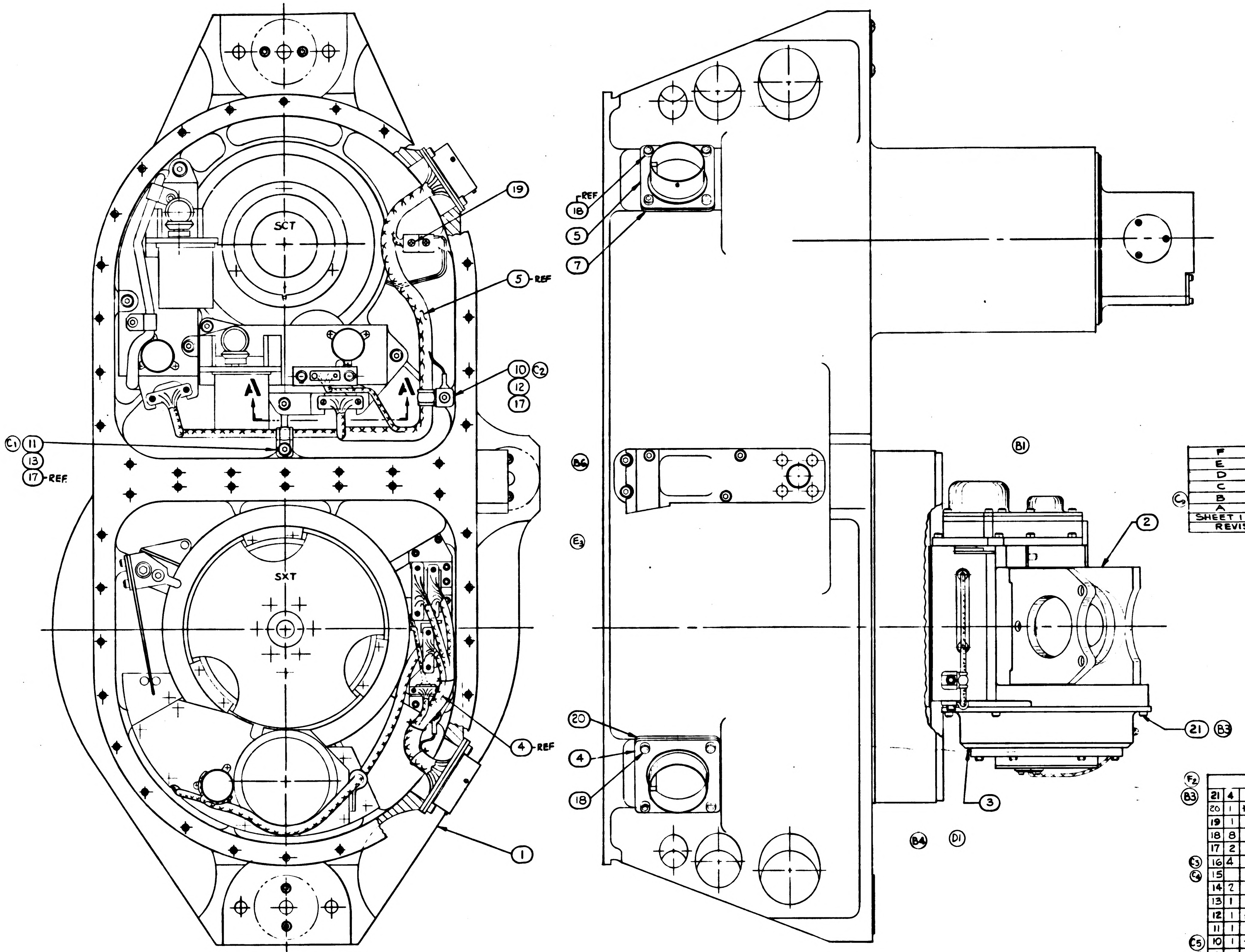
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. SEE SHEET 3 OF 3 FOR SUPPLEMENTARY ASSEMBLY INFORMATION.
3. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.

(F1)

1011891 F

REVISIONS 02625 8-16-63

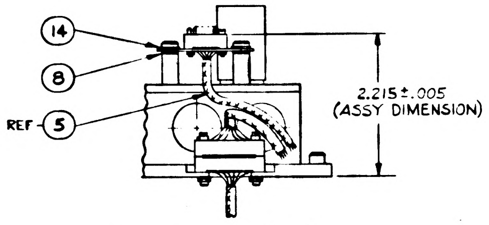
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO. 03812	10 Oct 63	WK
B6		REVISED PER TDRR NO. 06505	25 FEB 64	WK
C9		REVISED PER TDRR NO 08041	4-20-64	
D3		REVISED PER TDRR NO. 06600	5-19-64	
E3		REVISED PER TDRR NO. 08599	5-19-64	
F2		REVISED PER TDRR NO. 08458	5/14/64	



F	F	F
E	D	—
D	D	—
C	C	—
B	B	—
A	A	—
SHEET 1	SHEET 2	SHEET 3

REVISION STATUS OF SHEETS

(C9) (B2)



PARTIAL SECTION A-A

SEE SHEET 2 FOR SUBSEQUENT ITEMS

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
21	4		NAS1352C04LL4	74455157013		SCREW, CAP, SOC. HD. SELF LOCKING			
20	1	*	1011599-10	74453034010		PACKING, PREFORMED, RETAINED			
19	1		NAS1189C02P4L	74455155002		SCREW, SELF LOCKING, 100° FLAT HEAD			
18	8		NAS1352C06LL5	74455157018		SCREW, CAP, SOC. HEAD, SELF LOCKING			
17	2		NAS1352C06LL6	74455157019		SCREW, CAP, SOC. HEAD, SELF LOCKING			
16	4		NAS1351C3LL10	74455156040		SCREW, CAP, SOC. HEAD, SELF LOCKING			
15									
14	2		MS16624-15			RING, RETAINING, EXTERNAL, BASIC			
13	1		MS15795-305			WASHER, FLAT			
12	1	*	1011918-2			WASHER, CABLE CLAMP			
11	1	*	1000220-6			CLAMP, CABLE			
10	1	*	1000220-8			CLAMP, CABLE			
9									
8	AR		1011885	45386900170		SHIM			
7	1	*	1011599-9	74453034009		PACKING, PREFORMED, RETAINED			
6									
5	1		1011713	80386900020		SCT BASE HARNESS ASSY			
4	1		1011896	80386900030		SXT BASE HARNESS ASSY			
3	1		1011909	85386900920		RESOLVER AND CONNECTOR ASSY OF			
2	1		1011701	85386900760		SEXTANT INDEX HEAD ASSY			
1	1		1011890	85386900710		OPTICAL UNIT SUBASSY - STAGE II			

LIST OF PARTS AND MATERIALS

(F2) (B3) (C3) (C4) (C5) (E2) (E1)

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

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CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900720
DRAWN DATE 7-9-63
CHECKED 2-2-63
APPROVAL 8-13-63
APPROVAL 8-15-63
NASA APPROVAL F-16-63
MIT APPROVAL 16 Aug 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE III

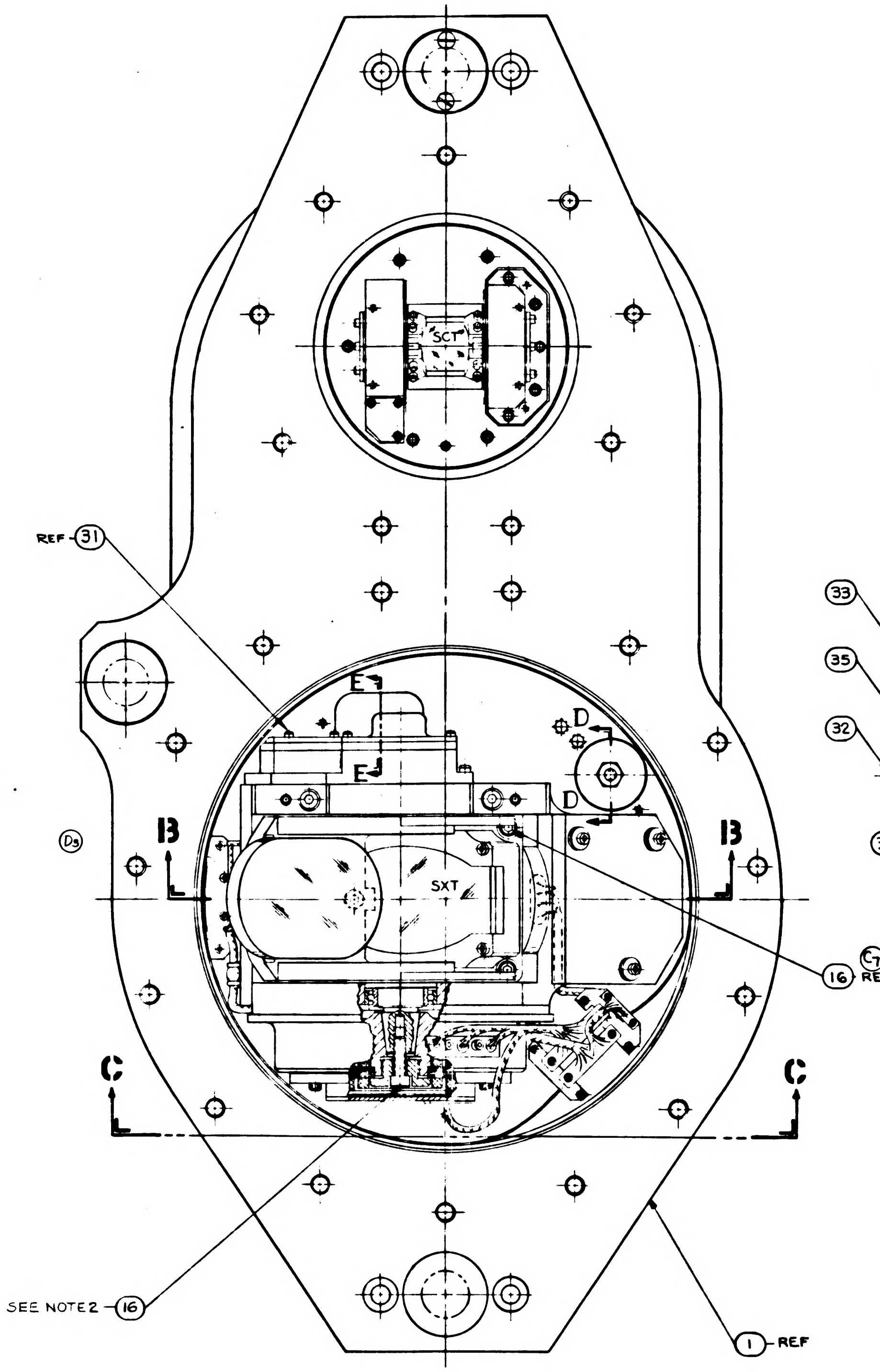
CODE IDENT NO.
SIZE E
NASA NUMBER 1011891
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 3

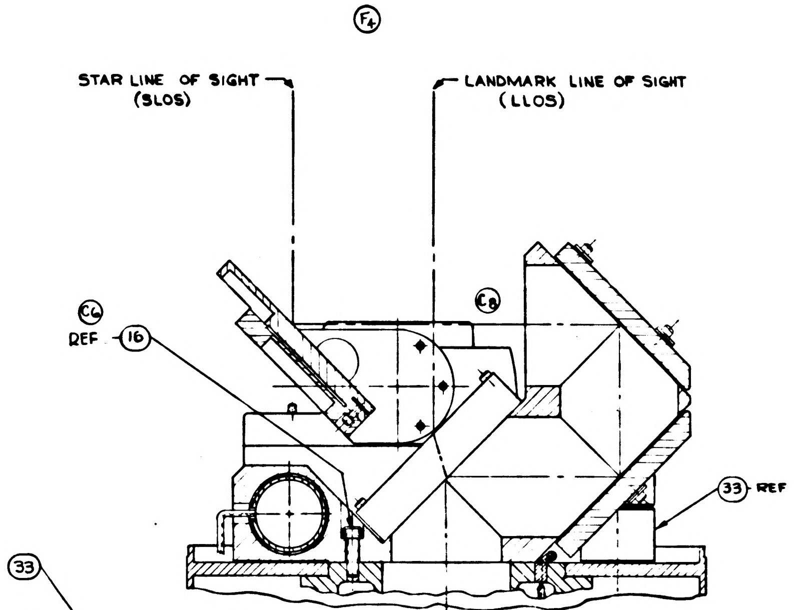
NOTES:
SEE SHEET 1 AND 3 OF 3.

1011891 F

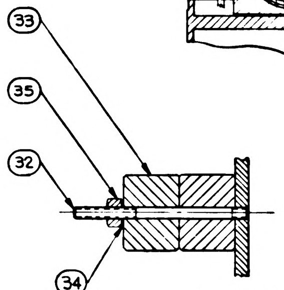
REVISIONS 02625 8-6-63

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		SEE SHEET NO. 1 TDRR 03812	10 Oct 63	GK
B₆		REVISED PER TDRR NO. 06505	25 FEB 64	WK
C₉		REVISED PER TDRR NO. 08041	4-28-64	
D₂		REVISED PER TDRR NO. 08600	5-19-64	
F₄		REVISED PER TDRR NO. 08458	3/16/64	



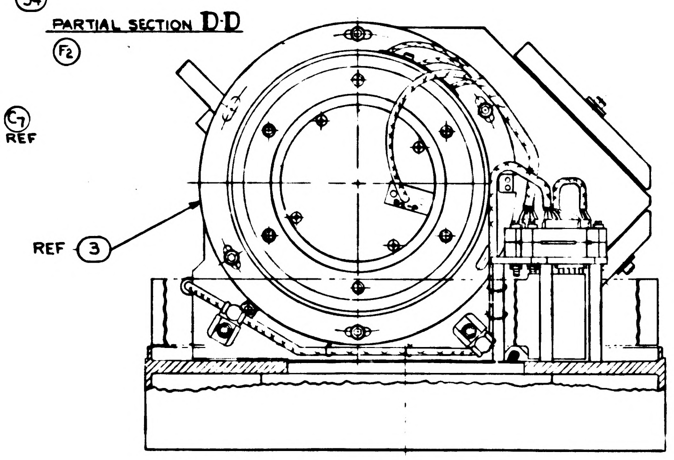


PARTIAL SECTION B-B



PARTIAL SECTION D-D

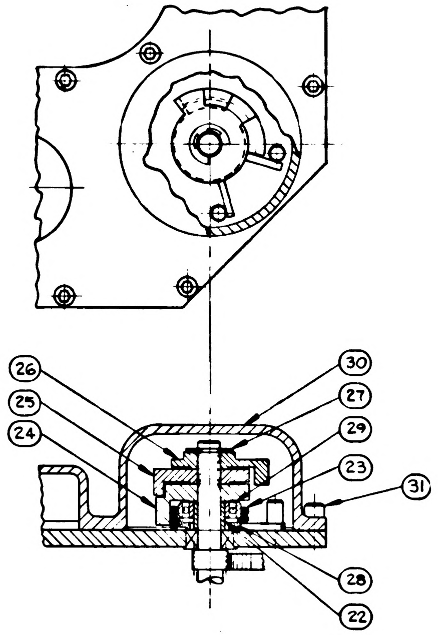
F2



D2

PARTIAL VIEW C-C

B5



F3 PARTIAL SECTION E-E
SCALE: 2/1

F1

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
35	1		AN363C1032			NUT, SELF-LOCKING, 550°F			
34	1		MS15795-308			WASHER, FLAT			
33	2		1011643	58386900080		COUNTERWEIGHT			
32	1		1011644	53[illegible]6900070		ROD, THREADED			
31	10	NAS	1352C03LL6	74455157010		SCREW, CAP, SOC HEAD, SELF-LOCKING			
30	1		1011595	52386900730		COVER, GEAR BOX			
29	1		1011610			BEARING, BALL, ANNULAR			
28	1		1012075			SPACER			
27	1		MS16633-4017	74453081008		RING, RETAINING			
26	1		1011578	57386900930		DOG, LIMIT STOP, OUTER			
25	1		1011579	57386900940		DOG, LIMIT STOP, MIDDLE			
24	1		1011580	57386900950		DOG, LIMIT STOP, INNER			
23	1		1011577	56386900290		SPRING, TORSION			
22	1		1011581	57386900960		GUIDE, SPRING, LIMIT STOP			

LIST OF PARTS AND MATERIALS

1011000	0-000
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900720
DRAWN [illegible] DATE 7-9-63
CHECKED [illegible] 8-2-63
APPROVAL [illegible] 8-7-63
APPROVAL [illegible]
NASA APPROVAL [illegible] 3-6-67
MIT APPROVAL [illegible]

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE III

CODE IDENT NO.
SIZE E
NASA NUMBER 1011891
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 2 OF 3

F 1011891

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
F		SHEET 3 ADDED, TDRR 08458		W.K.

NOTE NO.	ITEM NO.	DWG. 1011-	SHEET NO.	
1	ALL	ALL	ALL	FOLLOW SEQUENCE OF NOTES WITHIN GROUPING OF NOTES 2 THRU 8 AND 9 THRU 20.
2	38	890	1	SELECT SPACER FOR 0.0000 TO 0.0020 END PLAY OF ITEM 2 RELATIVE TO ITEM 1 MEASURED WITH 5 LBS LOAD APPLIED IN EACH DIRECTION.
3	6	890	1	CENTER RETICLE BEFORE MOUNTING TRUNNION AXIS ASSEMBLY. (A) ADD ITEM 6 WITH TRUNNION IN POSITION SHOWN ON 1011215. RECENTER RETICLE AS REQUIRED IN DIRECTION PARALLEL TO TRUNNION WITHIN 0° 0' 20", (B) ROTATE RETICLE TO SET "R" LINE PARALLEL TO TRUNNION TRACK WITHIN 2 LINE WIDTHS END TO END OF "R" LINE. (A) AND (B) MUST BE MUTUALLY ATTAINED.
4	3	890	1	SET RELAY FOCUS SO THAT A COLLIMATED TARGET RETICLE FROM THE PANEL END OF RELAY ASS'Y IS SEEN IN THE SAME FOCUS AS THE SCT RETICLE AS OBSERVED THROUGH THE SCT OBJECTIVE.
5	7 & 8	890	1	POSITION TRUNNION AT ZERO (POSITION SHOWN ON DWG. 1011215). POSITION SHAFT AT ZERO (TRUNNION PARALLEL TO LONG AXIS OF 3 BALL MOUNT AND X ON TRUNNION AWAY FROM MIDDLE MOUNTING BALL). SET GEAR BOX COUNTERS AT ZERO AND RESOLVERS WITH NULL MARK ON SHAFT ALIGNED WITH ARROW ON BODY. MOUNT GEAR BOXES IN MESH WITH ALL THESE RELATIONS MAINTAINED WITHIN ABOUT 5°.
6	31	890	1	SET UP GEAR BOX MESHES WITH CLUSTER GEARS, ITEM 5, AS CLOSELY AS POSSIBLE WITHOUT INCURRING NOTICEABLE BINDING THROUGH FULL TURNS OF ITEM 5.
7A		891	1	AFTER ALL ITEMS PERTAINING TO SCT ARE ASSEMBLED, RESOLVER ZEROS SHALL BE SET WITHIN 0° 1' OF TEST FIXTURE OPTICAL REFERENCE.
7B				COUNTER ZEROS SHALL BE SET WITHIN 0.01° OF FIXTURE OPTICAL REFERENCE.
7C				TOTAL BACKLASH FROM COUNTERS TO LINE OF SIGHT SHALL NOT EXCEED 0.02° READ ON COUNTER BY APPROACHING THE SAME OPTICAL CHECK POSITIONS FROM BOTH DIRECTIONS.
7D				BOTH DRIVES SHALL START AT 6.2 VOLTS MAX. AND RUN AT 3.6 VOLTS MAX. THROUGHOUT 360° OF COUNTERS ROTATION IN BOTH DIRECTIONS EXCEPT AT 0° AND 180° WHERE 10 VOLTS MAX. STARTING THROUGH THE COUNTER MASK SHIFTING CYCLES IS PERMITTED. STARTING VOLTAGE NEED ONLY BE MEASURED AT ANY POINTS WHERE SLOWING OF THE DRIVE IS NOTICEABLE WHEN RUNNING BELOW ITS MAX. ALLOWED RUNNING VOLTAGE.
8	17	890	1	VIBRATION PROOF ITEMS 17 USING LOCKING COMPOUND GRADE CV PER MIL-S-22473.
9		890	2	WITH ALL ITEMS ON DWG. 1011890 SHEET 2 PLUS ITEMS 17 AND 20, ON SHEET 1 AND ITEMS 2 AND 15 OF DRAWING 1011891 SHEET 1 ASSEMBLED THE FOLLOWING REQUIREMENTS SHALL BE MET:
9A				WITH THE TRUNNION ROTATED TO THE MIRROR POSITION CORRESPONDING TO ZERO LINE OF SIGHT, THE SLOS AND LLOS SHALL BE LATERALLY PARALLEL WITHIN 0° 0' 20" ("R" LINE COINCIDENCE).
9B				WITH THE TRUNNION ROTATED TO THE MIRROR POSITION AT WHICH THE SXT RETICLE IS REFLECTED BACK ON ITSELF, THE "R" LINE OF THE REFLECTED IMAGE SHALL COINCIDE WITH THE RETICLE "R" LINE WITHIN 0° 0' 10".
9C				THE DIFFERENCE BETWEEN MEASURES "9A" AND "9B" TAKING DIRECTION INTO ACCOUNT SHALL NOT EXCEED 0° 0' 20".
9D				THE SUM OF THE MEASURES "9A" AND "9B" SHALL NOT EXCEED 0° 0' 25" IGNORING DIRECTION.
9E				THE RETICLE AS OBSERVED THROUGH THE LLOS SHALL BE COINCIDENT WITH THE SHAFT AXIS WITHIN 0° 0' 5".
9F				THE RETICLE AS OBSERVED THROUGH THE SLOS SHALL BE COINCIDENT WITH THE SHAFT AXIS WITHIN 0° 0' 20", THAT IS, MEASURES "9A" AND "9E" SHALL NOT HAVE ADDITIVE TOLERANCES.
9G				THE RETICLE "R" LINE SHALL ALIGN WITH THE TRUNNION TRACK WITHIN 0° 0' 10" VARIATION OVER ITS WHOLE LENGTH.

NOTE NO.	ITEM NO.	DWG. 1011-	SHEET NO.	
10	3	891	1	THE 64X AND 1X RESOLVERS ARE TO BE AT THEIR MECHANICAL ZERO POSITION WITHIN 0° 1' WHEN THE SLOS AND LLOS ARE COINCIDENT ("M" LINES COINCIDENT).
11	9	890	1	THE 16X RESOLVER IS TO BE AT ITS MECHANICAL ZERO POSITION WITHIN 0° 1' WHEN THE SHAFT IS OPTICALLY POSITIONED TO A LINE OF SIGHT NORMAL TO THE LINE BETWEEN THE END BALLS AND AWAY FROM THE THIRD BALL OF THE THREE BALL MOUNTING.
12	22 THRU 29	891	2	THE LIMIT STOP IS TO BE SET SO THAT THE TRUNNION MIRROR HAS EQUAL OVERTRAVEL AT 0° TO THE 90° (SELF COLL.) LINE OF SIGHT POSITIONS WITHIN 3°.
13		891	2	THE ANTI-BACKLASH SPRING IS TO BE WOUND UP 1/4 TURN CLOCKWISE AND CLAMPED WHEN THE MIRROR IS AT THE 90°+ STOP POSITION.
14	32 THRU 35	891	2	WITH ITEMS 3, 21, 30 AND 31 IN PLACE, ITEMS 32 THRU 35 SHALL BE POSITIONED BY SELECTION OF HOLES AND ORIENTATION OR REDUCTION OF ECCENTRIC WEIGHTS ON THE THREADED POST TO BALANCE THE SHAFT WITHIN 2 IN. OZ. VIBRATION PROOF USING LOCKING COMPOUND GRADE CV PER MIL-S-22473 ON THREADS OF POST AND ON SURFACES OF WEIGHTS WHERE THEY CONTACT EACH OTHER AND THE MOUNTING SURFACE. BALANCE IS IN TOLERANCE IF 2 IN. OZ. TORQUE WILL REVERSE THE IMBALANCE.
15	12	890	1	THE SXT SHAFT SHALL BE AT ITS ZERO POSITION, SEE NOTE 11, DURING THE ASSEMBLY OF ITEMS 12 AND ITS HARDWARE, ITEM 22 AND ITS HARDWARE AND ITEM 11 AND ITS HARDWARE. ITEM 12, SHAFT GEARBOX MUST HAVE ITS RESOLVER PRESET TO ITS ELECTRICAL ZERO REFERENCE MARK. ITEM 22 MUST BE POSITIONED WITH ITS STOP DOG IN THE LARGER SECTOR BETWEEN THE TWO PINS ON ITEM 10.
16	30	890	1	VIBRATION PROOF USING LOCKING COMPOUND GRADE CV PER MIL-S-22473.
17	12	890	1	WITH THE SXT SHAFT ROTATED TO ITS COUNTER CLOCKWISE STOP, WIND UP THE ANTI-BACKLASH SPRING BY MEANS OF ITS COVER UNTIL TENSION IS SUFFICIENT TO TAKE UP BACKLASH IN THIS POSITION (1/4 TURN APPROX.). SPRING SHOULD TAKE UP BACKLASH WHEN BULL GEAR IS MANUALLY TURNED CLOCKWISE AND RELEASED.
18	12	890	1	SET THE 1/2 SPEED SHAFT RESOLVER ZERO WITHIN 0° 1' OF THE FIXTURE OPTICAL REFERENCE (SEE NOTE 11). ADD REMAINING ITEMS SHOWN ON DWGS. 1011890 AND 891 AND MEASURE SHAFT AND TRUNNION DRIVE VOLTAGES IN BOTH DIRECTIONS FROM STOP TO STOP. RUNNING SHALL NOT EXCEED 3.6 VOLTS. STARTING MEASURED AT POINTS WHERE DRIVE SLOWS DOWN SHALL NOT EXCEED 6.2 VOLTS. RUNNING SHALL BE MONITORED BY OBSERVING RATE GENERATOR OUTPUT OF EACH DRIVE.
19		890	1	VIBRATION PROOF SXT RETICLE LOCKING RING USING 1 DROP OF LOCKING COMPOUND GRADE H PER MIL-S-22473.
20	42	890	1	VIBRATION PROOF USING LOCKING COMPOUND GRADE HV PER MIL-S-22473.

Ⓕ THIS SHEET ADDED

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 2538-900720
DRAWN K.C. DATE 5-11-64
CHECKED
APPROVAL
APPROVAL 5/12/64
NASA APPROVAL W J 5-14-64
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY, STAGE III

CODE IDENT NO.
SIZE E
NASA NUMBER 1011891
SCALE
WEIGHT CALC ACTUAL
SHEET 3 OF 3

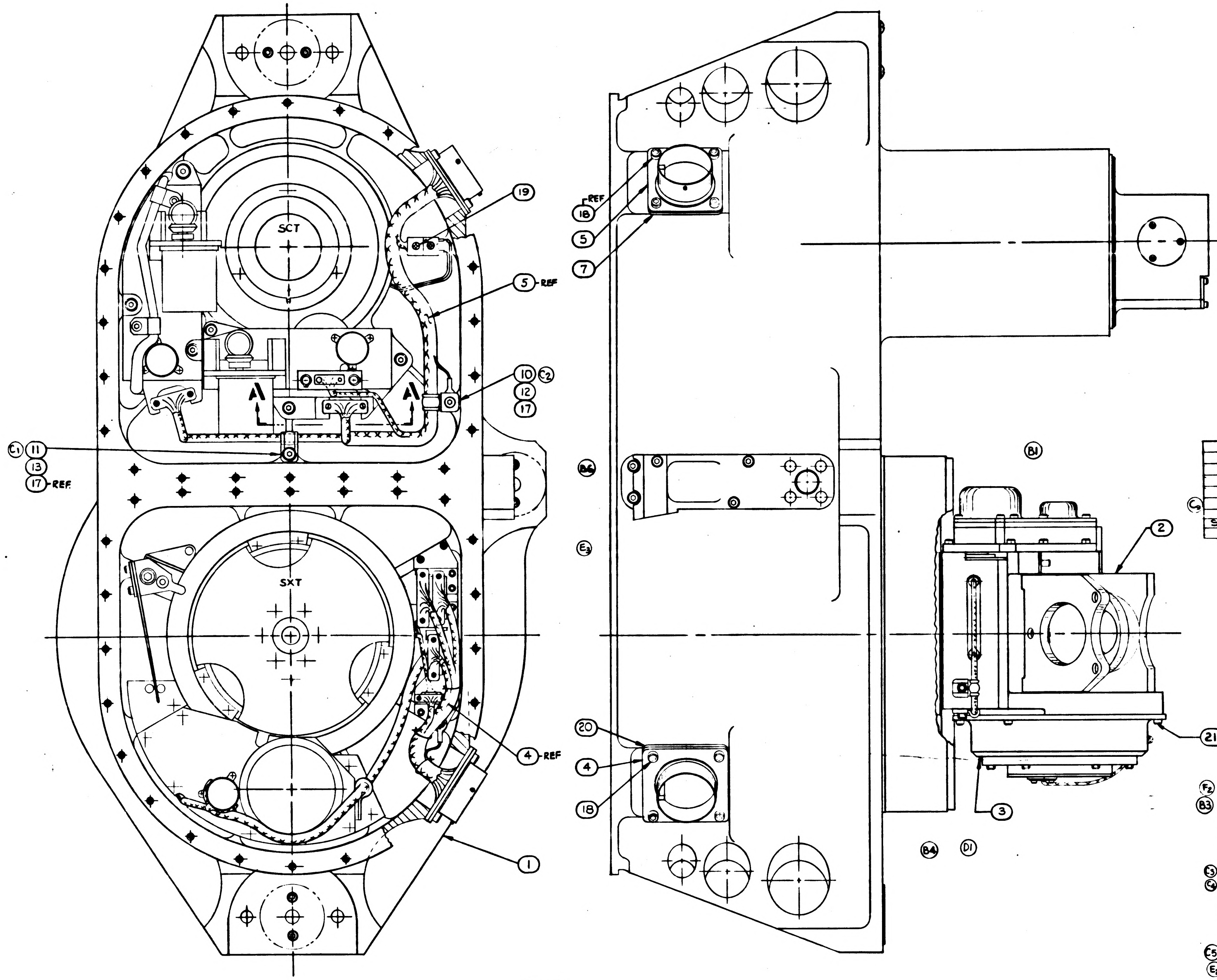
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. SEE SHEET 3 OF 3 FOR SUPPLEMENTARY ASSEMBLY INFORMATION.
3. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.

(F1)

5	1681101

REVISIONS 02625 8-16-63

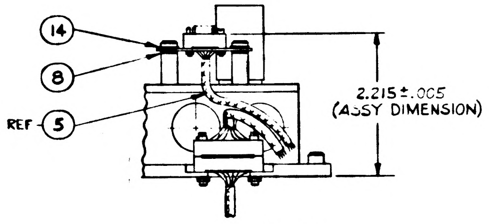
	SYM	ZONE	DESCRIPTION	DATE	APPROVAL
(B)	A3		REVISED PER TDRR NO 03812	10 Oct 63	WK
(H)	B6		REVISED PER TDRR NO. 06505	25 FEB 64	WK
(S)	C9		REVISED PER TDRR NO 08041	4-20-64	
(M)	D2		REVISED PER TDRR NO. 08600	5-19-64	
(M)	E3		REVISED PER TDRR NO. 08599	5-19-64	
(M)	F2		REVISED PER TDRR NO. 08458	5/19/64	
	G	C-5 OF SHEET 3	REVISED PER TDRR NO. 08598	5/19/64	



G	G	F
F	F	F
E	D	—
D	D	—
C	C	—
B	B	—
A	A	—
SHEET 1	SHEET 2	SHEET 3

REVISION STATUS OF SHEETS

(C9) (B2)



PARTIAL SECTION A-A

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

SEE SHEET 2 FOR SUBSEQUENT ITEMS

	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
(B3)	21	4		NAS1352C04LL4	74455157018		SCREW, CAP, SOC. HD. SELF LOCKING			
	20	1	*	1011599-10	74453034010		PACKING, PREFORMED, RETAINED			
	19	1		NAS1189C02P4L	74455155002		SCREW, SELF LOCKING, 100° FLAT HEAD			
	18	8		NAS1352C06LL5	74455157018		SCREW, CAP, SOC. HEAD, SELF LOCKING			
	17	2		NAS1352C06LL6	74455157019		SCREW, CAP, SOC. HEAD, SELF LOCKING			
(C3)	16	4		NAS1351C3LL10	74455156040		SCREW, CAP, SOC HEAD, SELF LOCKING			
(C4)	15									
	14	2		MS16624-15			RING, RETAINING, EXTERNAL, BASIC			
	13	1		MS15795-305			WASHER, FLAT			
	12	1	*	1011918-2			WASHER, CABLE CLAMP			
	11	1	*	1000220-6			CLAMP, CABLE			
(C5)	10	1	*	1000220-8			CLAMP, CABLE			
(E2)	9									
	8	AR		1011885	45386900170		SHIM			
	7	1	*	1011599-9	74453034009		PACKING, PREFORMED, RETAINED			
(E1)	6									
	5	1		1011713	80386900020		SCT BASE HARNESS ASSY			
	4	1		1011896	80386900030		SXT BASE HARNESS ASSY			
	3	1		1011909	85386900920		RESOLVER AND CONNECTOR ASSY OF			
	2	1		1011701	85386900760		SEXTANT INDEX HEAD ASSY			
	1	1		1011890	85386900710		OPTICAL UNIT SUBASSY - STAGE II			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

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MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 386900720

DRAWN DATE 7-9-63
CHECKED 8-2-63
APPROVAL 8-13-63
APPROVAL 8-15-63
NASA APPROVAL W.J. Klein F 1663
MIT APPROVAL 16 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE III

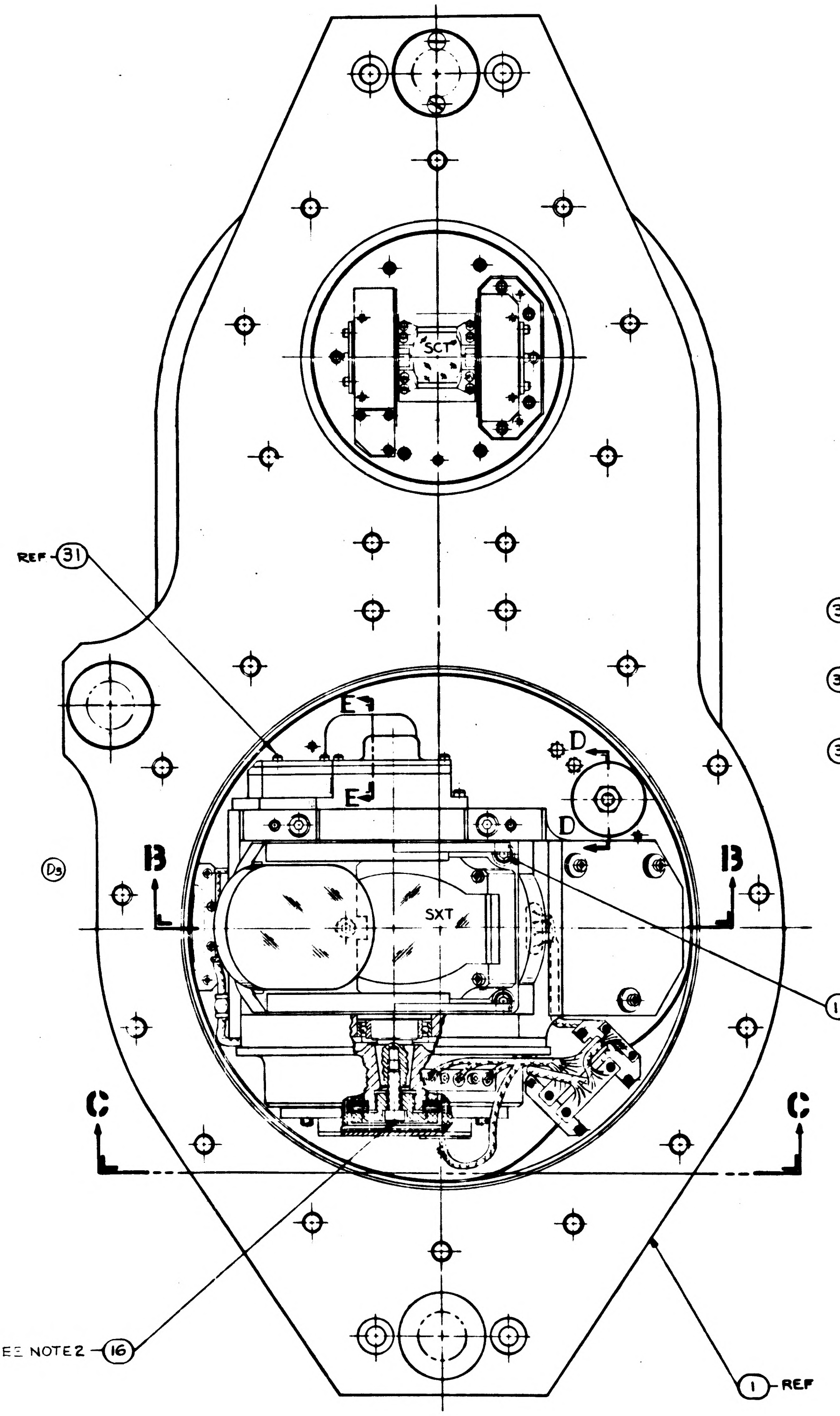
CODE IDENT NO. | SIZE E | NASA NUMBER 1011891
SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 3

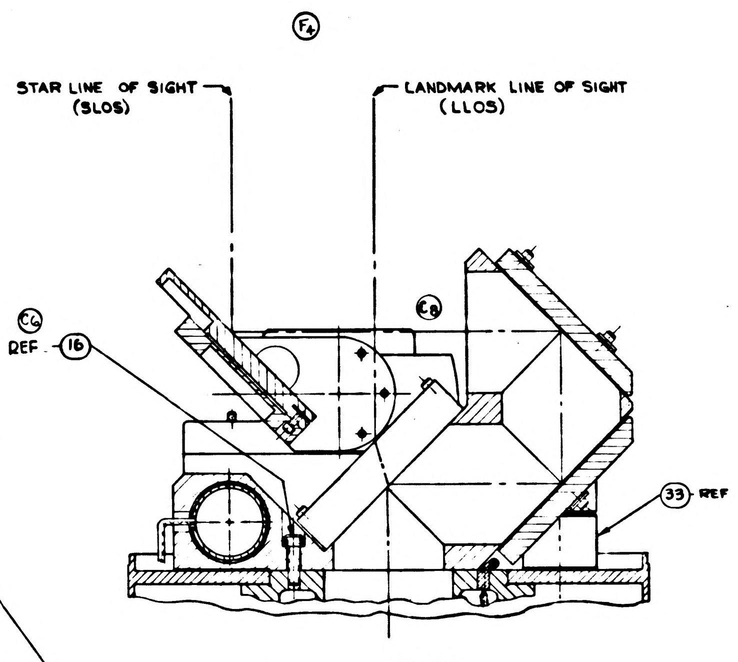
G
1011891

NOTES:
SEE SHEET 1 AND 3 OF 3.

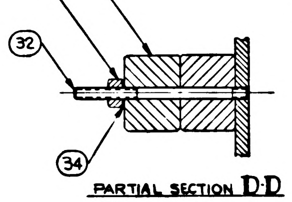
5 1681101

REVISIONS 02625 F-6-67				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		SEE SHEET NO. 1 TDRR 03812	10 Oct 63	GK
B6		REVISED PER TDRR NO. 06505	25 FEB 64	WK
C9		REVISED PER TDRR NO. 08041	4-20-64	
D3		REVISED PER TDRR NO. 08600	5-19-64	
F4		REVISED PER TDRR NO. 08458	3/19/64	
G	C-5	REVISED PER TDRR NO. 08598	3/19/64	



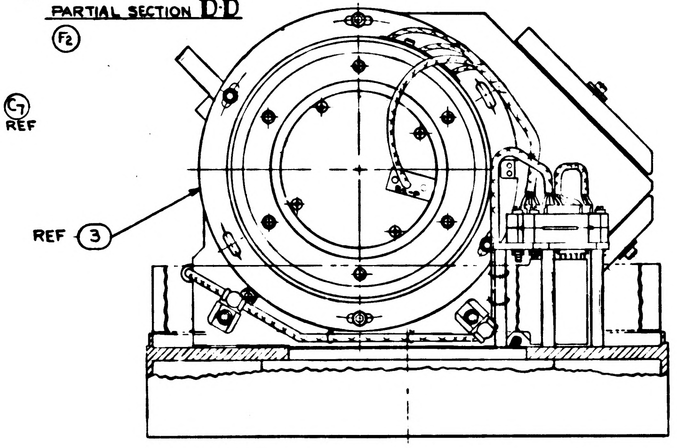


PARTIAL SECTION B-B



PARTIAL SECTION D-D

F2



D7
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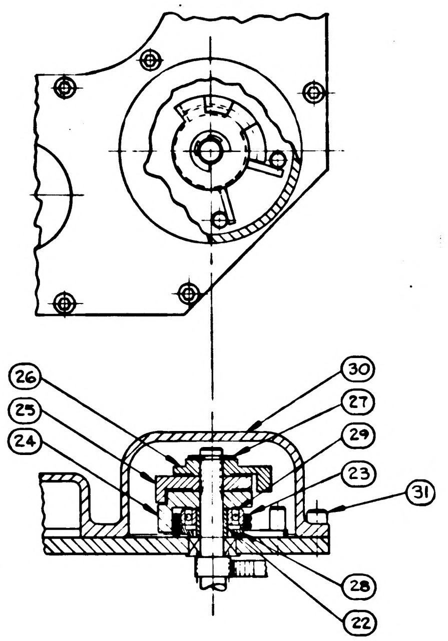
PARTIAL VIEW C-C

B5



F3 PARTIAL SECTION E-E
SCALE: 2/1

F1

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
35	1		AN363C1032			NUT, SELF-LOCKING, 550°F			
34	1		MS15795-308			WASHER, FLAT			
33	2		1011643	58386900080		COUNTERWEIGHT			
32	1		1011644	53386900070		ROD, THREADED			
31	10	NAS	1352C03LL6	74455157010		SCREW, CAP, SOC HEAD, SELF-LOCKING			
30	1		1011595	52386900730		COVER, GEAR BOX			
29	1		1011610			BEARING, BALL, ANNULAR			
28	1		1012075			SPACER			
27	1		MS16633-4017	74453081008		RING, RETAINING			
26	1		1011578	57386900930		DOG, LIMIT STOP, OUTER			
25	1		1011579	57386900940		DOG, LIMIT STOP, MIDDLE			
24	1		1011580	57386900950		DOG, LIMIT STOP, INNER			
23	1		1011577	56386900290		SPRING, TORSION			
22	1		1011581	57386900960		GUIDE, SPRING, LIMIT STOP			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

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CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900720
DRAWN DATE 7-9-63
CHECKED 8-12-63
APPROVAL 8-15-63
APPROVAL
NASA APPROVAL 6-16-67
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE III

CODE IDENT NO.
SIZE E
NASA NUMBER 1011891
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 2 OF 3

1011891 G

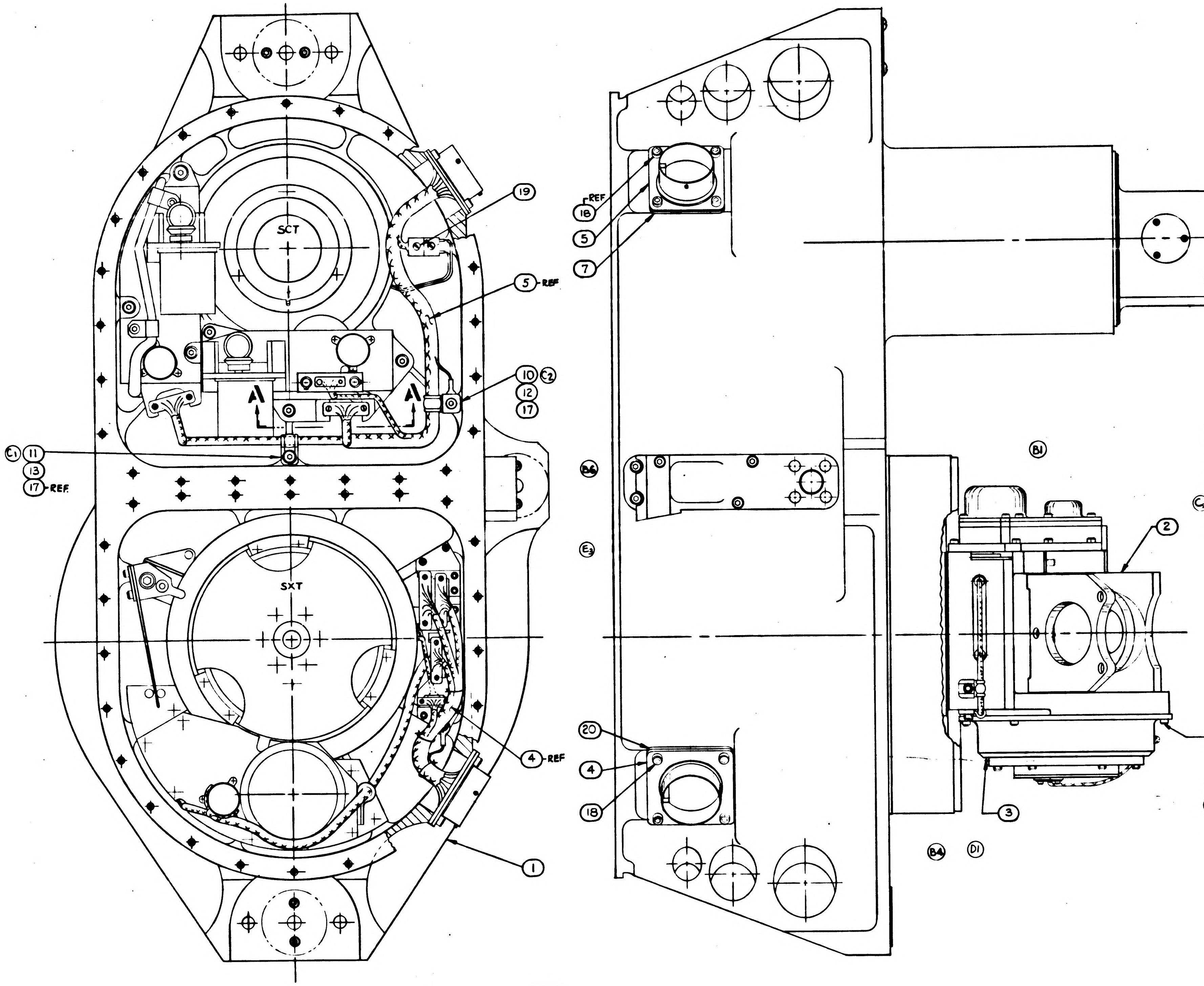
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. SEE SHEET 3 OF 3 FOR SUPPLEMENTARY ASSEMBLY INFORMATION.
3. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.

(F1)

H 1681101

REVISIONS 02625 8-16-63

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO 03812	10 Oct 63	WK
B6		REVISED PER TDRR NO. 06505	25 FEB 64	WK
C9		REVISED PER TDRR NO 08041	4-20-64	
D3		REVISED PER TDRR NO. 08600	5-19-64	
E3		REVISED PER TDRR NO. 08599	8-19-64	
F2		REVISED PER TDRR NO. 08458	5/14/64	
G	C-5 OF SHEET 2	REVISED PER TDRR NO. 08593	5/19/64	
H		REVISED PER TDRR NO. 09891	6/9/64	



H	G	H
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F	F	F
E	D	—
D	D	—
C	C	—
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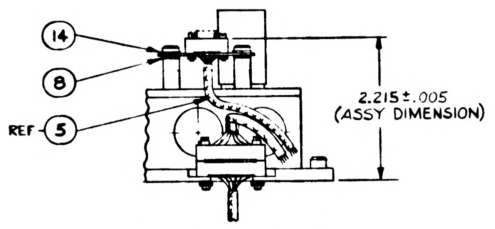
SHEET 1	SHEET 2	SHEET 3

REVISION STATUS OF SHEETS

(C9) (B2)



PARTIAL SECTION A-A

SEE SHEET 2 FOR SUBSEQUENT ITEMS

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
21	4		NAS1352C04LL4	74455157013		SCREW, CAP, SOC. HD. SELF LOCKING			
20	1	*	1011599-10	74453034010		PACKING, PREFORMED, RETAINED			
19	1		MS35249-11	74455187011		SCREW, 82° FLAT HEAD			
18	8		NAS1352C06LL5	74455157018		SCREW, CAP, SOC. HEAD, SELF LOCKING			
17	2		NAS1352C06LL6	74455157019		SCREW, CAP, SOC. HEAD, SELF LOCKING			
16	4		NAS1351C3LL10	74455156040		SCREW, CAP, SOC. HEAD, SELF LOCKING			
15									
14	2		MS16624-15			RING, RETAINING, EXTERNAL, BASIC			
13	1		MS15795-305			WASHER, FLAT			
12	1	*	1011918-2			WASHER, CABLE CLAMP			
11	1	*	1000220-6			CLAMP, CABLE			
10	1	*	1000220-8			CLAMP, CABLE			
9									
8	AR		1011885	45386900170		SHIM			
7	1	*	1011599-9	74453034009		PACKING, PREFORMED, RETAINED			
6									
5	1		1011713	80386900020		SCT BASE HARNESS ASSY			
4	1		1011896	80386900030		SXT BASE HARNESS ASSY			
3	1		1011909	85386900920		RESOLVER AND CONNECTOR ASSY OF			
2	1		1011701	85386900760		SEXTANT INDEX HEAD ASSY			
1	1		1011890	85386900710		OPTICAL UNIT SUBASSY - STAGE II			

LIST OF PARTS AND MATERIALS

(F2) (B3) (H) (C3) (C4) (C5) (E2) (E1)

1011891 H

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

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CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 38690 0720
DRAWN DATE 7-9-63
CHECKED 8-2-63
APPROVAL
APPROVAL
NASA APPROVAL F-4-63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE III

CODE IDENT NO.
SIZE E
NASA NUMBER 1011891
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 3

H 168110

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
F		SHEET 3 ADDED, TDRR 08458	[illegible]	[illegible]
H		REVISED PER TDRR No. 09891	5 June [illegible]	[illegible]

NOTE NO.	ITEM NO.	DWG. 1011-	SHEET NO.	
1	ALL	ALL	ALL	FOLLOW SEQUENCE OF NOTES WITHIN GROUPING OF NOTES 2 THRU 8 AND 9 THRU 20.
2	38	890	1	SELECT SPACER FOR 0.0000 TO 0.0020 END PLAY OF ITEM 2 RELATIVE TO ITEM 1 MEASURED WITH 5 LBS LOAD APPLIED IN EACH DIRECTION.
3	6	890	1	CENTER RETICLE BEFORE MOUNTING TRUNNION AXIS ASSEMBLY. (A) ADD ITEM 6 WITH TRUNNION IN POSITION SHOWN ON 1011215. RECENTER RETICLE AS REQUIRED IN DIRECTION PARALLEL TO TRUNNION WITHIN 0° 0' 20", (B) ROTATE RETICLE TO SET "R" LINE PARALLEL TO TRUNNION TRACK WITHIN 2 LINE WIDTHS END TO END OF "R" LINE. (A) AND (B) MUST BE MUTUALLY ATTAINED.
4	3	890	1	SET RELAY FOCUS SO THAT A COLLIMATED TARGET RETICLE FROM THE PANEL END OF RELAY ASS'Y IS SEEN IN THE SAME FOCUS AS THE SCT RETICLE AS OBSERVED THROUGH THE SCT OBJECTIVE.
5	7 & 8	890	1	POSITION TRUNNION AT ZERO (POSITION SHOWN ON DWG. 1011215). POSITION SHAFT AT ZERO (TRUNNION PARALLEL TO LONG AXIS OF 3 BALL MOUNT AND X ON TRUNNION AWAY FROM MIDDLE MOUNTING BALL). SET GEAR BOX COUNTERS AT ZERO AND RESOLVERS WITH NULL MARK ON SHAFT ALIGNED WITH ARROW ON BODY. MOUNT GEAR BOXES IN MESH WITH ALL THESE RELATIONS MAINTAINED WITHIN ABOUT 5°.
6	31	890	1	SET UP GEAR BOX MESHES WITH CLUSTER GEARS, ITEM 5, AS CLOSELY AS POSSIBLE WITHOUT INCURRING NOTICEABLE BINDING THROUGH FULL TURNS OF ITEM 5.
7A		891	1	AFTER ALL ITEMS PERTAINING TO SCT ARE ASSEMBLED, RESOLVER ZEROS SHALL BE SET WITHIN 0° 1' OF TEST FIXTURE OPTICAL REFERENCE.
7B				COUNTER ZEROS SHALL BE SET WITHIN 0.01° OF FIXTURE OPTICAL REFERENCE.
7C				TOTAL BACKLASH FROM COUNTERS TO LINE OF SIGHT SHALL NOT EXCEED 0.02° READ ON COUNTER BY APPROACHING THE SAME OPTICAL CHECK POSITIONS FROM BOTH DIRECTIONS.
7D				BOTH DRIVES SHALL START AT 6.2 VOLTS MAX. AND RUN AT 3.6 VOLTS MAX. THROUGHOUT 360° OF COUNTERS ROTATION IN BOTH DIRECTIONS EXCEPT AT 0° AND 180° WHERE 10 VOLTS MAX. STARTING THROUGH THE COUNTER MASK SHIFTING CYCLES IS PERMITTED. STARTING VOLTAGE NEED ONLY BE MEASURED AT ANY POINTS WHERE SLOWING OF THE DRIVE IS NOTICEABLE WHEN RUNNING BELOW ITS MAX. ALLOWED RUNNING VOLTAGE.
8	17	890	1	VIBRATION PROOF ITEMS 17 USING LOCKING COMPOUND GRADE CV PER MIL-S-22473.
9		890	2	WITH ALL ITEMS ON DWG. 1011890 SHEET 2 PLUS ITEMS 17 AND 20, ON SHEET 1 AND ITEMS 2 AND 15 OF DRAWING 1011891 SHEET 1 ASSEMBLED THE FOLLOWING REQUIREMENTS SHALL BE MET:
9A				WITH THE TRUNNION ROTATED TO THE MIRROR POSITION CORRESPONDING TO ZERO LINE OF SIGHT, THE SLOS AND LLOS SHALL BE LATERALLY PARALLEL WITHIN 0° 0' 20" ("R" LINE COINCIDENCE).
9B				WITH THE TRUNNION ROTATED TO THE MIRROR POSITION AT WHICH THE SXT RETICLE IS REFLECTED BACK ON ITSELF, THE "R" LINE OF THE REFLECTED IMAGE SHALL COINCIDE WITH THE RETICLE "R" LINE WITHIN 0° 0' 10".
9C				THE DIFFERENCE BETWEEN MEASURES "9A" AND "9B" TAKING DIRECTION INTO ACCOUNT SHALL NOT EXCEED 0° 0' 20".
9D				THE SUM OF THE MEASURES "9A" AND "9B" SHALL NOT EXCEED 0° 0' 25" IGNORING DIRECTION.
9E				THE RETICLE AS OBSERVED THROUGH THE LLOS SHALL BE COINCIDENT WITH THE SHAFT AXIS WITHIN 0° 0' 5".
9F				THE RETICLE AS OBSERVED THROUGH THE SLOS SHALL BE COINCIDENT WITH THE SHAFT AXIS WITHIN 0° 0' 20", THAT IS, MEASURES "9A" AND "9E" SHALL NOT HAVE ADDITIVE TOLERANCES.
9G				THE RETICLE "R" LINE SHALL ALIGN WITH THE TRUNNION TRACK WITHIN 0° 0' 10" VARIATION OVER ITS WHOLE LENGTH.
10	3	891	1	THE 64X AND 1X RESOLVERS ARE TO BE AT THEIR MECHANICAL ZERO POSITION WITHIN 0° 1' WHEN THE SLOS AND LLOS ARE COINCIDENT ("M" LINES COINCIDENT).
11	9	890	1	THE 16X RESOLVER IS TO BE AT ITS MECHANICAL ZERO POSITION WITHIN 0° 1' WHEN THE SHAFT IS OPTICALLY POSITIONED TO A LINE OF SIGHT NORMAL TO THE LINE BETWEEN THE END BALLS AND AWAY FROM THE THIRD BALL OF THE THREE BALL MOUNTING.
12	22 THRU 29	891	2	THE LIMIT STOP IS TO BE SET SO THAT THE TRUNNION MIRROR HAS EQUAL OVERTRAVEL AT 0° TO THE 90° (SELF COLL.) LINE OF SIGHT POSITIONS WITHIN 3°.
13		891	2	THE ANTI-BACKLASH SPRING IS TO BE WOUND UP 1/4 TURN CLOCKWISE AND CLAMPED WHEN THE MIRROR IS AT THE 90°+ STOP POSITION.
14	32 THRU 35	891	2	WITH ITEMS 3, 21, 30 AND 31 IN PLACE, ITEMS 32 THRU 35 SHALL BE POSITIONED BY SELECTION OF HOLES AND ORIENTATION OR REDUCTION OF ECCENTRIC WEIGHTS ON THE THREADED POST TO BALANCE THE SHAFT WITHIN 2 IN. OZ. VIBRATION PROOF USING LOCKING COMPOUND GRADE CV PER MIL-S-22473 ON THREADS OF POST AND ON SURFACES OF WEIGHTS WHERE THEY CONTACT EACH OTHER AND THE MOUNTING SURFACE. BALANCE IS IN TOLERANCE IF 2 IN. OZ. TORQUE WILL REVERSE THE IMBALANCE.
15	12	890	1	THE SXT SHAFT SHALL BE AT ITS ZERO POSITION, SEE NOTE 11, DURING THE ASSEMBLY OF ITEMS 12 AND ITS HARDWARE, ITEM 22 AND ITS HARDWARE AND ITEM 11 AND ITS HARDWARE. ITEM 12, SHAFT GEARBOX MUST HAVE ITS RESOLVER PRESET TO ITS ELECTRICAL ZERO REFERENCE MARK. ITEM 22 MUST BE POSITIONED WITH ITS STOP DOG IN THE LARGER SECTOR BETWEEN THE TWO PINS ON ITEM 10.
16	30	890	1	VIBRATION PROOF USING LOCKING COMPOUND GRADE CV PER MIL-S-22473.
17	12	890	1	WITH THE SXT SHAFT ROTATED TO ITS COUNTER CLOCKWISE STOP, WIND UP THE ANTI-BACKLASH SPRING BY MEANS OF ITS COVER UNTIL TENSION IS SUFFICIENT TO TAKE UP BACKLASH IN THIS POSITION (1/4 TURN APPROX.). SPRING SHOULD TAKE UP BACKLASH WHEN BULL GEAR IS MANUALLY TURNED CLOCKWISE AND RELEASED.
18	12	890	1	SET THE 1/2 SPEED SHAFT RESOLVER ZERO WITHIN 0° 1' OF THE FIXTURE OPTICAL REFERENCE (SEE NOTE 11). ADD REMAINING ITEMS SHOWN ON DWGS. 1011890 AND 891 AND MEASURE SHAFT AND TRUNNION DRIVE VOLTAGES IN BOTH DIRECTIONS FROM STOP TO STOP. RUNNING SHALL NOT EXCEED 3.6 VOLTS. STARTING MEASURED AT POINTS WHERE DRIVE SLOWS DOWN SHALL NOT EXCEED 6.2 VOLTS. RUNNING SHALL BE MONITORED BY OBSERVING RATE GENERATOR OUTPUT OF EACH DRIVE.
19		890	1	VIBRATION PROOF SXT RETICLE LOCKING RING USING 1 DROP OF LOCKING COMPOUND GRADE H PER MIL-S-22473.
20	42 19	890 891	1 1	VIBRATION PROOF USING LOCKING COMPOUND GRADE HV PER MIL-S-22473.

Ⓕ THIS SHEET ADDED

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

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KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900720
DRAWN [illegible] DATE 5-11-6[illegible]
CHECKED [illegible]
APPROVAL [illegible]
APPROVAL [illegible] 5/12/6[illegible]
NASA APPROVAL W. J. [illegible] 5-14-6[illegible]
MIT APPROVAL [illegible]

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY,
STAGE III

CODE IDENT NO.
SIZE E
NASA NUMBER 1011891
SCALE
WEIGHT CALC ACTUAL
SHEET 3 OF 3

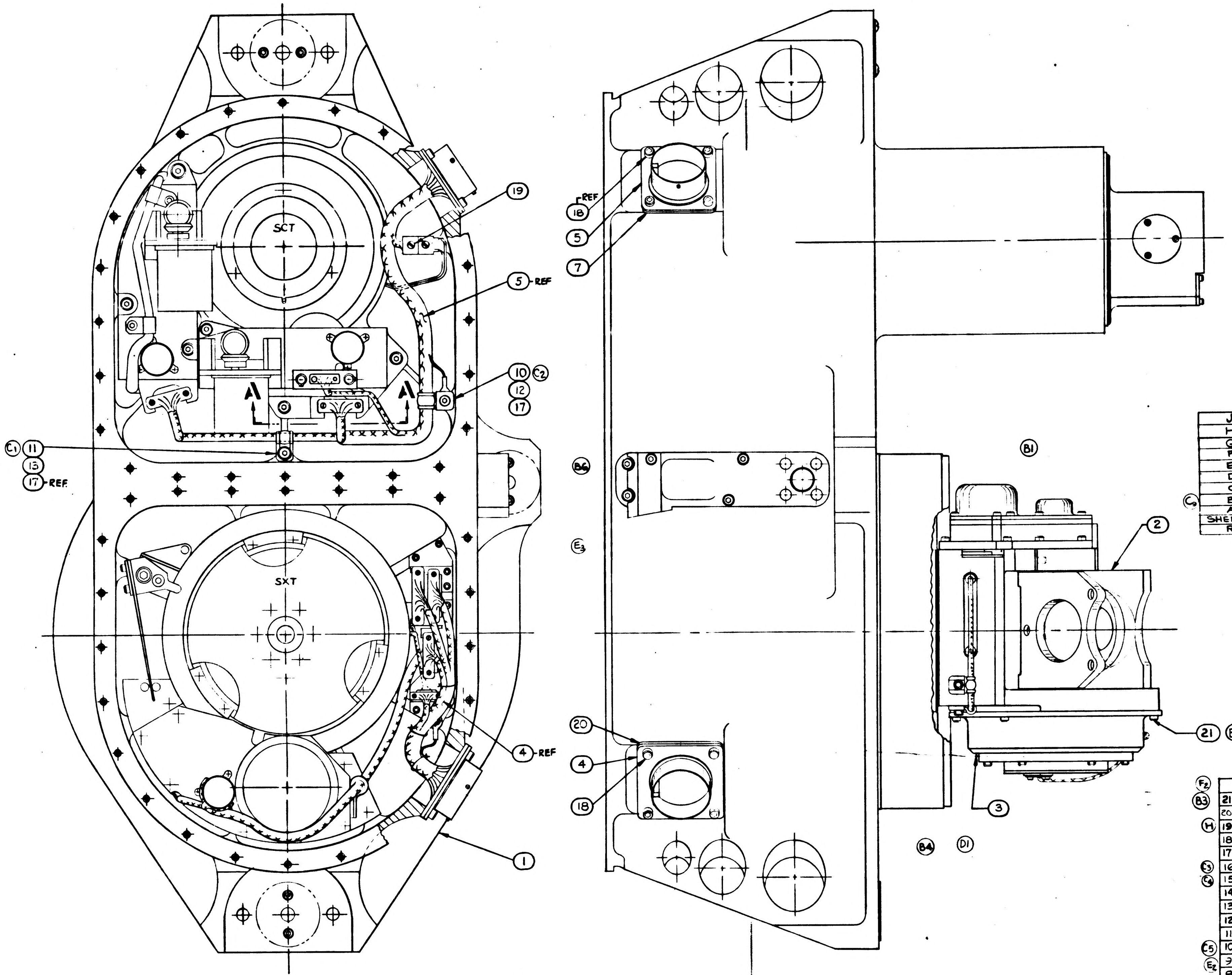
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. SEE SHEET 3 OF 3 FOR SUPPLEMENTARY ASSEMBLY INFORMATION.
3. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.

(F1)

1681101

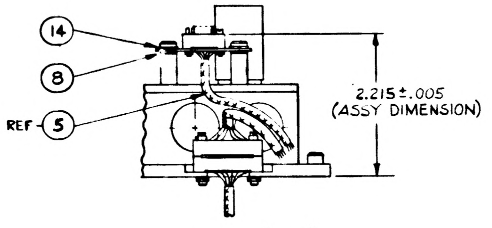
REVISIONS 02625 8-16-63

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO 03812	10 Oct 63	WK
B6		REVISED PER TDRR NO. 06505	25 FEB 64	WK
C9		REVISED PER TDRR NO 08041	4-20-64	
D2		REVISED PER TDRR NO. 08600	5-19-64	
E3		REVISED PER TDRR NO. 08599	5-19-64	
F2		REVISED PER TDRR NO. 08458	5/14/64	
G	C.S OF SHEET 2	REVISED PER TDRR NO. 08598	5/14/64	
H		REVISED PER TDRR NO. 09891	4/2/66	
J		REVISION STATUS CHANGED PER TDRR No. 10990	7/14/6.	



SHEET 1	SHEET 2	SHEET 3
J	J	H
H	G	H
G	G	F
F	F	F
E	D	—
D	D	—
C	C	—
B	B	—
A	A	—

REVISION STATUS OF SHEETS (B2) (C9)



PARTIAL SECTION **A-A**

SEE SHEET 2 FOR SUBSEQUENT ITEMS (F2)

	ITEM NO	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
(B3)	21	4		NAS1352C04LL4	74455157013		SCREW, CAP, SOC. HD. SELF LOCKING			
	20	1	*	1011599-10	74453034010		PACKING, PREFORMED, RETAINED			
(H)	19	1		MS35249-11	74455187011		SCREW, 82° FLAT HEAD			
	18	8		NAS1352C06LL5	74455157018		SCREW, CAP, SOC. HEAD, SELF LOCKING			
	17	2		NAS1352C06LL6	74455157019		SCREW, CAP, SOC. HEAD, SELF LOCKING			
(C3)	16	4		NAS1351C3LL10	74455156040		SCREW, CAP, SOC. HEAD, SELF LOCKING			
(C4)	15									
	14	2		MS16624-15			RING, RETAINING, EXTERNAL, BASIC			
	13	1		MS15795-305			WASHER, FLAT			
	12	1	*	1011918-2			WASHER, CABLE CLAMP			
	11	1	*	1000220-6			CLAMP, CABLE			
(C5)	10	1	*	1000220-8			CLAMP, CABLE			
(E2)	9									
	8	AR		1011885	45386900170		SHIM			
	7	1	*	1011599-9	74453034009		PACKING, PREFORMED, RETAINED			
(E1)	6									
	5	1		1011713	80386900020		SCT BASE HARNESS ASSY			
	4	1		1011896	80386900030		SXT BASE HARNESS ASSY			
	3	1		1011909	85386900920		RESOLVER AND CONNECTOR ASSY OF			
	2	1		1011701	85386900760		SEXTANT INDEX HEAD ASSY			
	1	1		1011890	85386900710		OPTICAL UNIT SUBASSY - STAGE I			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900720
DRAWN T. Borowski DATE 7-9-63
CHECKED 8-2-63
APPROVAL 8-1-63
APPROVAL
NASA APPROVAL W. G. 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE III

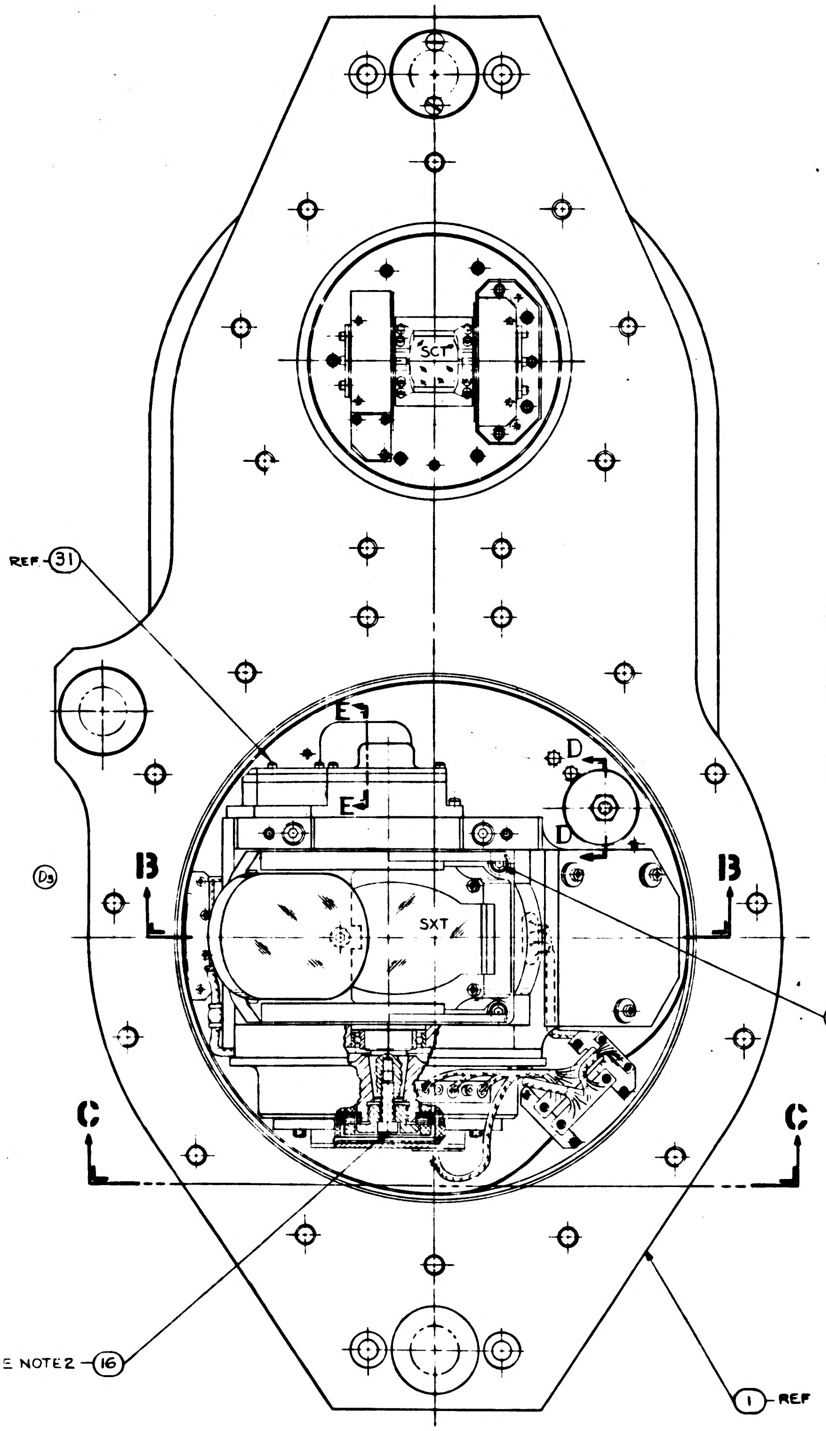
CODE IDENT NO.
SIZE E
NASA NUMBER 1011891
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 3

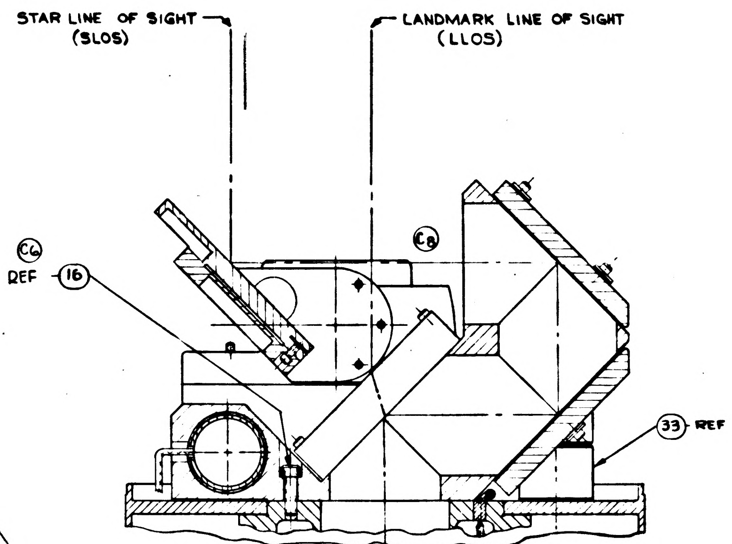
NOTES:
SEE SHEET 1 AND 3 OF 3.

r 1681101

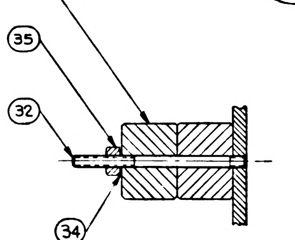
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		SEE SHEET NO. 1 TDRR 03812	10 Oct 62	GK
B6		REVISED PER TDRR NO. 06505	25 FEB 64	WK
C9		REVISED PER TDRR NO. 08041	4-20-64	
D3		REVISED PER TDRR NO. 08600	5-19-64	
F4		REVISED PER TDRR NO. 08458	3/14/64	
G	C-5	REVISED PER TDRR NO. 08598	3/19/64	
J		REVISED PER TDRR NO. 10990	7/14/64	

REVISIONS 02625 8-6-63



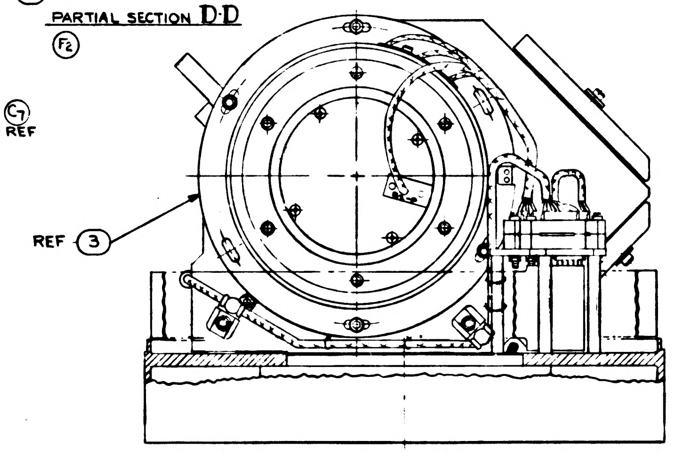


PARTIAL SECTION B-B



PARTIAL SECTION D-D

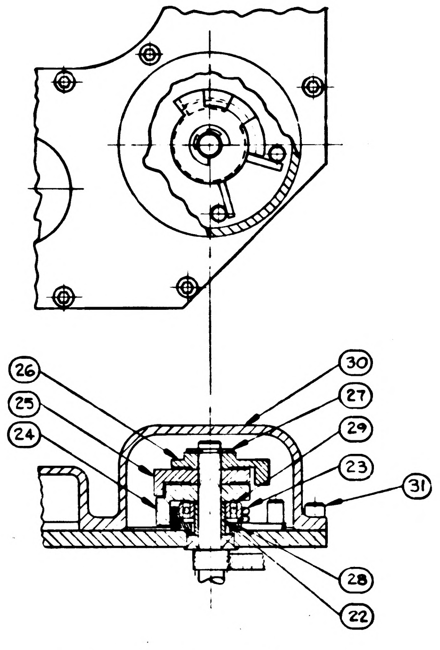
F2



D2
G

PARTIAL VIEW C-C

B5



F3

PARTIAL SECTION E-E
SCALE: 2/1

F1

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
35	1		AN363C1032			NUT, SELF-LOCKING, 550°F			
34	1		MS15795-308			WASHER, FLAT			
33	2		1011643	58386900080		COUNTERWEIGHT			
32	1		1011644	53386900070		ROD, THREADED			
31	10	NAS	1352C03LL6	74455157010		SCREW, CAP, SOC HEAD, SELF-LOCKING			
30	1		1011595	52386900730		COVER, GEAR BOX			
29	1		1011610			BEARING, BALL, ANNULAR			
28	1		1012075			SPACER			
27	1		MS16633-4017	74453081008		RING, RETAINING			
26	1		1011578	57386900930		DOG, LIMIT STOP, OUTER			
25	1		1011579	57386900940		DOG, LIMIT STOP, MIDDLE			
24	1		1011580	57386900950		DOG, LIMIT STOP, INNER			
23	1		1011577	56386900290		SPRING, TORSION			
22	1		1012074	57386901680		SLEEVE			

J

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
011000	5 000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS + − DECIMALS + − ANGLES + −
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 386900720
DRAWN Bottari DATE 7-9-63
CHECKED 8-12-63
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE III

CODE IDENT NO.
SIZE E
NASA NUMBER 1011891
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 2 OF 3

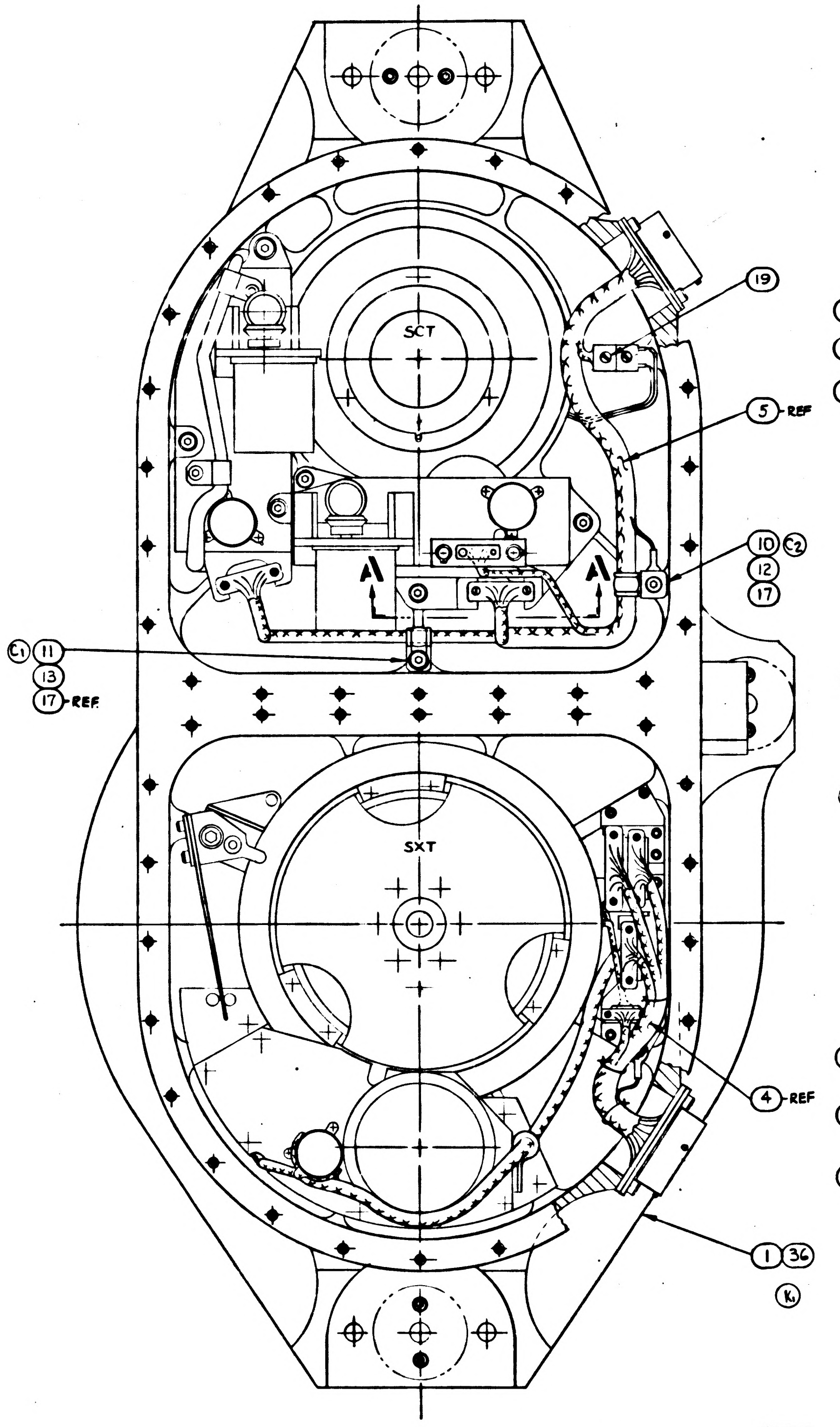
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. SEE SHEET 3 OF 3 FOR SUPPLEMENTARY ASSEMBLY INFORMATION.
3. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.

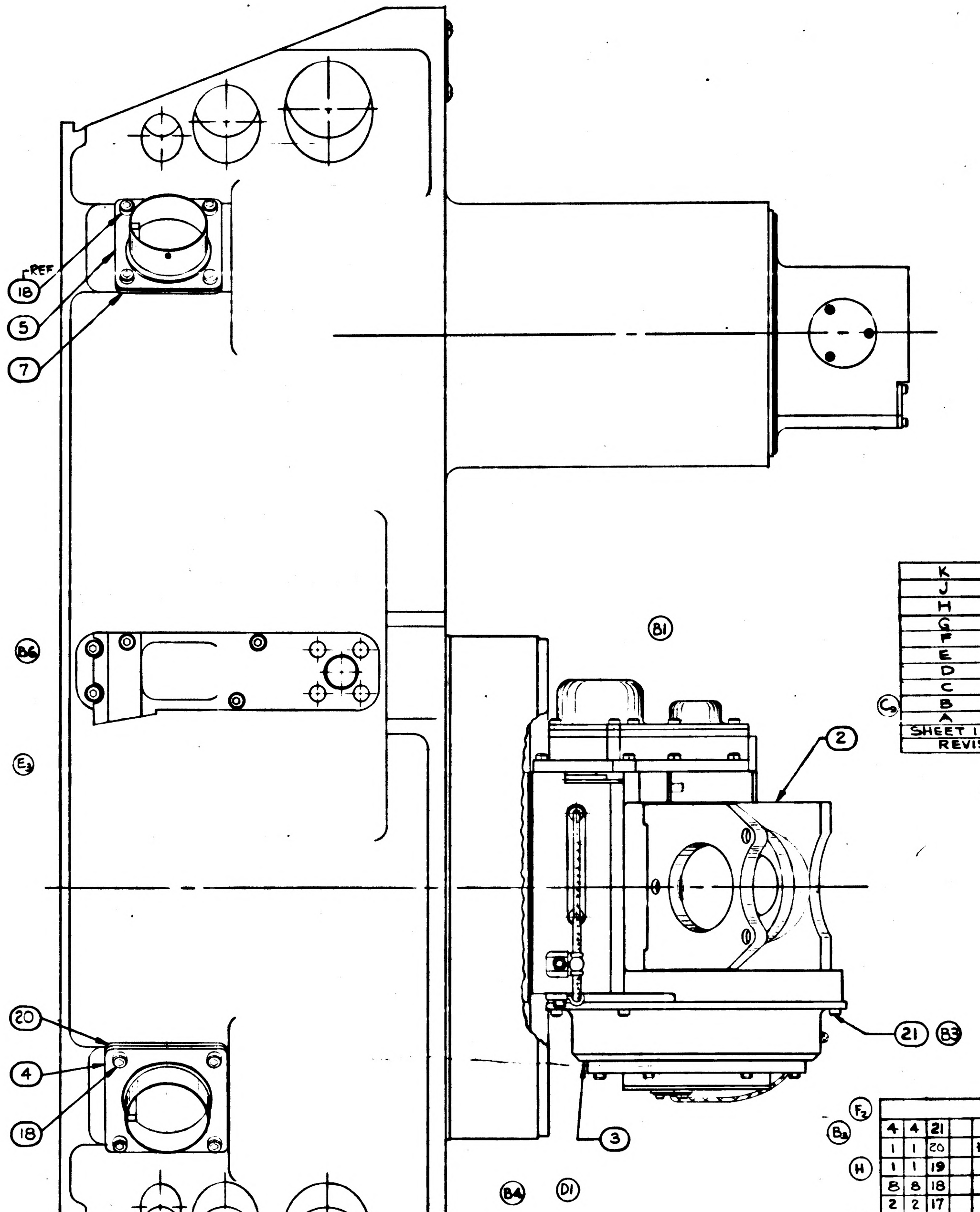
(F1)

K	1681101

REVISIONS 02625 8-16-63

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO. 03812	10 Oct 63	WK
B6		REVISED PER TDRR NO. 06505	25 FEB 64	WK
C9		REVISED PER TDRR NO 08041	4-20-64	
D3		REVISED PER TDRR NO. 08600	3-19-64	
E3		REVISED PER TDRR NO. 08599	3-19-64	
F2		REVISED PER TDRR NO. 08458	5/14/64	
G	C-5 OF SHEET 2	REVISED PER TDRR NO. 08593	5/19/64	
H		REVISED PER TDRR NO. 09891	6/3/64	
J		REVISION STATUS CHANGED PER TDRR No. 10990	7/14/64	
K2		REVISED PER TDRR NO. 3452	10/14/64	

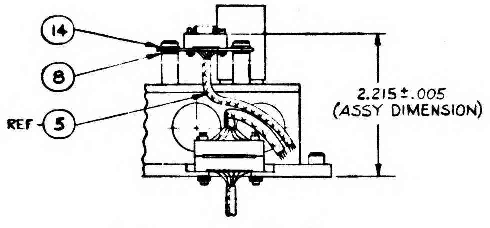




K	K	H
J	J	H
H	G	H
G	G	F
F	F	F
E	D	—
D	D	—
C	C	—
B	B	—
A	A	—
SHEET 1	SHEET 2	SHEET 3

REVISION STATUS OF SHEETS

(B2) (C9)



PARTIAL SECTION A·A

SEE SHEET 2 FOR SUBSEQUENT ITEMS

QTY REQ 001	QTY REQ 000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
4	4	21			NAS1352C04LL4	74455157013		SCREW, CAP, SOC. HD. SELF LOCKING			
1	1	20		*	1011599-10	74453034010		PACKING, PREFORMED, RETAINED			
1	1	19			MS35249-11	74455187011		SCREW, 82° FLAT HEAD			
8	8	18			NAS1352C06LL5	74455157018		SCREW, CAP, SOC. HEAD, SELF LOCKING			
2	2	17			NAS1352C06LL6	74455157019		SCREW, CAP, SOC. HEAD, SELF LOCKING			
4	4	16			NAS1351C3LL10	74455156040		SCREW, CAP, SOC. HEAD, SELF LOCKING			
		15									
2	2	14			MS16624-15			RING, RETAINING, EXTERNAL, BASIC			
1	1	13			MS15795-305			WASHER, FLAT			
1	1	12		*	1011918-2			WASHER, CABLE CLAMP			
1	1	11		*	1000220-6			CLAMP, CABLE			
1	1	10		*	1000220-8			CLAMP, CABLE			
		9									
AR	AR	8			1011885	45386900170		SHIM			
1	1	7		*	1011599-9	74453034009		PACKING, PREFORMED, RETAINED			
		6									
1	1	5			1011713	80386900020		SCT BASE HARNESS ASSY			
1	1	4			1011896	80386900030		SXT BASE HARNESS ASSY			
1	1	3			1011909	85386900920		RESOLVER AND CONNECTOR ASSY OF			
1	1	2			1011701	85386900760		SEXTANT INDEX HEAD ASSY			
0	1	1			1011890	85386900710		OPTICAL UNIT SUBASSY - STAGE II			

LIST OF PARTS AND MATERIALS

(F2) (B3) (H) (C3) (C4) (C5) (E2) (E1) (K2)

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 38690 0720

DRAWN DATE 7-9-63
CHECKED 8-2-63
APPROVAL 8-13-63
APPROVAL 8-15-63
NASA APPROVAL W J Kline 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE III

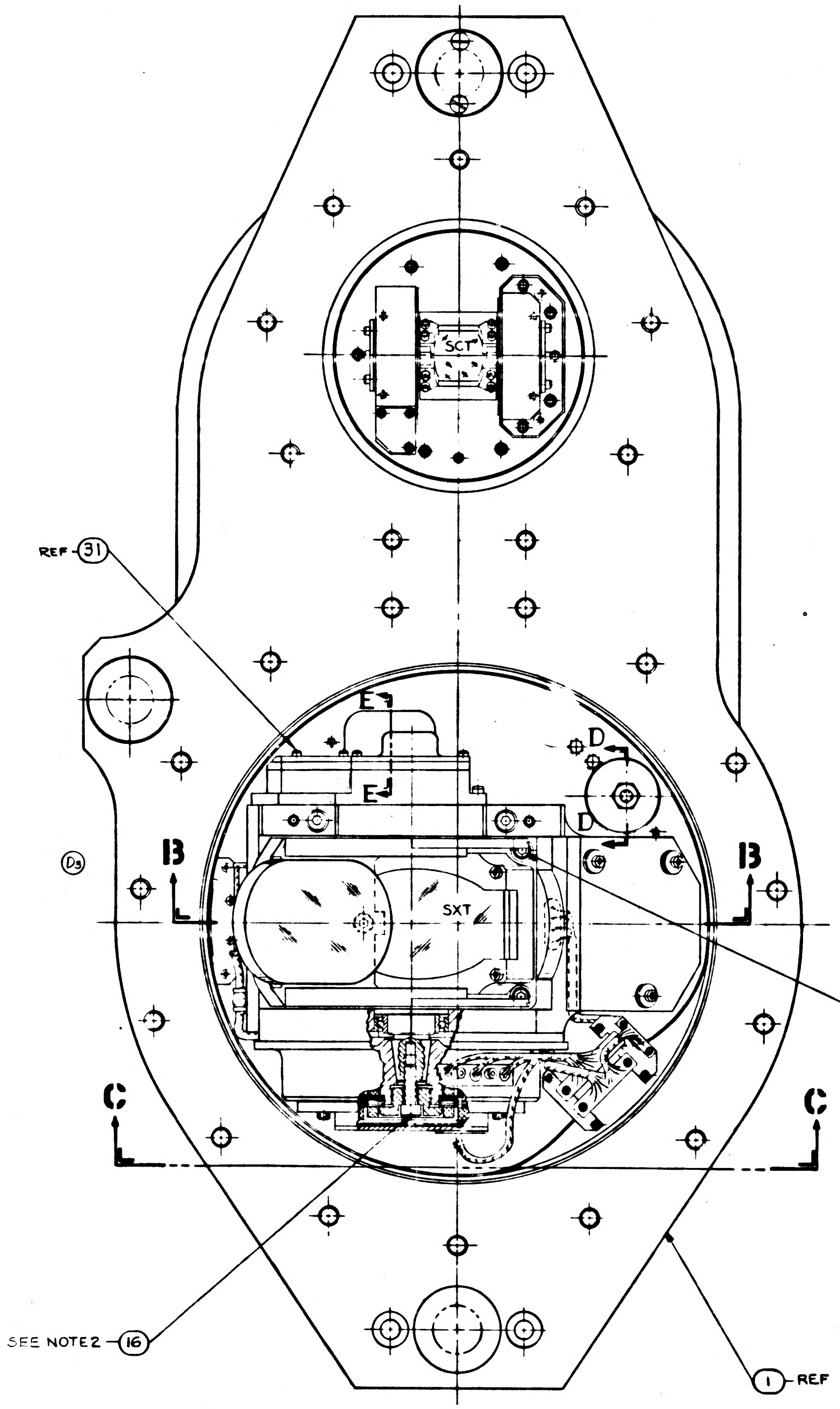
CODE IDENT NO. | SIZE E | NASA NUMBER 1011891
SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 3

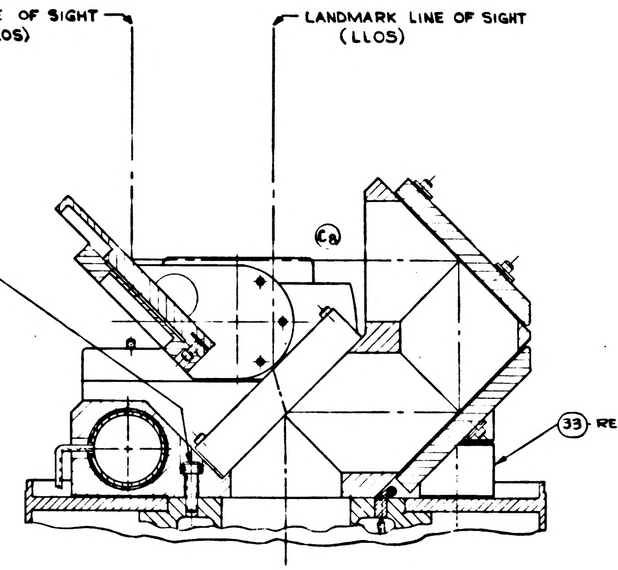
1011891 K

NOTES:
SEE SHEET 1 AND 3 OF 3.

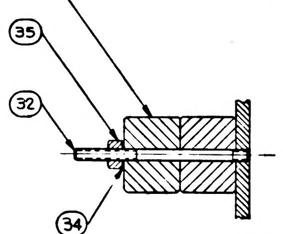
K 1681101

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS 02625 8-6-63				
A		SEE SHEET NO. 1 TDRR 03812	10 Oct 63	
B6		REVISED PER TDRR NO. 06505	25 FEB 64	
C9		REVISED PER TDRR NO. 08041	4-20-64	
D3		REVISED PER TDRR NO. 08600	5-19-64	
F4		REVISED PER TDRR NO. 08458	5/14/64	
G	C-5	REVISED PER TDRR NO. C8598	5/19/64	
J		REVISED PER TDRR NO. 10990	7/14/64	
K		REVISED PER TDRR NO. 13452	10/ /64	



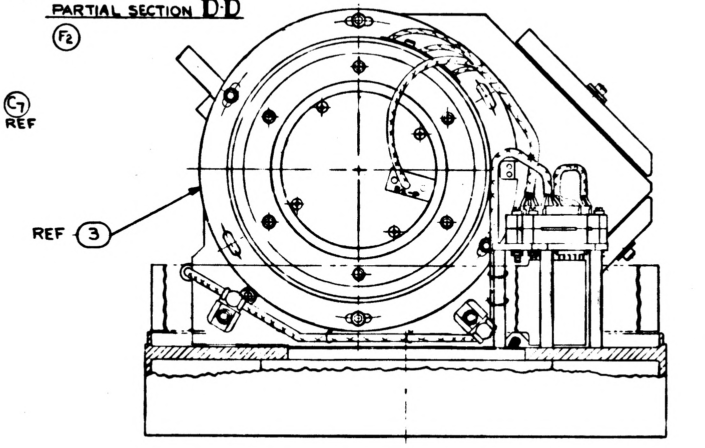


PARTIAL SECTION B-B



PARTIAL SECTION D-D

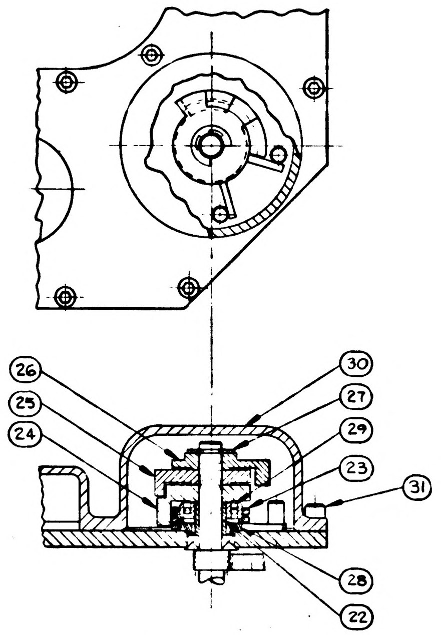
F2



D2
G

PARTIAL VIEW C-C

B5



F3

PARTIAL SECTION E-E
SCALE: 2/1

QTY REQ 001	QTY REQ 000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
1	0	36			1011890-001			OPTICAL UNIT SUB-ASSY STAGE II			
1	1	35			AN363C1032			NUT, SELF-LOCKING, 550°F			
1	1	34			MS15795-308			WASHER, FLAT			
2	2	33			1011643	58386900080		COUNTERWEIGHT			
1	1	32			1011644	53386900070		ROD, THREADED			
10	10	31		NAS	1352C03LL6	74455157010		SCREW, CAP, SOC HEAD, SELF-LOCKING			
1	1	30			1011595	52386900730		COVER, GEAR BOX			
1	1	29			1011610			BEARING, BALL, ANNULAR			
1	1	28			1012075			SPACER			
1	1	27			MS16633-4017	74453081008		RING, RETAINING			
1	1	26			1011578	57386900930		DOG, LIMIT STOP, OUTER			
1	1	25			1011579	57386900940		DOG, LIMIT STOP, MIDDLE			
1	1	24			1011580	57386900950		DOG, LIMIT STOP, INNER			
1	1	23			1011577	56386900290		SPRING, TORSION			
0	1	22			1012074	57386901680		SLEEVE			

LIST OF PARTS AND MATERIALS

K
J
F1

NEXT ASSY	USED ON
011000	011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900720
DRAWN DATE 7-9-63
CHECKED 8-12-63
APPROVAL 8-7-63
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE III

CODE IDENT NO.
SIZE E
NASA NUMBER 1011891
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 2 OF 3

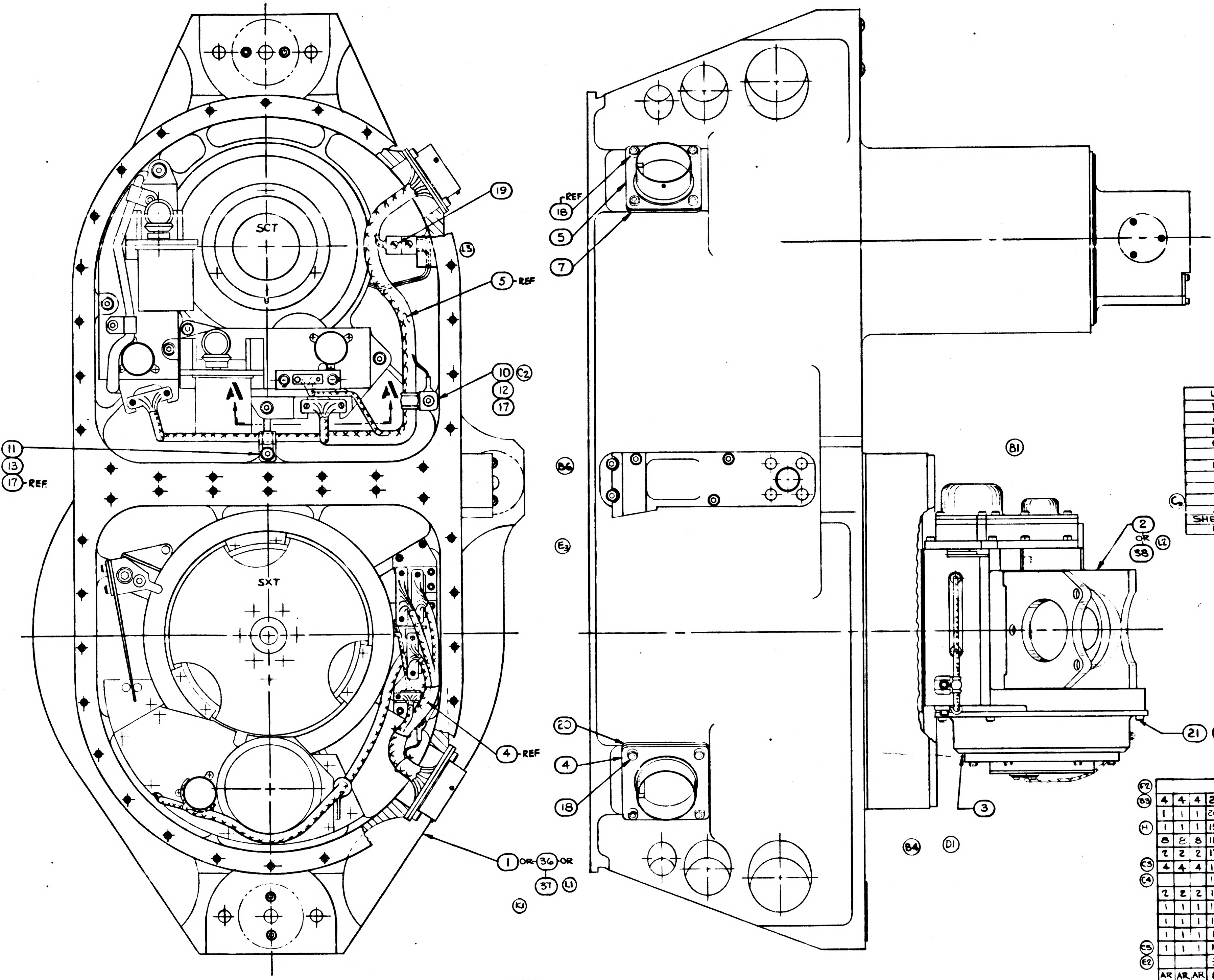
K 1011891

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. SEE SHEET 3 OF 3 FOR SUPPLEMENTARY ASSEMBLY INFORMATION.
3. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.

Ⓕ₁

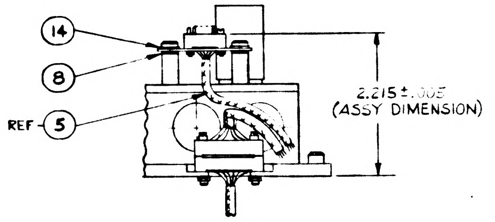
7 | 1681101

REVISIONS 02675 8-1-63				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A₃		REVISED PER TDRR NO 03812	10 Oct	
B₆		REVISED PER TDRR NO. 06505	25 FEB 64	
C₉		REVISED PER TD2R NO 08041	4-20-64	
D₃		REVISED PER TDRR NO. 08600	5-19-64	
E₃		REVISED PER TDRR NO. 08599	5-19-64	
F₂		REVISED PER TDRR NO. 08458	5/14/64	
G	C-5 OF SHEET 2	REVISED PER TDRR NO 08593	5/29/64	
H		REVISED PER TDRR NO. 09891	9/8/64	
J		REVISION STATUS CHANGED PER TDRR No. 10990	7/14/64	
K₂		REVISED PER TDRR NO. 3452	10/14/65	
L₄		REVISED PER TDRR NO 15347	1/4/68	



SHEET 1	SHEET 2	SHEET 3
L	L	H
K	K	H
J	J	H
H	G	H
G	G	F
F	F	F
E	D	—
D	D	—
C	C	—
B	B	—
A	A	—

REVISION STATUS OF SHEETS



PARTIAL SECTION A-A

SEE SHEET 2 FOR SUBSEQUENT ITEMS													
002	001	000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
4	4	4	21			NAS1352C04LL4	74455157013		SCREW, CAP, SOC. HD. SELF LOCKING			
1	1	1	20		*	1011599-10	74453034010		PACKING, PREFORMED, RETAINED			
1	1	1	19			MS35249-11	74455187011		SCREW, 82° FLAT HEAD			
8	8	8	18			NAS1352C06LL5	74455157018		SCREW, CAP, SOC. HEAD, SELF LOCKING			
2	2	2	17			NAS1352C06LL6	74455157019		SCREW, CAP, SOC. HEAD, SELF LOCKING			
4	4	4	16			NAS1351C3LL10	74455156040		SCREW, CAP, SOC. HEAD, SELF LOCKING			
			15									
2	2	2	14			MS16624-15			RING, RETAINING, EXTERNAL, BASIC			
1	1	1	13			MS15795-305			WASHER, FLAT			
1	1	1	12		*	1011918-2			WASHER, CABLE CLAMP			
1	1	1	11		*	1000220-6			CLAMP, CABLE			
1	1	1	10		*	1000220-8			CLAMP, CABLE			
			9									
AR	AR	AR	8			1011885	45386900170		SHIM			
1	1	1	7		*	1011599-9	74453034009		PACKING, PREFORMED, RETAINED			
			6									
1	1	1	5			1011713	80386900020		SCT BASE HARNESS ASSY			
1	1	1	4			1011896	80386900030		SXT BASE HARNESS ASSY			
1	1	1	3			1011909	85386900920		RESOLVER AND CONNECTOR ASSY OF			
0	1	1	2			1011701	85386900760		SEXTANT INDEX HEAD ASSY			
0	0	1	1			1011890	85386900710		OPTICAL UNIT SUBASSY - STAGE II			

QTY REQ

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900720

DRAWN DATE 7-9-63
CHECKED 8-2-63
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE III

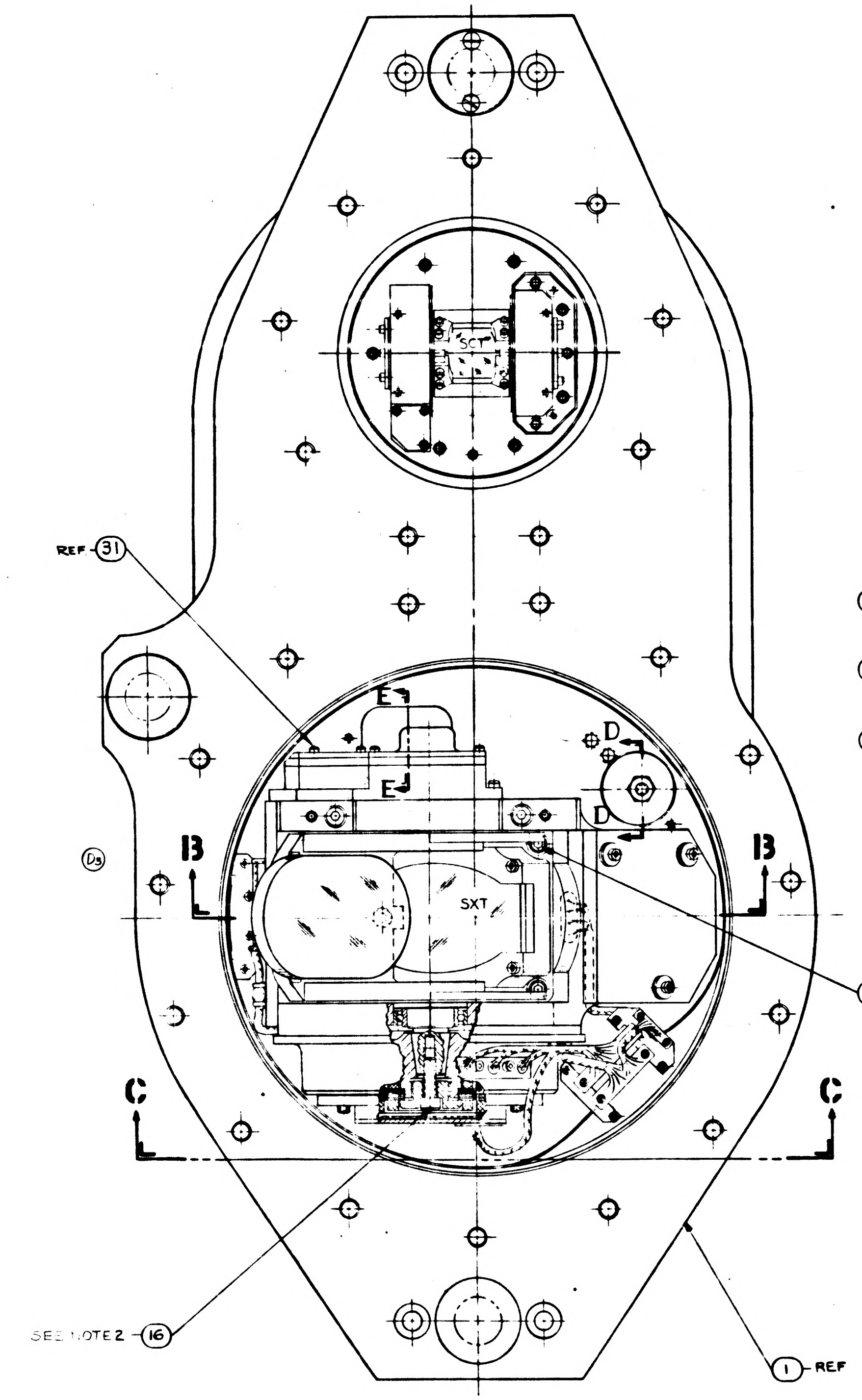
CODE IDENT NO.
SIZE E
NASA NUMBER 1011891
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 3

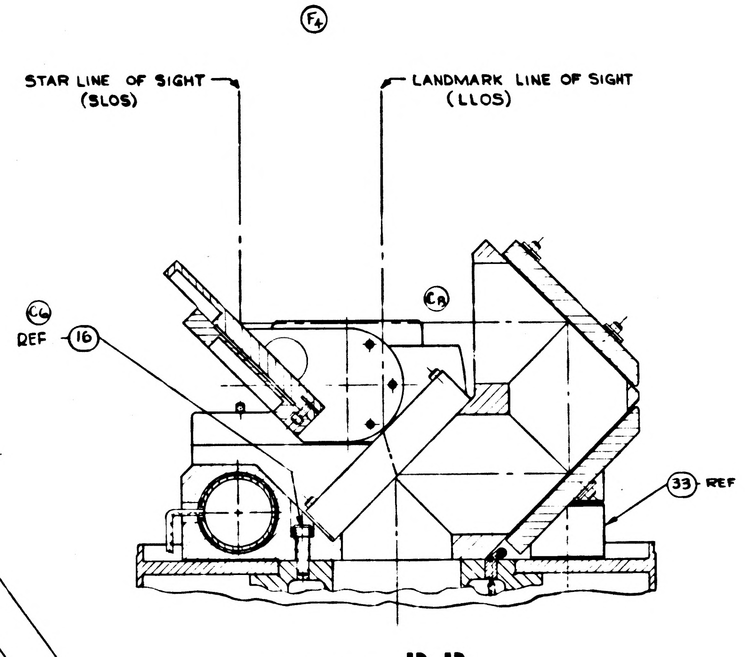
NOTES:
SEE SHEET 1 AND 3 OF 3.

7	1681101

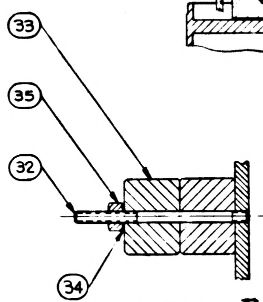
REVISIONS 32625 7-6-63

	SYM	ZONE	DESCRIPTION	DATE	APPROVAL
	A		SEE SHEET NO. 1 TDRR 03812	10 Oct	
	B6		REVISED PER TDRR NO. 06505	25 FEB 64	
	C9		REVISED PER TDRR NO. 08C41	4-20-64	
	D3		REVISED PER TDRR NO. 08600	5-19-64	
	F4		REVISED PER TDRR NO. 08458	5/14/64	
	G	C-5	REVISED PER TDRR NO. 08598	5/19/64	
	J		REVISED PER TDRR NO. 10990	7/14/64	
	K		REVISED PER TDRR NO. 13452	[illegible]	
	L		REVISED PER TDRR NO. 15544	1/6/65	

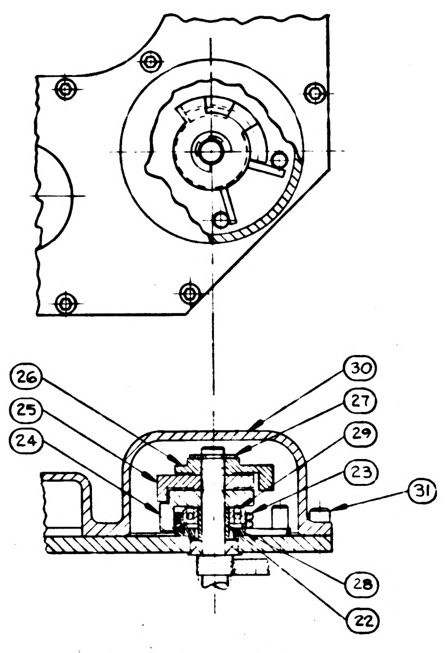




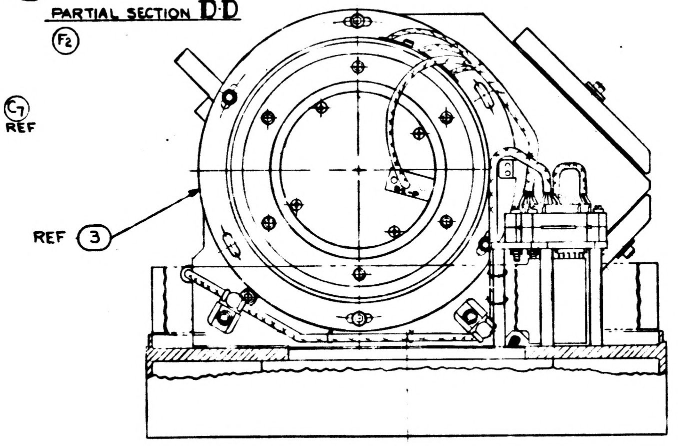
PARTIAL SECTION B-B



PARTIAL SECTION D-D



PARTIAL SECTION E-E
SCALE: 2/1



PARTIAL VIEW C-C

	QTY REQ 002	QTY REQ 001	QTY REQ 000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
L	1	0	0	38			1011701-001			SEXTANT INDEX HEAD ASSY			
	1	0	0	37			1011890-002			OPTICAL UNIT SUB-ASSY STAGE II			
K	0	1	0	36			1011890-001			OPTICAL UNIT SUB-ASSY STAGE II			
	1	1	1	35			AN363C1032			NUT, SELF-LOCKING, 550°F			
	1	1	1	34			MS15795-308			WASHER, FLAT			
	2	2	2	33			1011643	58386900080		COUNTERWEIGHT			
	1	1	1	32			1011644	53386900070		ROD, THREADED			
	10	10	10	31		NAS	1352C03LL6	74455157010		SCREW, CAP, SOC HEAD, SELF-LOCKING			
	1	1	1	30			1011595	52386900730		COVER, GEAR BOX			
	1	1	1	29			1011610			BEARING, BALL, ANNULAR			
F1	1	1	1	28			1012075			SPACER			
	1	1	1	27			MS16633-4017	74453081008		RING, RETAINING			
	1	1	1	26			1011578	57386900930		DOG, LIMIT STOP, OUTER			
	1	1	1	25			1011579	57386900940		DOG, LIMIT STOP, MIDDLE			
	1	1	1	24			1011580	57386900950		DOG, LIMIT STOP, INNER			
	1	1	1	23			1011577	56386900290		SPRING, TORSION			
J	1	1	1	22			1012074	57386901680		SLEEVE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
011000	0 000

APPLICATION

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CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 386900720
DRAWN DATE
CHECKED 8-2-63
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

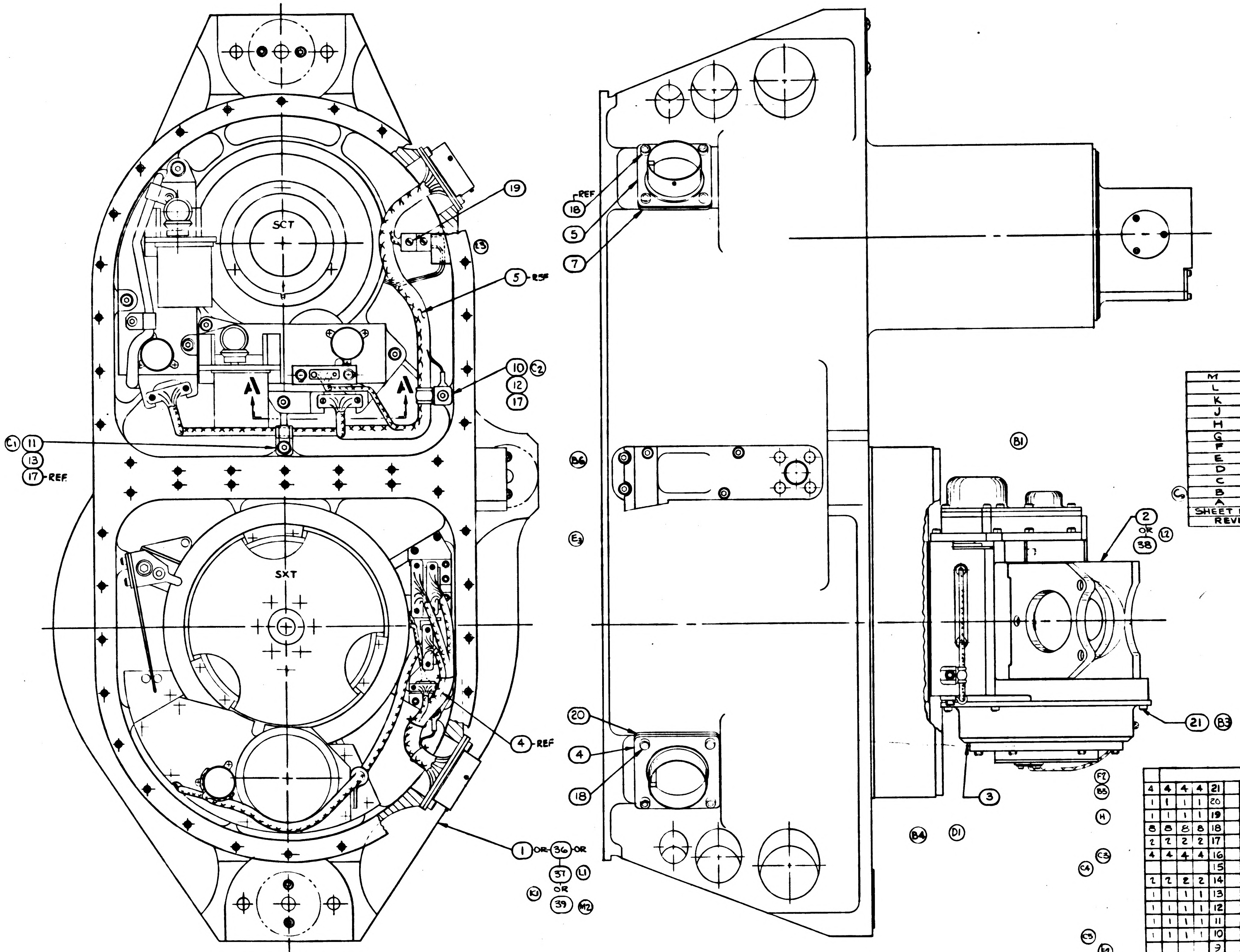
TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE III

CODE IDENT NO.
SIZE E
NASA NUMBER 1011891
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 2 OF 3

W 1681101

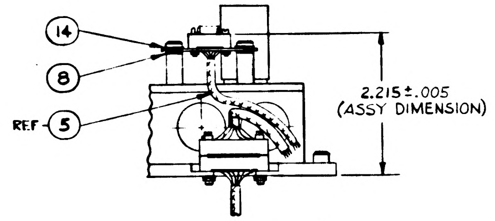
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. SEE SHEET 3 OF 3 FOR SUPPLEMENTARY ASSEMBLY INFORMATION.
3. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO. 03812		WK
B6		REVISED PER TDRR NO. 06505	25 FEB 64	WK
C9		REVISED PER TDRR NO 08041	4-20-64	
D3		REVISED PER TDRR NO. 08600	5-19-64	
E3		REVISED PER TDRR NO. 08599	8-4-64	
F2		REVISED PER TDRR NO. 08458	5/14/64	
G	C-5 OF SHEET 3	REVISED PER TDRR NO. 08598	9/2/64	
H		REVISED PER TDRR NO. 09891	9/3/64	
J		REVISION STATUS CHANGED PER TDRR No. 10990	7/14/64	
K2		REVISED PER TDRR NO. 13452	10/14/66	
L4		REVISED PER TDRR NO 15344	1/4/68	
M2		REVISED PER TDRR NO. 15858	1/9/68	



M	M	H
L	L	H
K	K	H
J	J	H
H	G	H
G	G	F
F	F	F
E	D	—
D	D	—
C	C	—
B	B	—
A	A	—
SHEET 1	SHEET 2	SHEET 3

REVISION STATUS OF SHEETS



PARTIAL SECTION **A-A**

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

SEE SHEET 2 FOR SUBSEQUENT ITEMS

QTY REQ 005	QTY REQ 002	QTY REQ 001	QTY REQ 000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
4	4	4	4	21			NAS1352C04LL4	74455157013		SCREW, CAP, SOC. HD. SELF LOCKING			
1	1	1	1	20		*	1011599-10	74453034010		PACKING, PREFORMED, RETAINED			
1	1	1	1	19			MS35249-11	74455187011		SCREW, 82° FLAT HEAD			
8	8	8	8	18			NAS1352C06LL5	74455157018		SCREW, CAP, SOC. HEAD, SELF LOCKING			
2	2	2	2	17			NAS1352C06LL6	74455157019		SCREW, CAP, SOC. HEAD, SELF LOCKING			
4	4	4	4	16			NAS1351C3LL10	74455156040		SCREW, CAP, SOC. HEAD, SELF LOCKING			
				15									
2	2	2	2	14			MS16624-15			RING, RETAINING, EXTERNAL, BASIC			
1	1	1	1	13			MS15795-305			WASHER, FLAT			
1	1	1	1	12		*	1011918-2			WASHER, CABLE CLAMP			
1	1	1	1	11		*	1000220-6			CLAMP, CABLE			
1	1	1	1	10		*	1000220-8			CLAMP, CABLE			
				9									
AR	AR	AR	AR	8			1011885	45386900170		SHIM			
1	1	1	1	7		*	1011599-9	74453034009		PACKING, PREFORMED, RETAINED			
				6									
1	1	1	1	5			1011713	80386900020		SCT BASE HARNESS ASSY			
1	1	1	1	4			1011896	80386900030		SXT BASE HARNESS ASSY			
1	1	1	1	3			1011909	85386900920		RESOLVER AND CONNECTOR ASSY OF			
0	0	1	1	2			1011701	85386900760		SEXTANT INDEX HEAD ASSY			
0	0	0	1	1			1011890	85386900710		OPTICAL UNIT SUBASSY - STAGE II			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

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MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 386900720
DRAWN DATE 7-9-63
CHECKED 8-2-63
APPROVAL 8-1?-63
APPROVAL 8-15-63
NASA APPROVAL W J Klene F 19-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

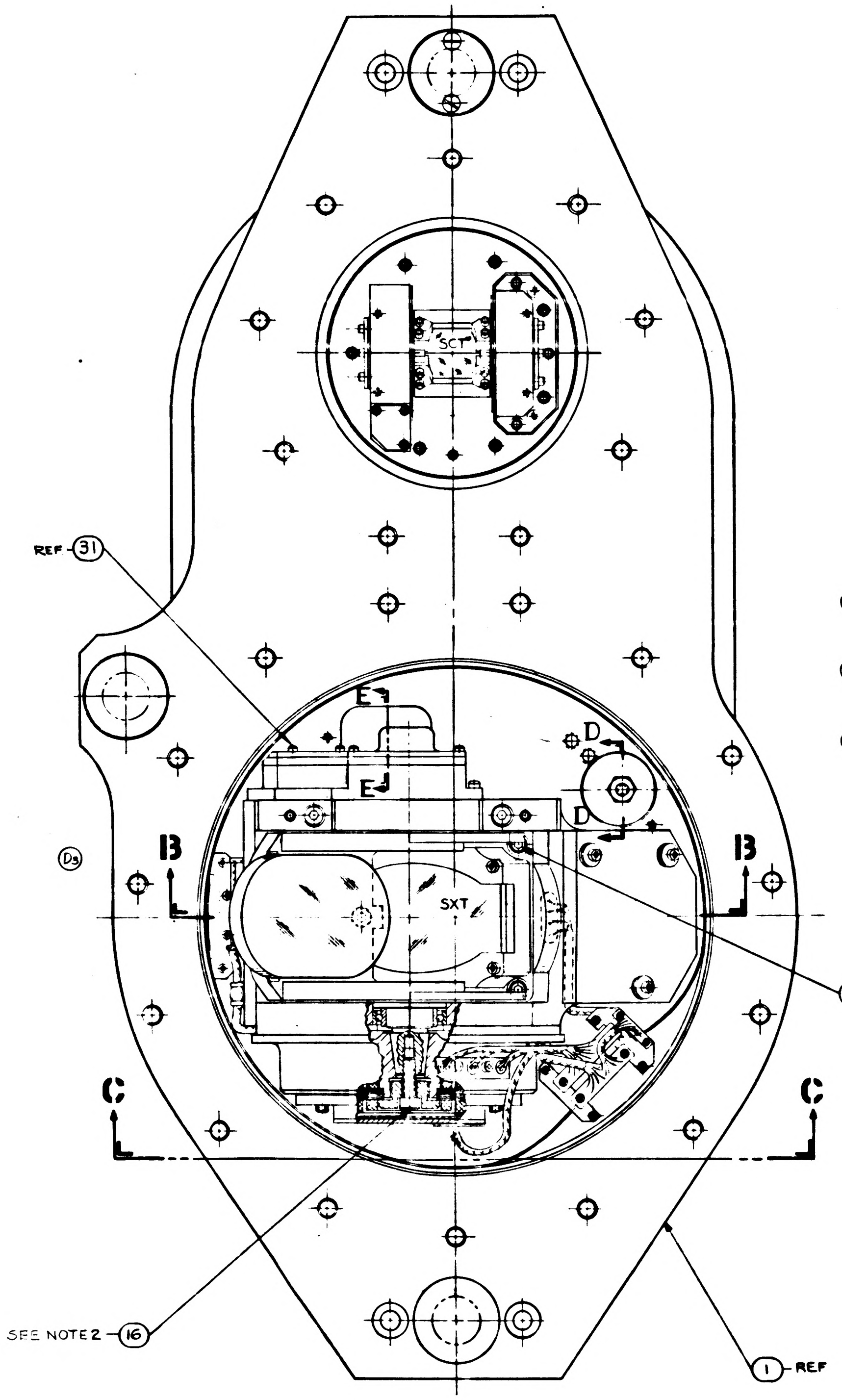
TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE III

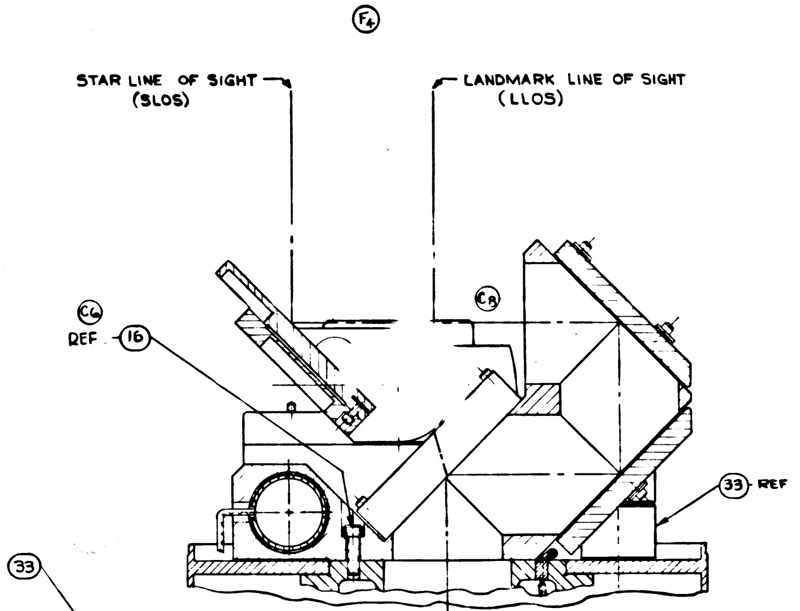
CODE IDENT NO. SIZE E NASA NUMBER 1011891
SCALE 1/1 WEIGHT CALC ACTUAL SHEET 1 OF 3

W 1681101

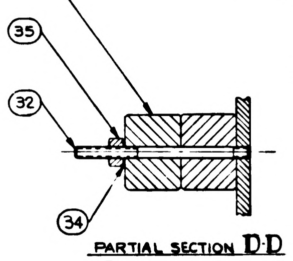
NOTES:
SEE SHEET 1 AND 3 OF 3.

REVISIONS 32625				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		SEE SHEET NO 1	0 OCT 63	GK
B6		REVISED PER TDRR NO. 06505	25 FEB 64	WK
C9		REVISED PER TDRR NO. 08041	4-28-64	
D3		REVISED PER TDRR NO. 08600		
F4		REVISED PER TDRR NO. 08458	5/14/64	
G	C-5	REVISED PER TDRR NO. 08593	5/19/64	
J		REVISED PER TDRR NO. 10990	7/14/64	
K		REVISED PER TDRR NO. 13432		
L		REVISED PER TDRR NO. 15544	1/6/65	
M		REVISED PER TDRR NO. 15858	1/27/65	

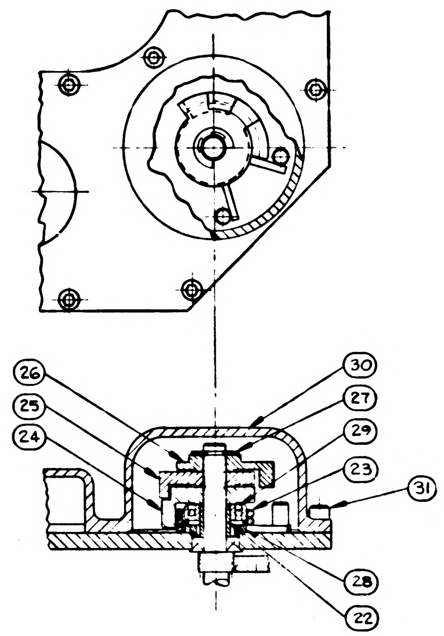




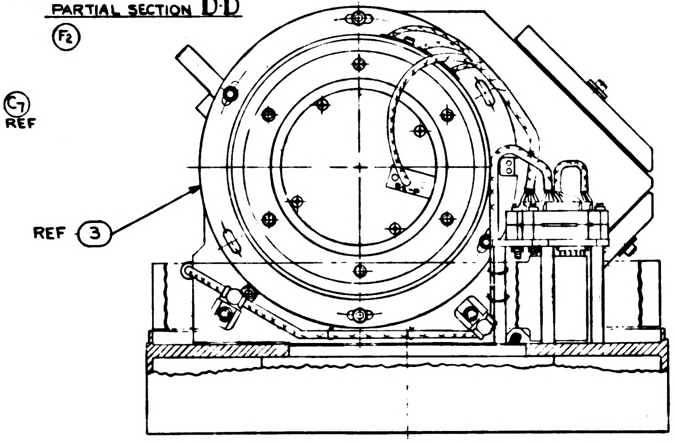
PARTIAL SECTION B-B



PARTIAL SECTION D-D
F2



F3 PARTIAL SECTION E-E
SCALE: 2/1



D2
G
PARTIAL VIEW C-C
B5

QTY REQ'D 003	002	001	000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
1	0	0	0	39			1011890-003			OPTICAL UNIT SUBASSY STAGE III			
0	1	0	0	38			1011701-001			SEXTANT INDEX HEAD ASSY			
0	1	0	0	37			1011890-002			OPTICAL UNIT SUB-ASSY STAGE II			
0	0	1	0	36			1011890-001			OPTICAL UNIT SUB-ASSY STAGE II			
1	1	1	1	35			AN363C1032			NUT, SELF-LOCKING, 550°F			
1	1	1	1	34			MS15795-308			WASHER, FLAT			
2	2	2	2	33			1011643	58386900080		COUNTERWEIGHT			
1	1	1	1	32			1011644	53386900070		ROD, THREADED			
10	10	10	10	31		NAS	1352C03LL6	74455157010		SCREW, CAP, SOC HEAD, SELF-LOCKING			
1	1	1	1	30			1011595	52386900730		COVER, GEAR BOX			
1	1	1	1	29			1011610			BEARING, BALL, ANNULAR			
1	1	1	1	28			1012075			SPACER			
1	1	1	1	27			MS16633-4017	74453081008		RING, RETAINING			
1	1	1	1	26			1011578	57386900930		DOG, LIMIT STOP, OUTER			
1	1	1	1	25			1011579	57386900940		DOG, LIMIT STOP, MIDDLE			
1	1	1	1	24			1011580	57386900950		DOG, LIMIT STOP, INNER			
1	1	1	1	23			1011577	56386900290		SPRING, TORSION			
1	1	1	1	22			1012074	57386901680		SLEEVE			

LIST OF PARTS AND MATERIALS

1011000	01000
NEXT ASSY	USED ON
APPLICATION	

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CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900720
DRAWN DATE 7-9-63
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APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE III

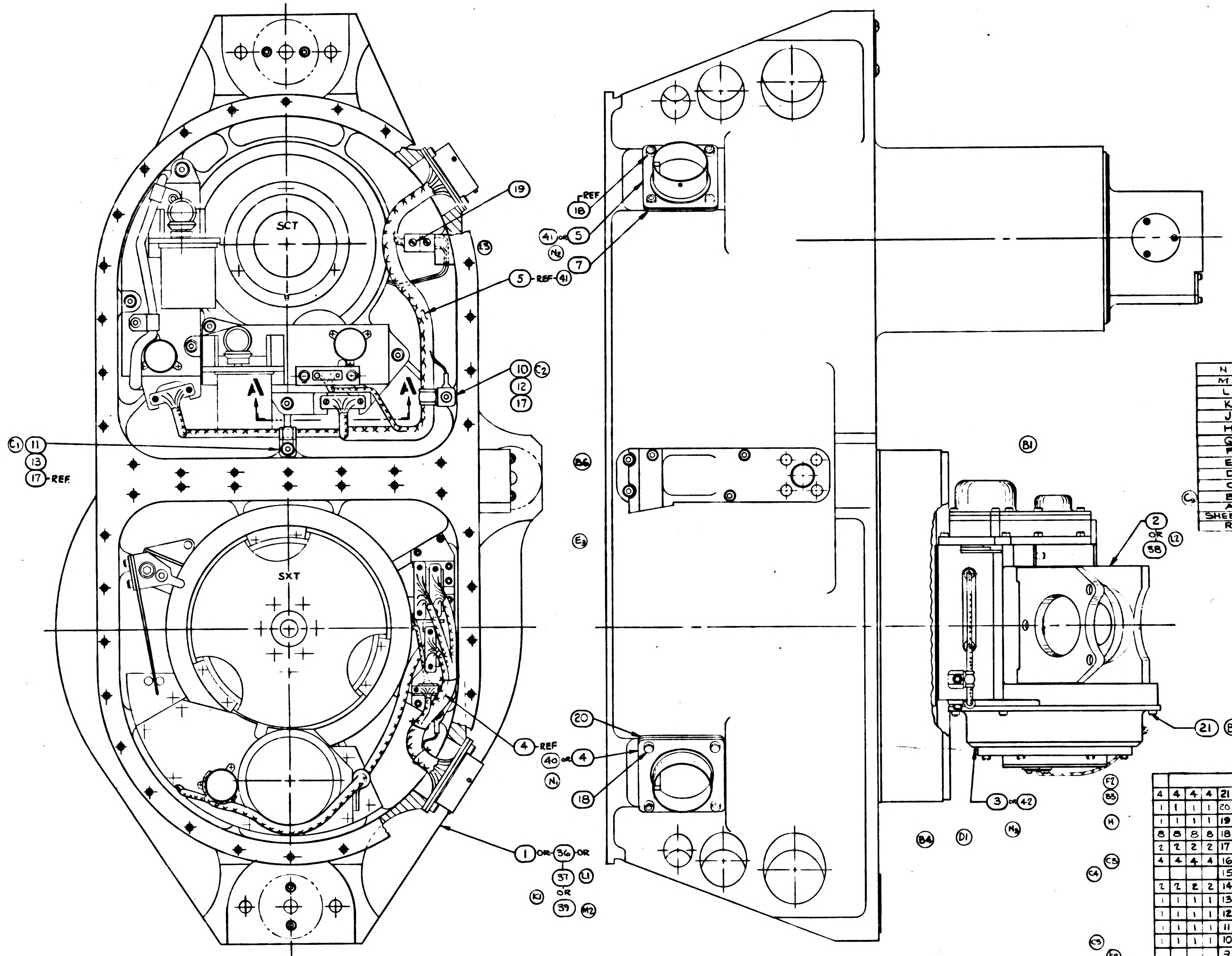
CODE IDENT NO. | SIZE E | NASA NUMBER 1011891
SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 2 OF 3

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. SEE SHEET 3 OF 3 FOR SUPPLEMENTARY ASSEMBLY INFORMATION.
3. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.

N 1681101

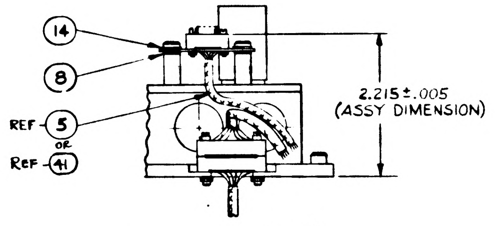
REVISIONS 02675 8-... -63

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO. 03812	10 Oct 63	WK
B6		REVISED PER TDRR NO. 06505	25 FEB 64	WK
C9		REVISED PER TDRR NO 08041	4-20-64	
D		REVISED PER TDRR NO. 08600	5-1964	
E3		REVISED PER TDRR NO. 08599	5-14-64	
F2		REVISED PER TDRR NO. 08458	5/14/64	
G	C-5 OF SHEET 2	REVISED PER TDRR NO. 08598	5/19/64	
H		REVISED PER TDRR NO. 09891	4/3/64	
J		REVISION STATUS CHANGED PER TDRR No. 10990	7/14/64	
K2		REVISED PER TDRR NO. 13452	10/14/64	
L4		REVISED PER TDRR NO 15344	1/4/65	
M2		REVISED PER TDRR NO. 15858	1/14/65	
N3		REVISED PER TDRR No. 16295	2/24/65	



N	N	H
M	M	H
L	L	H
K	K	H
J	J	H
H	G	H
G	G	F
F	F	F
E	D	—
D	D	—
C	C	—
B	B	—
A	A	—
SHEET 1	SHEET 2	SHEET 3

REVISION STATUS OF SHEETS



PARTIAL SECTION A-A

SEE SHEET 2 FOR SUBSEQUENT ITEMS

QTY REQ 005	QTY REQ 002	QTY REQ 001	QTY REQ 000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
4	4	4	4	21			NAS1352C04LL4	74455157013		SCREW, CAP, SOC. HD. SELF LOCKING			
1	1	1	1	20		*	1011599-10	74453034010		PACKING, PREFORMED, RETAINED			
1	1	1	1	19			MS35249-11	74455187011		SCREW, 82° FLAT HEAD			
8	8	8	8	18			NAS1352C06LL5	74455157018		SCREW, CAP, SOC. HEAD, SELF LOCKING			
2	2	2	2	17			NAS1352C06LL6	74455157019		SCREW, CAP, SOC. HEAD, SELF LOCKING			
4	4	4	4	16			NAS1351C3LL10	74455156040		SCREW, CAP, SOC. HEAD, SELF LOCKING			
				15									
2	2	2	2	14			MS16624-15			RING, RETAINING, EXTERNAL, BASIC			
1	1	1	1	13			MS15795-305			WASHER, FLAT			
1	1	1	1	12		*	1011918-2			WASHER, CABLE CLAMP			
1	1	1	1	11		*	1000220-6 or 5			CLAMP, CABLE			
1	1	1	1	10		*	1000220-8 or 5			CLAMP, CABLE			
				9									
AR	AR	AR	AR	8			1011885	45386900170		SHIM			
1	1	1	1	7		*	1011599-9	74453034009		PACKING, PREFORMED, RETAINED			
				6									
0	0	0	1	5			1011713-000	80386900020		SCT BASE HARNESS ASSY			
0	0	0	1	4			1011896-000	80386900030		SXT BASE HARNESS ASSY			
0	0	0	1	3			1011909-000	85386900920		RESOLVER AND CONNECTOR ASSY OF			
0	0	0	1	2			1011701-000	85386900760		SEXTANT INDEX HEAD ASSY			
0	0	0	1	1			1011890	85386900710		OPTICAL UNIT SUBASSY - STAGE II			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

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KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900720

DRAWN DATE 7-9-63
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APPROVAL 8-...-63
APPROVAL 8-...-63
NASA APPROVAL W J ... F ...-63
MIT APPROVAL ... Nov ...63

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STAGE III

CODE IDENT NO.
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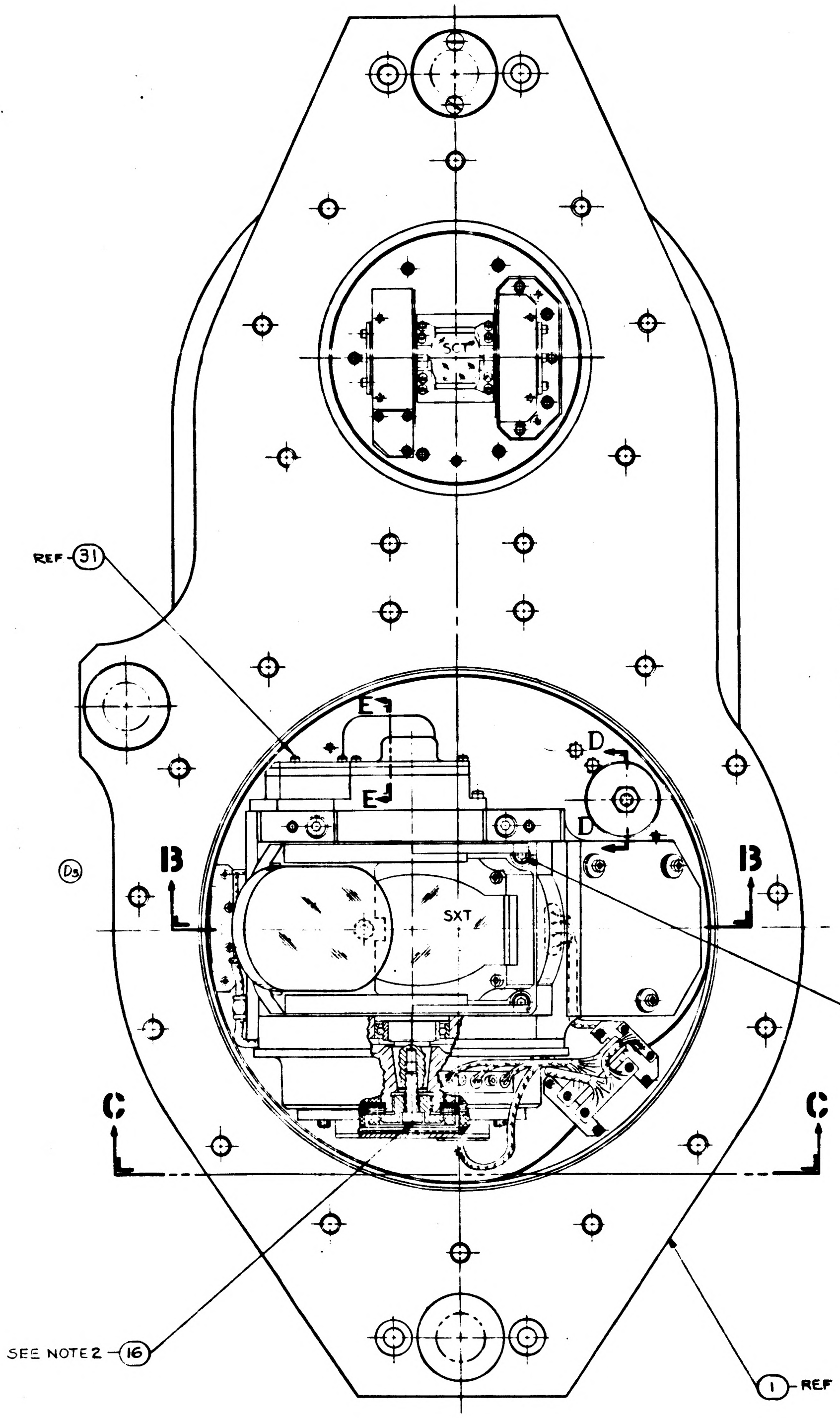
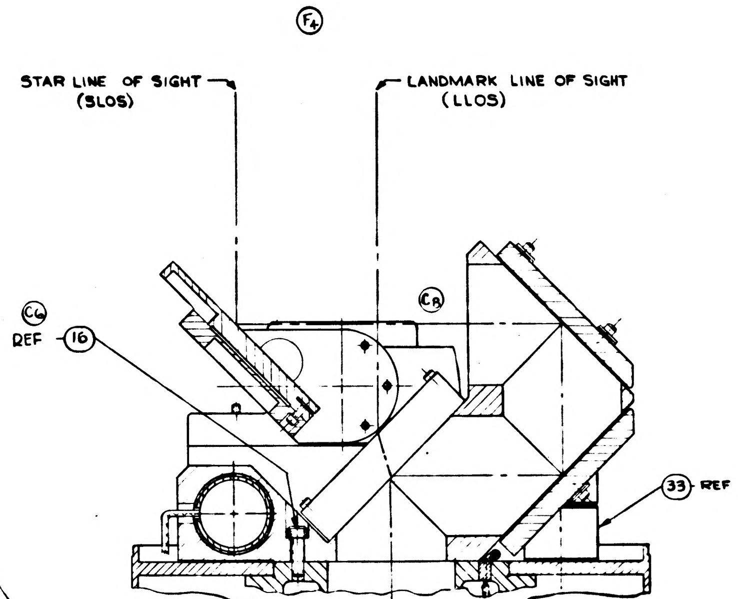
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 3

NOTES:
SEE SHEET 1 AND 3 OF 3.

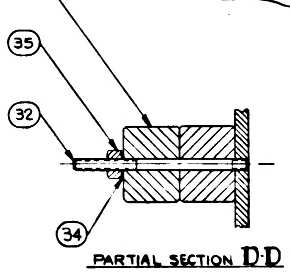
N 1681101

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		SEE SHEET NO. 1	[illegible]	
B6		REVISED PER TDRR NO. 06505	25 FEB 64	
C9		REVISED PER TDRR NO. 08041	4-20-64	
D3		REVISED PER TDRR NO. 08600	[illegible]	
F4		REVISED PER TDRR NO. 08458	5/14/64	
G	C-5	REVISED PER TDRR NO. 08598	5/13/64	
J		REVISED PER TDRR NO. 10990	7/14/64	
K		REVISED PER TDRR NO. 13452	[illegible]	
L		REVISED PER TDRR NO. 15544	1/6/65	
M		REVISED PER TDRR NO. 5858	4/24/65	
N		REVISED PER TDRR NO. 6895	9/24/65	



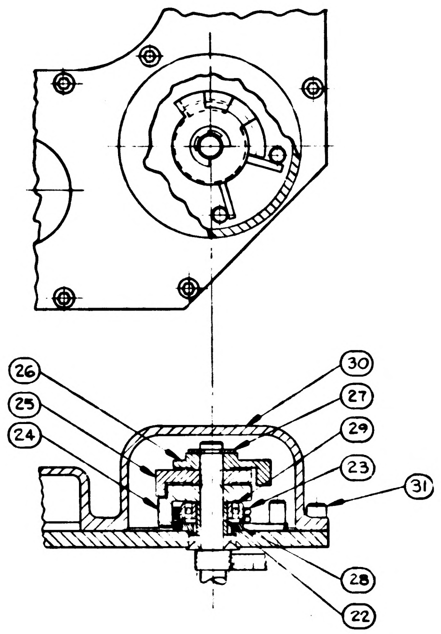


PARTIAL SECTION B-B

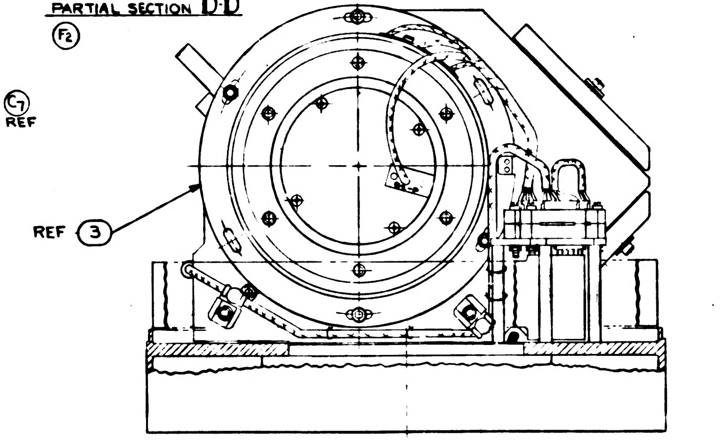


PARTIAL SECTION D-D

F2



F3 PARTIAL SECTION E-E
SCALE: 2/1



D2 G

PARTIAL VIEW C-C

B5

1	1	1	0	42			1011909-001			RESOLVER & CONNECTOR, ASSY OF			
1	1	1	0	41			1011713-001			SCT BASE HARNESS ASSY			
1	1	1	0	40			1011896-001			SXT BASE HARNESS ASSY			
1	0	0	0	39			1011890-003			OPTICAL UNIT SUBASSY STAGE II			
1	1	1	0	38			1011701-001			SEXTANT INDEX HEAD ASSY			
0	1	0	0	37			1011890-002			OPTICAL UNIT SUB-ASSY STAGE II			
0	0	1	0	36			1011890-001			OPTICAL UNIT SUB-ASSY STAGE II			
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1	1	1	1	34			MS15795-308			WASHER, FLAT			
2	2	2	2	33			1011643	58386900080		COUNTERWEIGHT			
1	1	1	1	32			1011644	53386900070		ROD, THREADED			
10	10	10	10	31		NAS	1352C03LL6	74455157010		SCREW, CAP, SOC HEAD, SELF-LOCKING			
1	1	1	1	30			1011595	52386900730		COVER, GEAR BOX			
1	1	1	1	29			1011610			BEARING, BALL, ANNULAR			
1	1	1	1	28			1012075			SPACER			
1	1	1	1	27			MS16633-4017	74453081008		RING, RETAINING			
1	1	1	1	26			1011578	57386900930		DOG, LIMIT STOP, OUTER			
1	1	1	1	25			1011579	57386900940		DOG, LIMIT STOP, MIDDLE			
1	1	1	1	24			1011580	57386900950		DOG, LIMIT STOP, INNER			
1	1	1	1	23			1011577	56386900290		SPRING, TORSION			
1	1	1	1	22			1012074	57386901680		SLEEVE			
003	002	001	000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
QTY REQD													

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
011000	[illegible]

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900720
DRAWN DATE 7-9-63
CHECKED 8-2-63
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE III

CODE IDENT NO. SIZE E NASA NUMBER 1011891
SCALE 1/1 WEIGHT CALC ACTUAL SHEET 2 OF 3

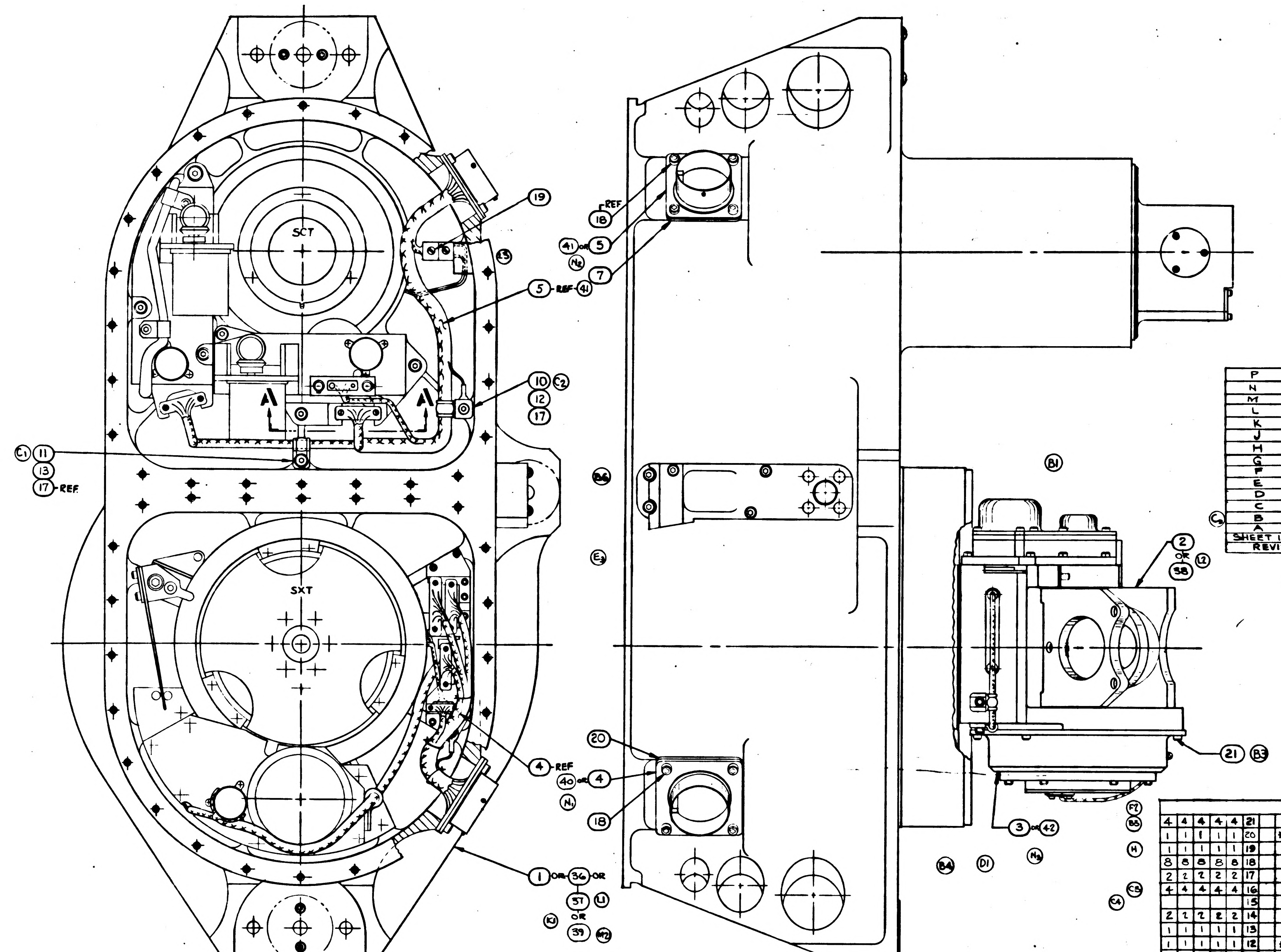
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. SEE SHEET 3 OF 3 FOR SUPPLEMENTARY ASSEMBLY INFORMATION.
3. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.

(F1)

d	1681101

REVISIONS 02625

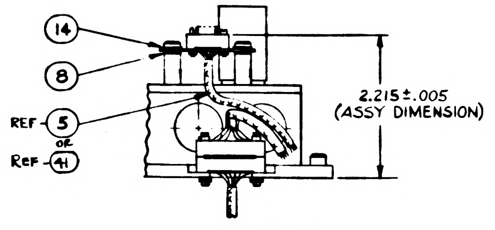
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO 03812	10 Oct 63	WK
B6		REVISED PER TDRR NO. 06806	25 FEB 64	WK
C9		REVISED PER TDRR NO 08041	[illegible]	
D3		REVISED PER TDRR NO. 08600	[illegible]	
E3		REVISED PER TDRR NO. 08599	[illegible]	
F2		REVISED PER TDRR NO. 08458	[illegible]	
G	C.5 OF [illegible]	REVISED PER TDRR NO. 08598	[illegible]	
H		REVISED PER TDRR NO. 09891	[illegible]	
J		REVISION STATUS CHANGED PER TDRR No. 10990	[illegible]	
K2		REVISED PER TDRR NO. 13452	[illegible]	
L4		REVISED PER TDRR NO 15344	[illegible]	
M2		REVISED PER TDRR NO. 15858	[illegible]	
N3		REVISED PER TDRR No. 16893	[illegible]	
P		REVISED PER TDRR No 22246	9/6/65	



P	P	P
N	N	H
M	M	H
L	L	H
K	K	H
J	J	H
H	G	H
G	G	F
F	F	F
E	D	—
D	D	—
C	C	—
B	B	—
A	A	—
SHEET 1	SHEET 2	SHEET 3

REVISION STATUS OF SHEETS

(B2)



PARTIAL SECTION A-A

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

SEE SHEET 2 FOR SUBSEQUENT ITEMS

004	005	002	001	000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
4	4	4	4	4	21			NAS1352C04LL4	74455157018		SCREW, CAP, SOC. HD. SELF LOCKING			
1	1	1	1	1	20		*	1011599-10	74453034010		PACKING, PREFORMED, RETAINED			
1	1	1	1	1	19			MS35249-11	74455187011		SCREW, 82° FLAT HEAD			
8	8	8	8	8	18			NAS1352C06LL5	74455157018		SCREW, CAP, SOC. HEAD, SELF LOCKING			
2	2	2	2	2	17			NAS1352C06LL6	74455157019		SCREW, CAP, SOC. HEAD, SELF LOCKING			
4	4	4	4	4	16			NAS1351C3LL10	74455156040		SCREW, CAP, SOC. HEAD, SELF LOCKING			
					15									
2	2	2	2	2	14			MS16624-15			RING, RETAINING, EXTERNAL, BASIC			
1	1	1	1	1	13			MS15795-305			WASHER, FLAT			
1	1	1	1	1	12		*	1011918-2			WASHER, CABLE CLAMP			
1	1	1	1	1	11		*	1000220-6or5			CLAMP, CABLE			
1	1	1	1	1	10		*	[illegible]			CLAMP, CABLE			
					9									
AR	AR	AR	AR	AR	8			1011885	45386900170		SHIM			
1	1	1	1	1	7		*	1011599-9	74453034009		PACKING, PREFORMED, RETAINED			
					6									
0	0	0	0	1	5			1011713-000	80386900020		SCT BASE HARNESS ASSY			
0	0	0	0	1	4			1011896-000	80386900030		SXT BASE HARNESS ASSY			
0	0	0	0	1	3			1011909-000	85386900920		RESOLVER AND CONNECTOR ASSY OF			
0	0	0	0	1	2			1011701-000	85386900760		SEXTANT INDEX HEAD ASSY			
0	0	0	0	1	1			1011890	85386900710		OPTICAL UNIT SUBASSY - STAGE II			

QTY REQ

LIST OF PARTS AND MATERIALS

(F2) (B5) (H) (C3) (C4) (C5) (E2) (E1) (L4) (M1)

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
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TOL ON: FRACTIONS ± | DECIMALS ± | ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 386900720

DRAWN DATE 7-9-63
CHECKED 8-2-63
APPROVAL 8-13-63
APPROVAL 8-15-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE III

CODE IDENT NO.
SIZE E
NASA NUMBER 1011891
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 3

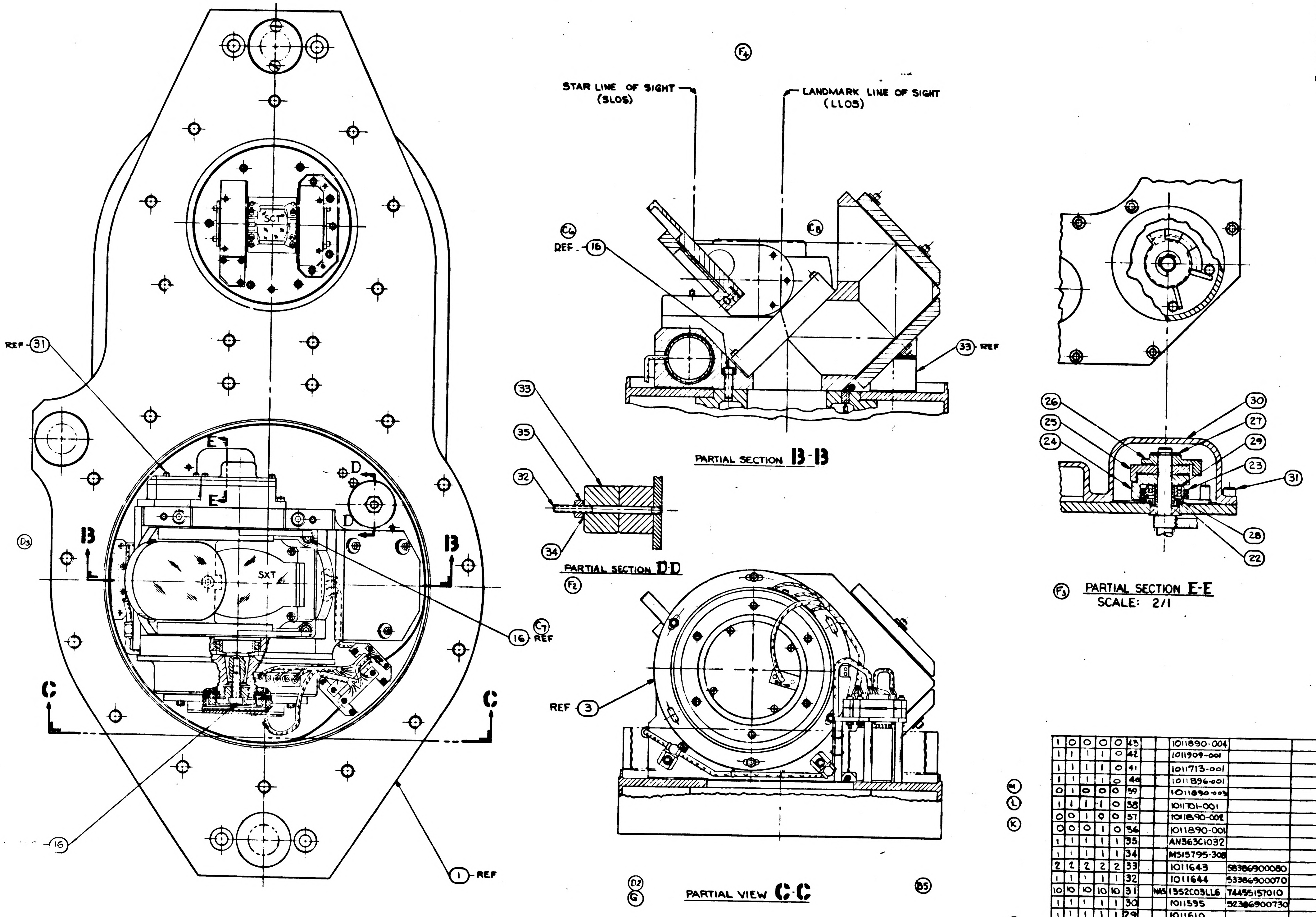
1011891

NOTES:
SEE SHEET 1 AND 3 OF 3.

d 1681101

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		SEE SHEET NO. 1 TDRR 03512	16 Oct 63	GK
B6		REVISED PER TDRR NO. 06505	25 FEB 64	WK
C9		REVISED PER TDRR NO. 08041	4-28-64	JWB
D3		REVISED PER TDRR NO. 08600	5-9-64	JWB
F4		REVISED PER TDRR NO. 08458	5/19/64	JWB
G	C-5	REVISED PER TDRR NO. 08598	5/19/64	JWB
J		REVISED PER TDRR NO. 10990	7/14/64	JWB
K		REVISED PER TDRR NO. 13452	10/14/64	JWB
L		REVISED PER TDRR NO. 15544	4/14/65	JWB
M		REVISED PER TDRR NO. 15858	4/24/65	JWB
N		REVISED PER TDRR NO. 6895	9/24/65	JWB
P		REVISED PER TDRR NO. 22246	7/16/68	JWB

REVISIONS 02625 8-6-68



004	003	002	001	000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
1	0	0	0	0	43			1011890-004			OPTICAL UNIT SUB ASSY STAGE II			
1	1	1	1	0	42			1011909-001			RESOLVER & CONNECTOR, ASSY OF			
1	1	1	1	0	41			1011713-001			SCT BASE HARNESS ASSY			
1	1	1	1	0	40			1011896-001			SXT BASE HARNESS ASSY			
0	1	0	0	0	39			1011890-003			OPTICAL UNIT SUB ASSY STAGE I			
1	1	1	1	0	38			1011701-001			SEXTANT INDEX HEAD ASSY			
0	0	1	0	0	37			1011890-002			OPTICAL UNIT SUB-ASSY STAGE II			
0	0	0	1	0	36			1011890-001			OPTICAL UNIT SUB-ASSY STAGE II			
1	1	1	1	1	35			AN363C1032			NUT, SELF-LOCKING, 550°F			
1	1	1	1	1	34			MS15795-308			WASHER, FLAT			
2	2	2	2	2	33			1011643	58386900080		COUNTERWEIGHT			
1	1	1	1	1	32			1011644	53386900070		ROD, THREADED			
10	10	10	10	10	31		NAS	1352C03LL6	74455157010		SCREW, CAP, SOC HEAD, SELF-LOCKING			
1	1	1	1	1	30			1011595	52386900730		COVER, GEAR BOX			
1	1	1	1	1	29			1011610			BEARING, BALL, ANNULAR			
1	1	1	1	1	28			1012075			SPACER			
1	1	1	1	1	27			MS16633-4017	74453081008		RING, RETAINING			
1	1	1	1	1	26			1011578	57386900930		DOG, LIMIT STOP, OUTER			
1	1	1	1	1	25			1011579	57386900940		DOG, LIMIT STOP, MIDDLE			
1	1	1	1	1	24			1011580	57386900950		DOG, LIMIT STOP, INNER			
1	1	1	1	1	23			1011577	56386900290		SPRING, TORSION			
1	1	1	1	1	22			1012074	57386901680		SLEEVE			

QTY REQ'D

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	0 000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 386900720
DRAWN P. Borum DATE 7-9-63
CHECKED 8-12-63
APPROVAL 8-7-63
APPROVAL
NASA APPROVAL 8-16-67
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE III

CODE IDENT NO.
SIZE E
NASA NUMBER 1011891
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 2 OF 3

1011891

NOTE NO.	ITEM NO.	DWG. 1011-	SHEET NO.	
1	ALL	ALL	ALL	FOLLOW SEQUENCE OF NOTES WITHIN GROUPING OF NOTES 2 THRU 8 AND 9 THRU 20.
2	38	890	1	SELECT SPACER FOR 0.0000 TO 0.0020 END PLAY OF ITEM 2 RELATIVE TO ITEM 1 MEASURED WITH 5 LBS LOAD APPLIED IN EACH DIRECTION.
3	6	890	1	CENTER RETICLE BEFORE MOUNTING TRUNNION AXIS ASSEMBLY. (A) ADD ITEM 6 WITH TRUNNION IN POSITION SHOWN ON 1011215. RECENTER RETICLE AS REQUIRED IN DIRECTION PARALLEL TO TRUNNION WITHIN 0° 0' 20", (B) ROTATE RETICLE TO SET "R" LINE PARALLEL TO TRUNNION TRACK WITHIN 2 LINE WIDTHS END TO END OF "R" LINE. (A) AND (B) MUST BE MUTUALLY ATTAINED.
4	3	890	1	SET RELAY FOCUS SO THAT A COLLIMATED TARGET RETICLE FROM THE PANEL END OF RELAY ASS'Y IS SEEN IN THE SAME FOCUS AS THE SCT RETICLE AS OBSERVED THROUGH THE SCT OBJECTIVE.
5	7 & 8	890	1	POSITION TRUNNION AT ZERO (POSITION SHOWN ON DWG. 1011215). POSITION SHAFT AT ZERO (TRUNNION PARALLEL TO LONG AXIS OF 3 BALL MOUNT AND X ON TRUNNION AWAY FROM MIDDLE MOUNTING BALL). SET GEAR BOX COUNTERS AT ZERO AND RESOLVERS WITH NULL MARK ON SHAFT ALIGNED WITH ARROW ON BODY. MOUNT GEAR BOXES IN MESH WITH ALL THESE RELATIONS MAINTAINED WITHIN ABOUT 5°.
6	31	890	1	SET UP GEAR BOX MESHES WITH CLUSTER GEARS, ITEM 5, AS CLOSELY AS POSSIBLE WITHOUT INCURRING NOTICEABLE BINDING THROUGH FULL TURNS OF ITEM 5.
7A		891	1	AFTER ALL ITEMS PERTAINING TO SCT ARE ASSEMBLED, RESOLVER ZEROS SHALL BE SET WITHIN 0° 1' OF TEST FIXTURE OPTICAL REFERENCE.
7B				COUNTER ZEROS SHALL BE SET WITHIN 0.01° OF FIXTURE OPTICAL REFERENCE.
7C				TOTAL BACKLASH FROM COUNTERS TO LINE OF SIGHT SHALL NOT EXCEED 0.02° READ ON COUNTER BY APPROACHING THE SAME OPTICAL CHECK POSITIONS FROM BOTH DIRECTIONS.
7D				BOTH DRIVES SHALL START AT 6.2 VOLTS MAX. AND RUN AT 3.6 VOLTS MAX. THROUGHOUT 360° OF COUNTERS ROTATION IN BOTH DIRECTIONS EXCEPT AT 0° AND 180° WHERE 10 VOLTS MAX. STARTING THROUGH THE COUNTER MASK SHIFTING CYCLES IS PERMITTED. STARTING VOLTAGE NEED ONLY BE MEASURED AT ANY POINTS WHERE SLOWING OF THE DRIVE IS NOTICEABLE WHEN RUNNING BELOW ITS MAX. ALLOWED RUNNING VOLTAGE.
8	17	890	1	VIBRATION PROOF ITEMS 17 USING LOCKING COMPOUND GRADE CV PER MIL-S-22473.
9		890	2	WITH ALL ITEMS ON DWG. 1011890 SHEET 2 PLUS ITEMS 17 AND 20, ON SHEET 1 AND ITEMS 2 AND 15 OF DRAWING 1011891 SHEET 1 ASSEMBLED THE FOLLOWING REQUIREMENTS SHALL BE MET:
9A				WITH THE TRUNNION ROTATED TO THE MIRROR POSITION CORRESPONDING TO ZERO LINE OF SIGHT, THE SLOS AND LLOS SHALL BE LATERALLY PARALLEL WITHIN 0° 0' 20" ("R" LINE COINCIDENCE).
9B				WITH THE TRUNNION ROTATED TO THE MIRROR POSITION AT WHICH THE SXT RETICLE IS REFLECTED BACK ON ITSELF, THE "R" LINE OF THE REFLECTED IMAGE SHALL COINCIDE WITH THE RETICLE "R" LINE WITHIN 0° 0' 10".
9C				THE DIFFERENCE BETWEEN MEASURES "9A" AND "9B" TAKING DIRECTION INTO ACCOUNT SHALL NOT EXCEED 0° 0' 20".
9D				THE SUM OF THE MEASURES "9A" AND "9B" SHALL NOT EXCEED 0° 0' 25" IGNORING DIRECTION.
9E				THE RETICLE AS OBSERVED THROUGH THE LLOS SHALL BE COINCIDENT WITH THE SHAFT AXIS WITHIN 0° 0' 5".
9F				THE RETICLE AS OBSERVED THROUGH THE SLOS SHALL BE COINCIDENT WITH THE SHAFT AXIS WITHIN 0° 0' 20", THAT IS, MEASURES "9A" AND "9E" SHALL NOT HAVE ADDITIVE TOLERANCES.
9G				THE RETICLE "R" LINE SHALL ALIGN WITH THE TRUNNION TRACK WITHIN 0° 0' 10" VARIATION OVER ITS WHOLE LENGTH.
9H				(FOR 1011891-004 ONLY) AFTER SXT RETICLE POSITION IS FINALIZED, SECURE BY APPLYING 28 IN-LBS LOCKING TORQUE TO (3) RETICLE LOCKING SCREWS (NAS1352C02LL6) WHICH ARE PART OF THE SXT RETICLE ASSEMBLY. VIBRATION PROOF SXT RETICLE LOCKING RING USING (1) DROP OF LOCKING COMPOUND GRADE H PER MIL-S-22473. THE SURFACES SHALL HAVE BEEN PREVIOUSLY PREPARED IN ACCORDANCE WITH ND 1002211. AFTER ABOVE REQUIREMENTS HAVE BEEN ACCOMPLISHED, REMOVE (3) BEVEL RETAINERS AND (3) HEX SOCKET HEAD CAP SCREWS (MS 16995-3) WHICH ARE PART OF SXT RETICLE ASSEMBLY (PART OF ITEM 67).
10	3	891	1	THE 64X AND 1X RESOLVERS ARE TO BE AT THEIR MECHANICAL ZERO POSITION WITHIN 0° 1' WHEN THE SLOS AND LLOS ARE COINCIDENT ("R" LINES COINCIDENT).
11	9	890	1	THE 16X RESOLVER IS TO BE AT ITS MECHANICAL ZERO POSITION WITHIN 0° 1' WHEN THE SHAFT IS OPTICALLY POSITIONED TO A LINE OF SIGHT NORMAL TO THE LINE BETWEEN THE END BALLS AND AWAY FROM THE THIRD BALL OF THE THREE BALL MOUNTING.
12	22 THRU 29	891	2	THE LIMIT STOP IS TO BE SET SO THAT THE TRUNNION MIRROR HAS EQUAL OVERTRAVEL AT 0° TO THE 90° (SELF COLL.) LINE OF SIGHT POSITIONS WITHIN 3°.
13		891	2	THE ANTI-BACKLASH SPRING IS TO BE WOUND UP 1/4 TURN CLOCKWISE AND CLAMPED WHEN THE MIRROR IS AT THE 90°+ STOP POSITION.
14	32 THRU 35	891	2	WITH ITEMS 3, 29, 30 AND 31 IN PLACE, ITEMS 32 THRU 35 SHALL BE POSITIONED BY SELECTION OF HOLES AND ORIENTATION OR REDUCTION OF ECCENTRIC WEIGHTS ON THE THREADED POST TO BALANCE THE SHAFT WITHIN 2 IN.OZ. VIBRATION PROOF USING LOCKING COMPOUND GRADE CV PER MIL-S-22473 ON THREADS OF POST AND ON SURFACES OF WEIGHTS WHERE THEY CONTACT EACH OTHER AND THE MOUNTING SURFACE. BALANCE IS IN TOLERANCE IF 2 IN.OZ. TORQUE WILL REVERSE THE IMBALANCE.
15	12	890	1	THE SXT SHAFT SHALL BE AT ITS ZERO POSITION, SEE NOTE 11, DURING THE ASSEMBLY OF ITEMS 12 AND ITS HARDWARE, ITEM 22 AND ITS HARDWARE AND ITEM 11 AND ITS HARDWARE. ITEM 12, SHAFT GEARBOX MUST HAVE ITS RESOLVER PRESET TO ITS ELECTRICAL ZERO REFERENCE MARK. ITEM 22 MUST BE POSITIONED WITH ITS STOP DOG IN THE LARGER SECTOR BETWEEN THE TWO PINS ON ITEM 10.
16	30	890	1	VIBRATION PROOF USING LOCKING COMPOUND GRADE CV PER MIL-S-22473.
17	12	890	1	WITH THE SXT SHAFT ROTATED TO ITS COUNTER CLOCKWISE STOP, WIND UP THE ANTI-BACKLASH SPRING BY MEANS OF ITS COVER UNTIL TENSION IS SUFFICIENT TO TAKE UP BACKLASH IN THIS POSITION (1/4 TURN APPROX.). SPRING SHOULD TAKE UP BACKLASH WHEN BULL GEAR IS MANUALLY TURNED CLOCKWISE AND RELEASED.
18	12	890	1	SET THE 1/2 SPEED SHAFT RESOLVER ZERO WITHIN 0° 1' OF THE FIXTURE OPTICAL REFERENCE (SEE NOTE 11). ADD REMAINING ITEMS SHOWN ON DWGS. 1011890 AND 891 AND MEASURE SHAFT AND TRUNNION DRIVE VOLTAGES IN BOTH DIRECTIONS FROM STOP TO STOP. RUNNING SHALL NOT EXCEED 3.6 VOLTS. STARTING MEASURED AT POINTS WHERE DRIVE SLOWS DOWN SHALL NOT EXCEED 6.2 VOLTS. RUNNING SHALL BE MONITORED BY OBSERVING RATE GENERATOR OUTPUT OF EACH DRIVE.
19		890	1	VIBRATION PROOF SXT RETICLE LOCKING RING USING 1 DROP OF LOCKING COMPOUND GRADE H PER MIL-S-22473.
20	42 19	890 891	1 1	VIBRATION PROOF USING LOCKING COMPOUND GRADE HV PER MIL-S-22473.

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REVISIONS

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
F		SHEET 3 ADDED, TDRR 08458	[illegible]	
H		REVISED PER TDRR NO. 09891	[illegible]	
P		REVISED PER TDRR No. 22246	[illegible]	

Ⓕ THIS SHEET ADDED

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
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DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900720
DRAWN KIC DATE 5-11-64
CHECKED
APPROVAL
APPROVAL 5/12/64
NASA APPROVAL 5-14-64
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY,
STAGE III

CODE IDENT NO.
SIZE E
NASA NUMBER 1011891
SCALE
WEIGHT CALC ACTUAL
SHEET 3 OF 3

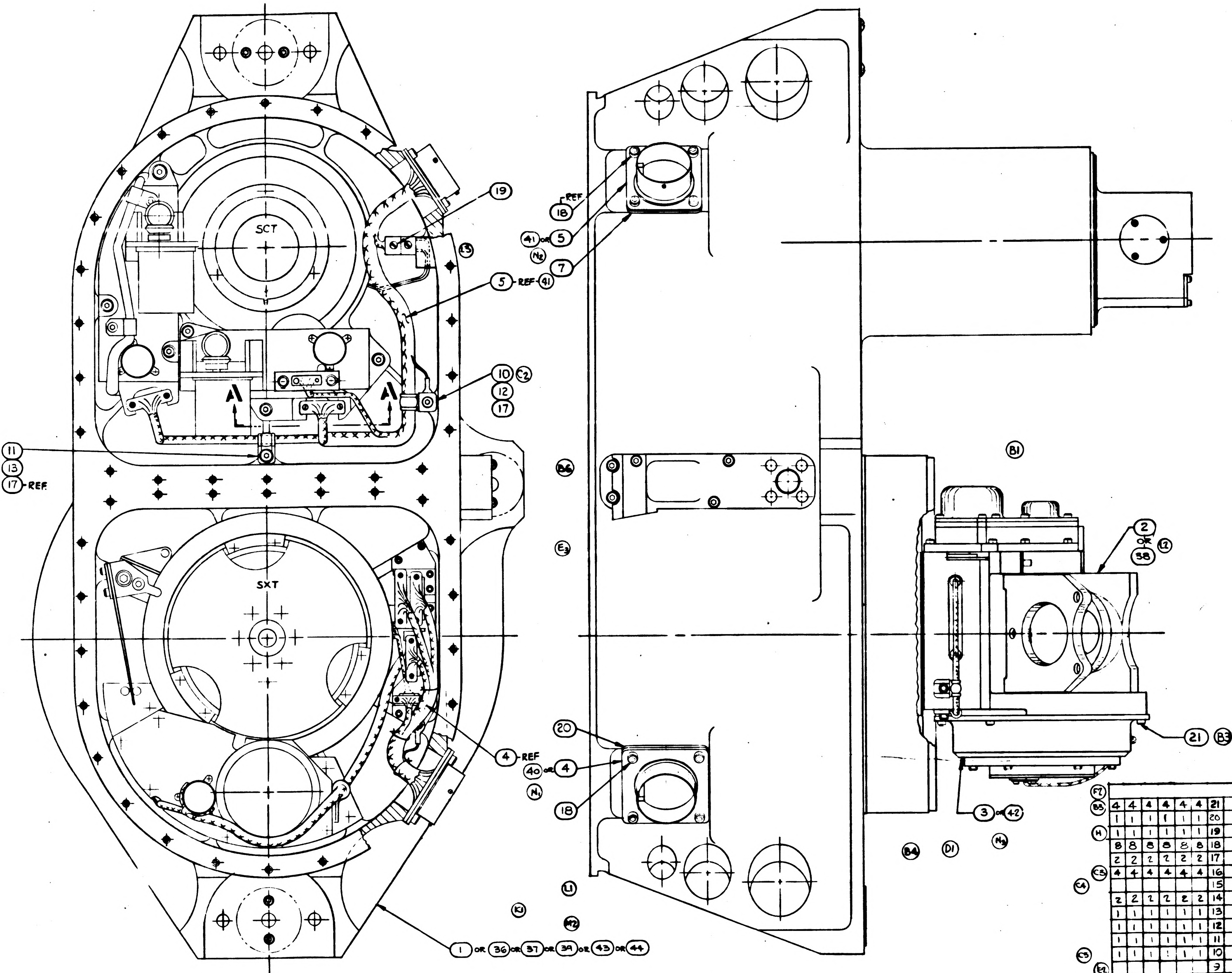
1011891 P

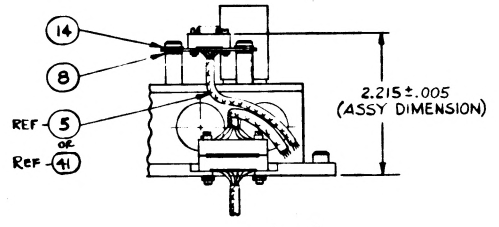
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. SEE SHEET 3 OF 3 FOR SUPPLEMENTARY ASSEMBLY INFORMATION.
3. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.

R 1681101

REVISIONS 02675

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO 03812	10 OCT 63	WK
B6		REVISED PER TDRR NO. 06505	25 FEB 64	WK
C9		REVISED PER TDRR NO 08041	4-20-64	
D		REVISED PER TDRR NO. 08600	5-19-64	
E3		REVISED PER TDRR NO. 08599	5-19-64	
F2		REVISED PER TDRR NO. 08458	5/14/64	
G	C-5 OF SHEET 2	REVISED PER TDRR NO. 08598	5/19/64	
H		REVISED PER TDRR NO. 09891	4/29/64	
J		REVISION STATUS CHANGED PER TDRR No. 10990	7/14/64	
K2		REVISED PER TDRR NO. 13452	10/14/64	
L4		REVISED PER TDRR NO 15344	1/4/65	
M2		REVISED PER TDRR NO. 15858	1/14/65	
N3		REVISED PER TDRR NO. 16893	2/24/65	
P		REVISED PER TDRR NO 22246	9/6/65	
R		REVISED PER TDRR NO. 23895		





PARTIAL SECTION A·A

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

SEE SHEET 2 FOR SUBSEQUENT ITEMS

005	004	003	002	001	000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
4	4	4	4	4	4	21			NAS1352C04LL4	74455157013		SCREW, CAP, SOC. HD. SELF LOCKING			
1	1	1	1	1	1	20		*	1011599-10	74453034010		PACKING, PREFORMED, RETAINED			
1	1	1	1	1	1	19			MS35249-11	74455187011		SCREW, 82° FLAT HEAD			
8	8	8	8	8	8	18			NAS1352C06LL5	74455157018		SCREW, CAP, SOC. HEAD, SELF LOCKING			
2	2	2	2	2	2	17			NAS1352C06LL6	74455157019		SCREW, CAP, SOC. HEAD, SELF LOCKING			
4	4	4	4	4	4	16			NAS1351C3LL10	74455156040		SCREW, CAP, SOC. HEAD, SELF LOCKING			
						15									
2	2	2	2	2	2	14			MS16624-15			RING, RETAINING, EXTERNAL, BASIC			
1	1	1	1	1	1	13			MS15795-305			WASHER, FLAT			
1	1	1	1	1	1	12		*	1011918-2			WASHER, CABLE CLAMP			
1	1	1	1	1	1	11		*	1000220-6 or 5			CLAMP, CABLE			
1	1	1	1	1	1	10		*	1000220-8 or 5			CLAMP, CABLE			
						9									
AR	AR	AR	AR	AR	AR	8			1011885	45386900170		SHIM			
1	1	1	1	1	1	7		*	1011599-9	74453034009		PACKING, PREFORMED, RETAINED			
						6									
0	0	0	0	0	1	5			1011713-000	80386900020		SCT BASE HARNESS ASSY			
0	0	0	0	0	1	4			1011896-000	80386900030		SXT BASE HARNESS ASSY			
0	0	0	0	0	1	3			1011909-000	85386900920		RESOLVER AND CONNECTOR ASSY OF			
0	0	0	0	0	1	2			1011701-000	85386900760		SEXTANT INDEX HEAD ASSY			
0	0	0	0	0	1	1			1011890	85386900710		OPTICAL UNIT SUBASSY - STAGE II			

QTY REQ'D

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 386900720
DRAWN Borsutzki DATE 7-9-63
CHECKED 8-2-63
APPROVAL 8-13-63
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

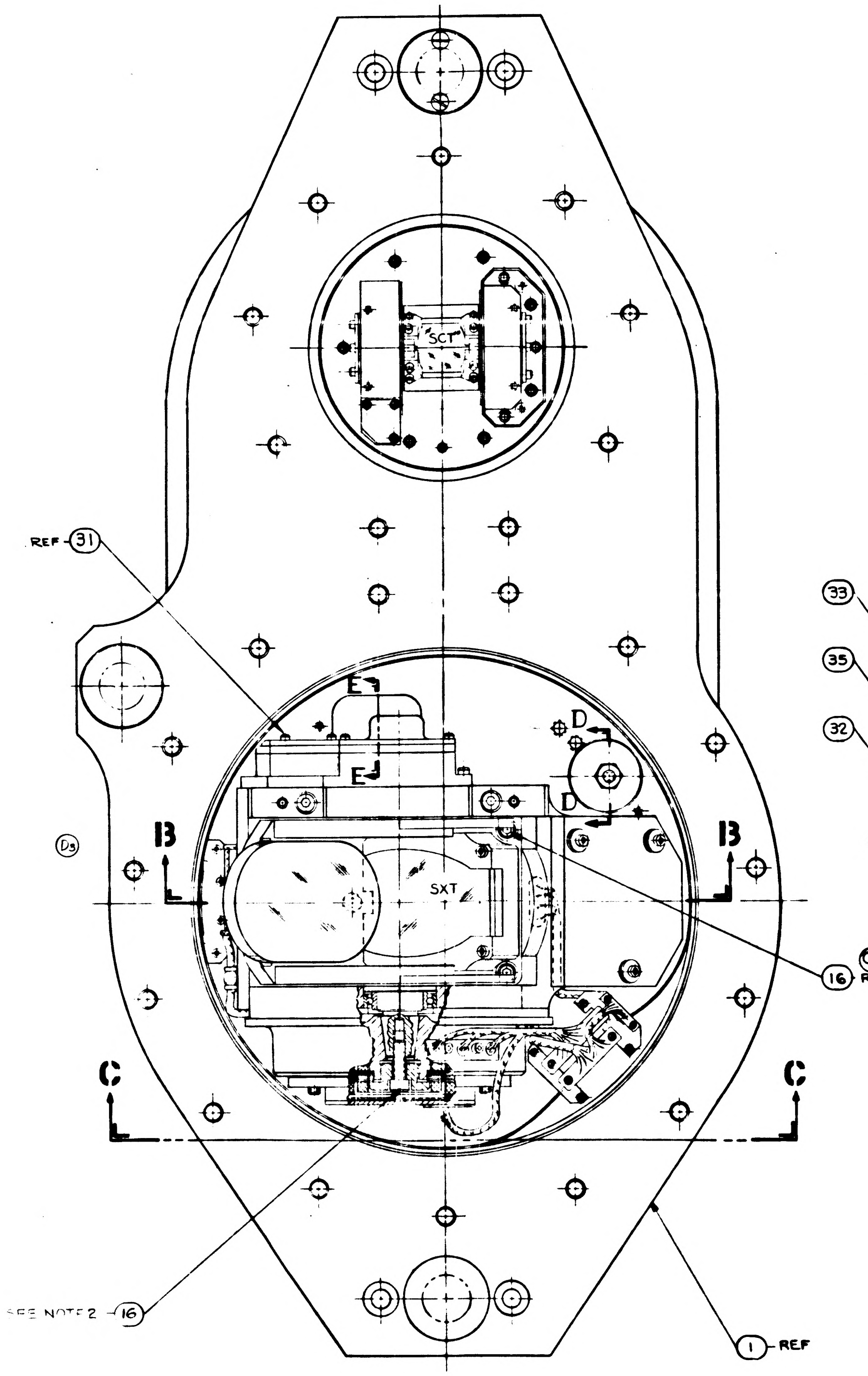
TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE III

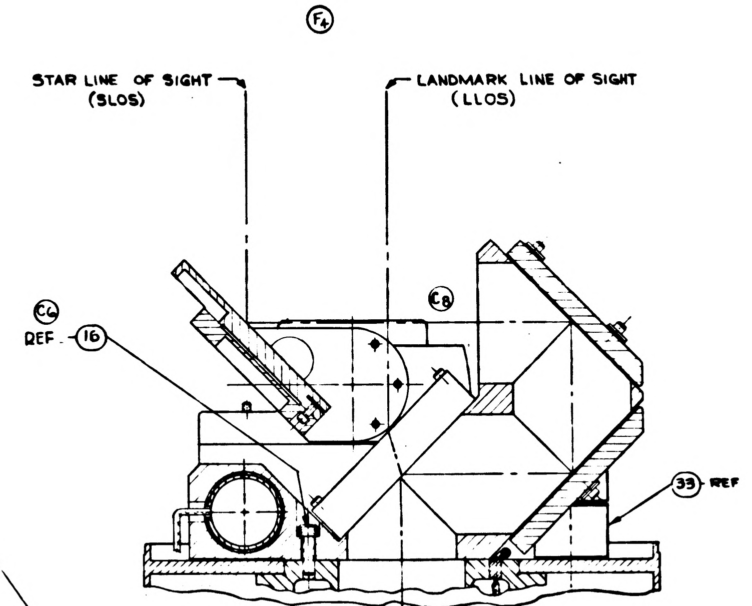
CODE IDENT NO. | SIZE E | NASA NUMBER 1011891
SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 3

NOTES:
SEE SHEET 1 AND 3 OF 3.

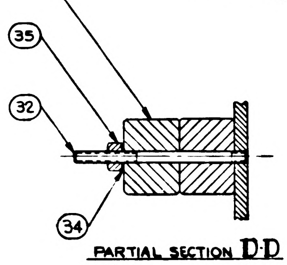
3 1681101

	SYM	ZONE	DESCRIPTION	DATE	APPROVAL
			REVISIONS 02625		
	A		SEE SHEET NO. 1 TDRR 03812	10 Oct 63	GK
(A)	B6		REVISED PER TDRR NO. 06505	25 FEB 64	
(M)	C9		REVISED PER TDRR NO. 08041	4-28-64	
(M)	D3		REVISED PER TDRR NO. 08600	5-19-64	
(M)	F4		REVISED PER TDRR NO. C8458	3/18/64	
(M)	G	C-5	REVISED PER TDRR NO. C8598	3/19/64	
(M)	J		REVISED PER TDRR NO. 10990	7/24/64	
(M)	K		REVISED PER TDRR NO. 13432	10/14/64	
(M)	L		REVISED PER TDRR NO. 15344	1/6/65	
(M)	M		REVISED PER TDRR NO. 15858	4/21/65	
(M)	N		REVISED PER TDRR NO. 6895	4/24/65	
(M)	P		REVISED PER TDRR NO 22246	5/6 65	
	R		REVISED PER TDRR NO. 23895	4/21 65	

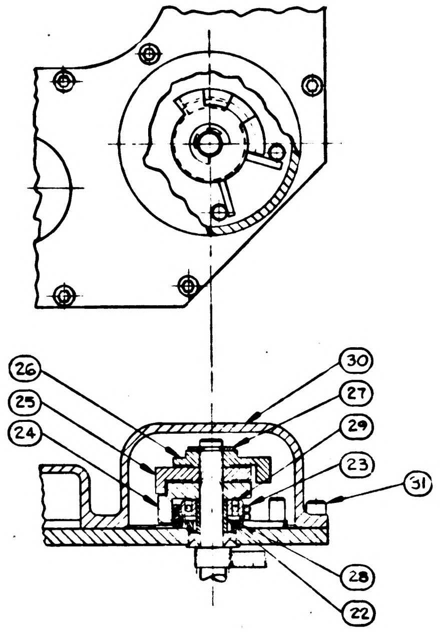




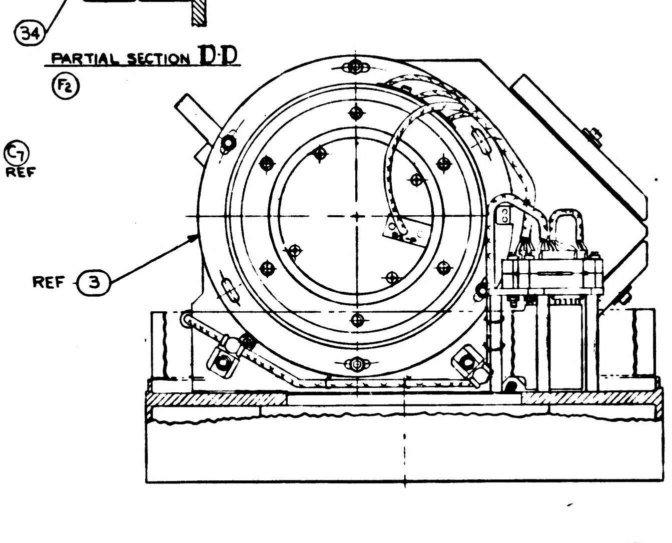
PARTIAL SECTION B-B



PARTIAL SECTION D-D
(F2)



(F3) PARTIAL SECTION E-E
SCALE: 2/1



(D2)
(G)
PARTIAL VIEW C-C

	QTY REQ'D 005	004	003	002	001	000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
	1	0	0	0	0	0	44			1011890-005			OPTICAL UNIT SUB ASSY STAGE II			
	0	1	0	0	0	0	43			1011890-004			OPTICAL UNIT SUB ASSY STAGE II			
	1	1	1	1	1	0	42			1011909-001			RESOLVER & CONNECTOR, ASSY OF			
	1	1	1	1	1	0	41			1011713-001			SCT BASE HARNESS ASSY			
	1	1	1	1	1	0	40			1011896-001			SXT BASE HARNESS ASSY			
(M)	0	0	1	0	0	0	39			1011890-003			OPTICAL UNIT SUB ASSY STAGE II			
(L)	1	1	1	1	1	0	38			1011701-001			SEXTANT INDEX HEAD ASSY			
	0	0	0	1	0	0	37			1011890-002			OPTICAL UNIT SUB-ASSY STAGE II			
(K)	0	0	0	0	1	0	36			1011890-001			OPTICAL UNIT SUB-ASSY STAGE II			
	1	1	1	1	1	1	35			AN363C1032			NUT, SELF-LOCKING, 550°F			
	1	1	1	1	1	1	34			MS15795-308			WASHER, FLAT			
	2	2	2	2	2	2	33			1011643	58386900080		COUNTERWEIGHT			
	1	1	1	1	1	1	32			1011644	53386900070		ROD, THREADED			
	10	10	10	10	10	10	31			NAS1352C03LL6	74455157010		SCREW, CAP, SOC HEAD, SELF-LOCKING			
	1	1	1	1	1	1	30			1011595	52386900730		COVER, GEAR BOX			
	1	1	1	1	1	1	29			1011610			BEARING, BALL, ANNULAR			
(F1)	1	1	1	1	1	1	28			1012075			SPACER			
	1	1	1	1	1	1	27			MS16633-4017	74453081008		RING, RETAINING			
	1	1	1	1	1	1	26			1011578	57386900930		DOG, LIMIT STOP, OUTER			
	1	1	1	1	1	1	25			1011579	57386900940		DOG, LIMIT STOP, MIDDLE			
	1	1	1	1	1	1	24			1011580	57386900950		DOG, LIMIT STOP, INNER			
	1	1	1	1	1	1	23			1011577	56386900290		SPRING, TORSION			
(J)	1	1	1	1	1	1	22			1012074	57386901680		SLEEVE			

LIST OF PARTS AND MATERIALS

1011000	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
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CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 386900720
DRAWN DATE 7-9-63
CHECKED 8-12-63
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE III

CODE IDENT NO.
SIZE E
NASA NUMBER 1011891
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 2 OF 3

1011891 R

NOTE NO.	ITEM NO.	DWG. 1011-	SHEET NO.	
1	ALL	ALL	ALL	FOLLOW SEQUENCE OF NOTES WITHIN GROUPING OF NOTES 2 THRU 8 AND 9 THRU 20.
2	38	890	1	SELECT SPACER FOR 0.0000 TO 0.0020 END PLAY OF ITEM 2 RELATIVE TO ITEM 1 MEASURED WITH 5 LBS LOAD APPLIED IN EACH DIRECTION.
3	6	890	1	CENTER RETICLE BEFORE MOUNTING TRUNNION AXIS ASSEMBLY. (A) ADD ITEM 6 WITH TRUNNION IN POSITION SHOWN ON 1011215. RECENTER RETICLE AS REQUIRED IN DIRECTION PARALLEL TO TRUNNION WITHIN 0° 0' 20", (B) ROTATE RETICLE TO SET "R" LINE PARALLEL TO TRUNNION TRACK WITHIN 2 LINE WIDTHS END TO END OF "R" LINE. (A) AND (B) MUST BE MUTUALLY ATTAINED.
4	3	890	1	SET RELAY FOCUS SO THAT A COLLIMATED TARGET RETICLE FROM THE PANEL END OF RELAY ASS'Y IS SEEN IN THE SAME FOCUS AS THE SCT RETICLE AS OBSERVED THROUGH THE SCT OBJECTIVE.
5	7 & 8	890	1	POSITION TRUNNION AT ZERO (POSITION SHOWN ON DWG. 1011215). POSITION SHAFT AT ZERO (TRUNNION PARALLEL TO LONG AXIS OF 3 BALL MOUNT AND X ON TRUNNION AWAY FROM MIDDLE MOUNTING BALL). SET GEAR BOX COUNTERS AT ZERO AND RESOLVERS WITH NULL MARK ON SHAFT ALIGNED WITH ARROW ON BODY. MOUNT GEAR BOXES IN MESH WITH ALL THESE RELATIONS MAINTAINED WITHIN ABOUT 5°.
6	31	890	1	SET UP GEAR BOX MESHES WITH CLUSTER GEARS, ITEM 5, AS CLOSELY AS POSSIBLE WITHOUT INCURRING NOTICEABLE BINDING THROUGH FULL TURNS OF ITEM 5.
7A		891	1	AFTER ALL ITEMS PERTAINING TO SCT ARE ASSEMBLED, RESOLVER ZEROS SHALL BE SET WITHIN 0° 1' OF TEST FIXTURE OPTICAL REFERENCE.
7B				COUNTER ZEROS SHALL BE SET WITHIN 0.01° OF FIXTURE OPTICAL REFERENCE.
7C				TOTAL BACKLASH FROM COUNTERS TO LINE OF SIGHT SHALL NOT EXCEED 0.02° READ ON COUNTER BY APPROACHING THE SAME OPTICAL CHECK POSITIONS FROM BOTH DIRECTIONS.
7D				BOTH DRIVES SHALL START AT 6.2 VOLTS MAX. AND RUN AT 3.6 VOLTS MAX. THROUGHOUT 360° OF COUNTERS ROTATION IN BOTH DIRECTIONS EXCEPT AT 0° AND 180° WHERE 10 VOLTS MAX. STARTING THROUGH THE COUNTER MASK SHIFTING CYCLES IS PERMITTED. STARTING VOLTAGE NEED ONLY BE MEASURED AT ANY POINTS WHERE SLOWING OF THE DRIVE IS NOTICEABLE WHEN RUNNING BELOW ITS MAX. ALLOWED RUNNING VOLTAGE.
8	17	890	1	VIBRATION PROOF ITEMS 17 USING LOCKING COMPOUND GRADE CV PER MIL-S-22473.
9		890	2	WITH ALL ITEMS ON DWG. 1011890 SHEET 2 PLUS ITEMS 17 AND 20, ON SHEET 1 AND ITEMS 2 AND 15 OF DRAWING 1011891 SHEET 1 ASSEMBLED THE FOLLOWING REQUIREMENTS SHALL BE MET:
9A				WITH THE TRUNNION ROTATED TO THE MIRROR POSITION CORRESPONDING TO ZERO LINE OF SIGHT, THE SLOS AND LLOS SHALL BE LATERALLY PARALLEL WITHIN 0° 0' 20" ("R" LINE COINCIDENCE).
9B				WITH THE TRUNNION ROTATED TO THE MIRROR POSITION AT WHICH THE SXT RETICLE IS REFLECTED BACK ON ITSELF, THE "R" LINE OF THE REFLECTED IMAGE SHALL COINCIDE WITH THE RETICLE "R" LINE WITHIN 0° 0' 10".
9C				THE DIFFERENCE BETWEEN MEASURES "9A" AND "9B" TAKING DIRECTION INTO ACCOUNT SHALL NOT EXCEED 0° 0' 20".
9D				THE SUM OF THE MEASURES "9A" AND "9B" SHALL NOT EXCEED 0° 0' 25" IGNORING DIRECTION.
9E				THE RETICLE AS OBSERVED THROUGH THE LLOS SHALL BE COINCIDENT WITH THE SHAFT AXIS WITHIN 0° 0' 5".
9F				THE RETICLE AS OBSERVED THROUGH THE SLOS SHALL BE COINCIDENT WITH THE SHAFT AXIS WITHIN 0° 0' 20", THAT IS, MEASURES "9A" AND "9E" SHALL NOT HAVE ADDITIVE TOLERANCES.
9G				THE RETICLE "R" LINE SHALL ALIGN WITH THE TRUNNION TRACK WITHIN 0° 0' 10" VARIATION OVER ITS WHOLE LENGTH.
9H				(FOR 1011891-004 AND 1011891-005 ONLY) AFTER SXT RETICLE POSITION IS FINALIZED, SECURE BY APPLYING 28 IN-LBS LOCKING TORQUE TO (3) RETICLE LOCKING SCREWS (NAS 352C02LL6) WHICH ARE PART OF THE SXT RETICLE ASSEMBLY. VIBRATION PROOF SXT RETICLE LOCKING RING USING (1) DROP OF LOCKING COMPOUND GRADE H PER MIL-S-22473. THE SURFACES SHALL HAVE BEEN PREVIOUSLY PREPARED IN ACCORDANCE WITH ND 1002271. AFTER ABOVE REQUIREMENTS HAVE BEEN ACCOMPLISHED, REMOVE (3) BEVEL RETAINERS AND (3) HEX SOCKET HEAD CAP SCREWS (MS 16995-3) WHICH ARE PART OF SXT RETICLE ASSEMBLY (PART OF ITEM 67).

NOTE NO.	ITEM NO.	DWG. 1011-	SHEET NO.	
10	3	891	1	THE 64X AND 1X RESOLVERS ARE TO BE AT THEIR MECHANICAL ZERO POSITION WITHIN 0° 1' WHEN THE SLOS AND LLOS ARE COINCIDENT ("M" LINES COINCIDENT).
11	9	890	1	THE 16X RESOLVER IS TO BE AT ITS MECHANICAL ZERO POSITION WITHIN 0° 1' WHEN THE SHAFT IS OPTICALLY POSITIONED TO A LINE OF SIGHT NORMAL TO THE LINE BETWEEN THE END BALLS AND AWAY FROM THE THIRD BALL OF THE THREE BALL MOUNTING.
12	22 THRU 29	891	2	THE LIMIT STOP IS TO BE SET SO THAT THE TRUNNION MIRROR HAS EQUAL OVERTRAVEL AT 0° TO THE 90° (SELF COLL.) LINE OF SIGHT POSITIONS WITHIN 3°.
13		891	2	THE ANTI-BACKLASH SPRING IS TO BE WOUND UP 1/4 TURN CLOCKWISE AND CLAMPED WHEN THE MIRROR IS AT THE 90°+ STOP POSITION.
14	32 THRU 35	891	2	WITH ITEMS 3, 21, 30 AND 31 IN PLACE, ITEMS 32 THRU 35 SHALL BE POSITIONED BY SELECTION OF HOLES AND ORIENTATION OR REDUCTION OF ECCENTRIC WEIGHTS ON THE THREADED POST TO BALANCE THE SHAFT WITHIN 2 IN.OZ. VIBRATION PROOF USING LOCKING COMPOUND GRADE CV PER MIL-S-22473 ON THREADS OF POST AND ON SURFACES OF WEIGHTS WHERE THEY CONTACT EACH OTHER AND THE MOUNTING SURFACE. BALANCE IS IN TOLERANCE IF 2 IN.OZ. TORQUE WILL REVERSE THE IMBALANCE.
15	12	890	1	THE SXT SHAFT SHALL BE AT ITS ZERO POSITION, SEE NOTE 11, DURING THE ASSEMBLY OF ITEMS 12 AND ITS HARDWARE, ITEM 22 AND ITS HARDWARE AND ITEM 11 AND ITS HARDWARE. ITEM 12, SHAFT GEARBOX MUST HAVE ITS RESOLVER PRESET TO ITS ELECTRICAL ZERO REFERENCE MARK. ITEM 22 MUST BE POSITIONED WITH ITS STOP DOG IN THE LARGER SECTOR BETWEEN THE TWO PINS ON ITEM 10.
16	30	890	1	VIBRATION PROOF USING LOCKING COMPOUND GRADE CV PER MIL-S-22473.
17	12	890	1	WITH THE SXT SHAFT ROTATED TO ITS COUNTER CLOCKWISE STOP, WIND UP THE ANTI-BACKLASH SPRING BY MEANS OF ITS COVER UNTIL TENSION IS SUFFICIENT TO TAKE UP BACKLASH IN THIS POSITION (1/4 TURN APPROX.). SPRING SHOULD TAKE UP BACKLASH WHEN BULL GEAR IS MANUALLY TURNED CLOCKWISE AND RELEASED.
18	12	890	1	SET THE 1/2 SPEED SHAFT RESOLVER ZERO WITHIN 0° 1' OF THE FIXTURE OPTICAL REFERENCE (SEE NOTE 11). ADD REMAINING ITEMS SHOWN ON DWGS. 1011890 AND 891 AND MEASURE SHAFT AND TRUNNION DRIVE VOLTAGES IN BOTH DIRECTIONS FROM STOP TO STOP. RUNNING SHALL NOT EXCEED 3.6 VOLTS. STARTING MEASURED AT POINTS WHERE DRIVE SLOWS DOWN SHALL NOT EXCEED 6.2 VOLTS. RUNNING SHALL BE MONITORED BY OBSERVING RATE GENERATOR OUTPUT OF EACH DRIVE.
19		890	1	VIBRATION PROOF SXT RETICLE LOCKING RING USING 1 DROP OF LOCKING COMPOUND GRADE H PER MIL-S-22473.
20	42 19	890 891	1 1	VIBRATION PROOF USING LOCKING COMPOUND GRADE HV PER MIL-S-22473.

REVISIONS

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
Ⓜ F		SHEET 3 ADDED, TDRR 08458	[illegible]	[illegible]
Ⓜ H		REVISED PER TDRR NO. 09891	3 June 64	
P		REVISED PER TDRR No. 22246	9/14/65	
R		REVISED PER TDRR NO. 23893	11/12/65	

Ⓕ THIS SHEET ADDED

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ −	+ −	+ −

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MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900720
DRAWN KC DATE 5-1-64
CHECKED
APPROVAL
APPROVAL E. Thomas 7/12/64
NASA APPROVAL W J [illegible] 5-14-64
MIT APPROVAL

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SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY,
STAGE II

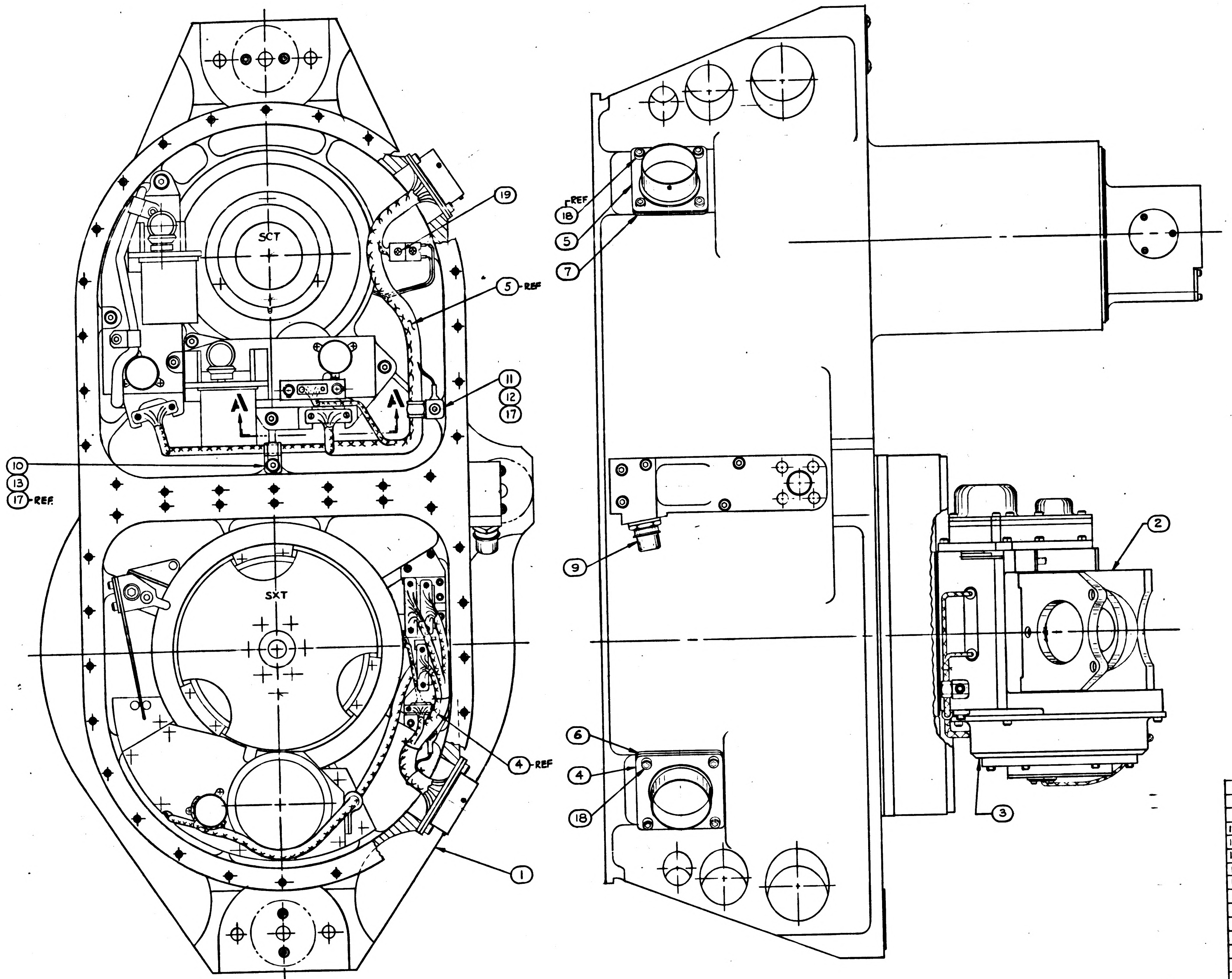
CODE IDENT NO.
SIZE E
NASA NUMBER 1011891
SCALE
WEIGHT CALC ACTUAL
SHEET 3 OF 3

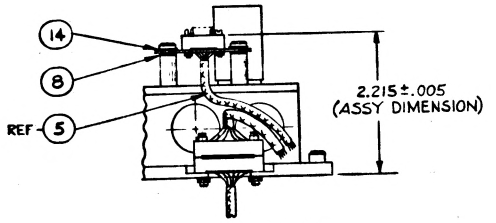
1681101

REVISIONS 02625 8-16-63

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. ASSEMBLE AND TEST IN ACCORDANCE WITH A.T.P 1011891.
3. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019





PARTIAL SECTION A-A

MASTER

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
19	1	NAS	1189C02P4L	74455155002		SCREW, SELF LOCKING, 100° FLAT HEAD			
18	8	NAS	1352C06LL5	74455157018		SCREW, CAP, SOC. HEAD, SELF LOCKING			
17	2	NAS	1352C06LL6	74455157019		SCREW, CAP, SOC. HEAD, SELF LOCKING			
16	1	NAS	1351C3LL10	74455156040		SCREW, CAP, SOC. HEAD, SELF LOCKING			
15	3	NAS	1351C3LL12	74455156041		SCREW, CAP, SOC. HEAD, SELF LOCKING			
14	2	MS	16624-15			RING, RETAINING, EXTERNAL, BASIC			
13	1	MS	15795-305			WASHER, FLAT			
12	1	*	1011918-2			WASHER, CABLE CLAMP			
11	1	*	1000220-6			CLAMP, CABLE			
10	1	*	1000220-4			CLAMP, CABLE			
9	1	*	1000135			COUPLING HALF, QUICK DISCONNECT (SCD)			
8	AR		1011885	45386900170		SHIM			
7	1	*	1011599			PACKING, PREFORMED, RETAINED			
6	1	*	1011597			PACKING, PREFORMED, RETAINED			
5	1		1011713	80386900020		SCT BASE HARNESS ASSY			
4	1		1011896	80386900030		SXT BASE HARNESS ASSY			
3	1		1011909	85386900920		RESOLVER AND CONNECTOR ASSY OF			
2	1		1011701	85386900760		SEXTANT INDEX HEAD ASSY			
1	1		1011890	85386900710		OPTICAL UNIT SUBASSY - STAGE II			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
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TOL ON FRACTIONS ± DECIMALS ± ANGLES ±
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CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 38690 0720
DRAWN Borstein DATE 7-9-63
CHECKED 8-12-63
APPROVAL 8-13-63
APPROVAL Siraco 8-15-63
NASA APPROVAL W J 8-16-63
MIT APPROVAL 16 Aug 63

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SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE II

CODE IDENT NO.
SIZE E
NASA NUMBER 1011891
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 2

1011891

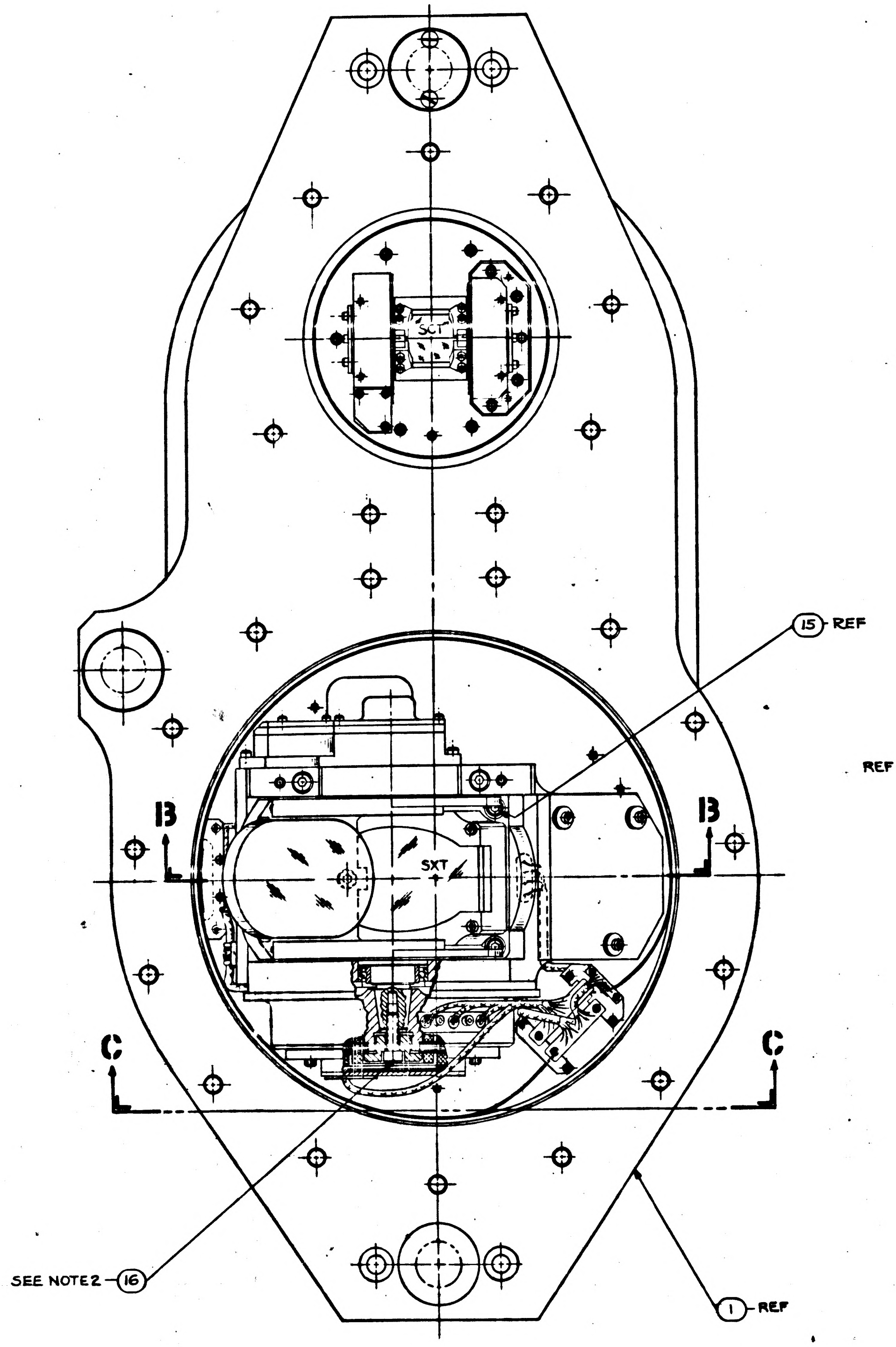
INCHES
PHOTOGRAPHIC SCALE ONLY

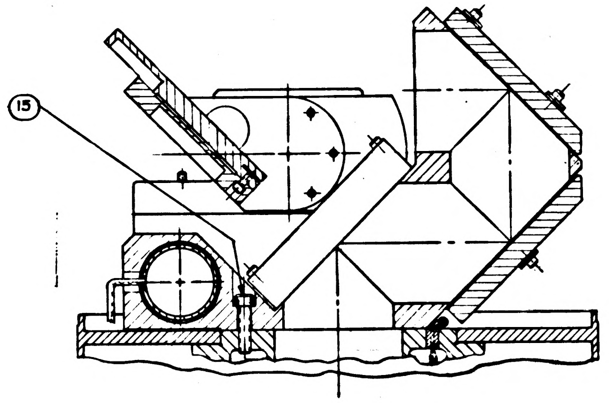
	1681101

REVISIONS 02625 8-6-63

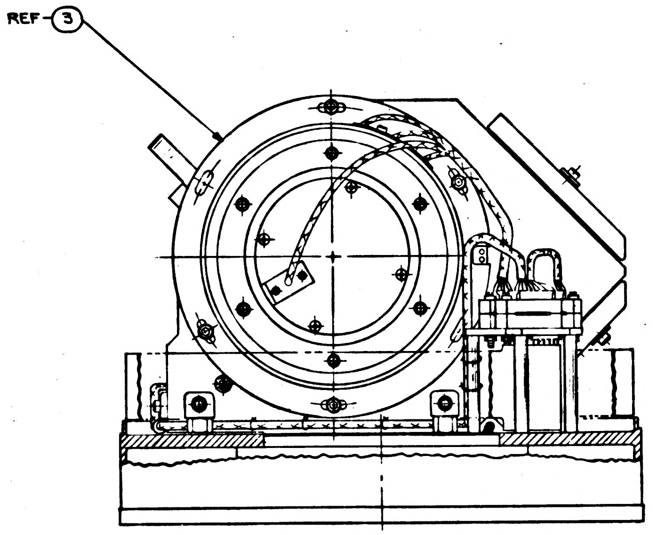
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
SEE SHEET 1 OF 2.





PARTIAL SECTION B-B



PARTIAL VIEW C-C

1011891

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

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CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85 386900720
DRAWN Boruski DATE 7-9-63
CHECKED D. Corlew 8-2-63
APPROVAL 8-1-63
APPROVAL 8-15-63
NASA APPROVAL W J 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
OPTICAL UNIT SUBASSEMBLY
STAGE III

CODE IDENT NO.
SIZE E
NASA NUMBER 1011891
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 2 OF 2

MASTER

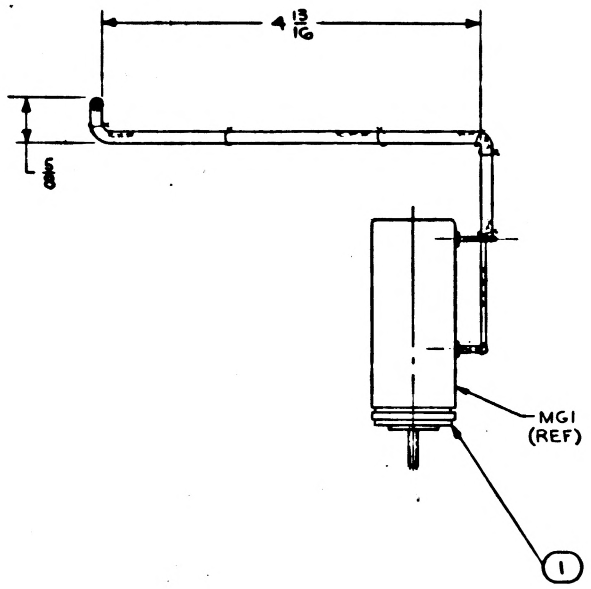
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

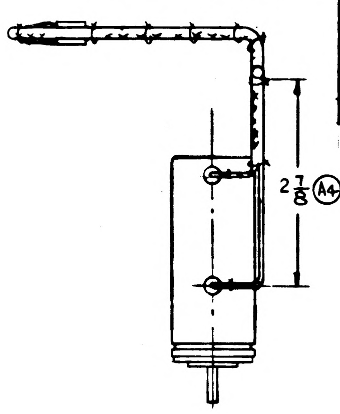
A 1011892

REVISIONS 02944				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A11		REVISED PER TDRR NO. 07519	4-7-64	

NOTES:

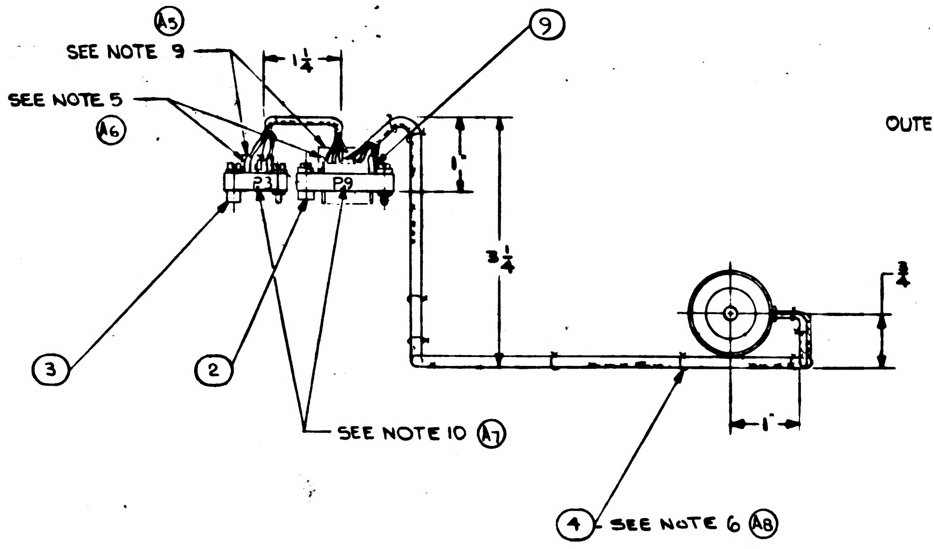
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING SCHEMATIC, NASA DWG. NO. 1015122.
3. TWIST CONDUCTORS, IN ACCORDANCE WITH ND-1002032. (A1)
4. SLIDE ITEM 9 OVER WIRES BEYOND STRIPPED ENDS.
5. SOLDER CONDUCTORS, PER WIRING LEGEND, WITH Sn60WRP2, PER QQ-S-571, PER MSFC-PROC-158.
6. LACE CONDUCTORS, USING ITEM 4, IN ACCORDANCE WITH ND-1002032.
7. PERFORM CONTINUITY CHECK.
8. SLIDE ITEM 9 OVER SOLDER JOINTS AND SHRINK.
9. POT IN ACCORDANCE WITH ND-1002009 METHOD C.
   A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
   B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
10. MARK REFERENCE DESIGNATIONS 1/8 INCH HIGH IN ACCORDANCE WITH ND1002019.

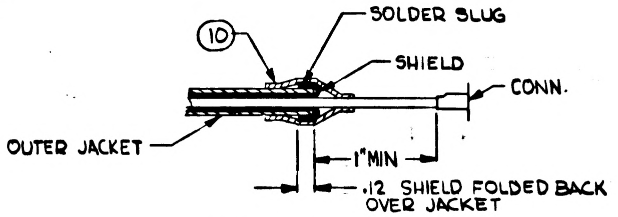




WIRING LEGEND

	COND. NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 3
(A2)	E1	YELLOW		MG1-YELLOW	P9-H	8
(A3)	E2	WHITE		MG1-WHITE	P9-D	
	E3	RED		MG1-RED	P9-L	8
(A11)	E4	RED-BLACK		MG1-RED-BLACK	P9-A	
	E5	BLACK		MG1-BLACK	P9-P	
	E6	ORANGE		MG1-ORANGE	P9-T	8
	E7	GRAY		MG1-GRAY	P9-W	
	E8	BLUE		MG1-BLUE	P9-Y	8
	E9	BROWN		MG1-BROWN	P9-b	
	E10	YELLOW	8	P3-D	P9-C	8
	E11	BLUE	7	P3-C	P9-F	
	E12	BLACK	6	P3-B	P9-K	8
	E13	RED	5	P3-A	P9-N	





DETAIL "A" (A9)
SCALE: NONE
APPLIES TO MG1- BLUE LEAD

	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
(A10)	10	1	*	1010402-2	"		INSULATION, SOLDER ELECT. COND. INSUL. HEAT SHRINK			
	9	17	*	1010490-060	—		INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
	8	1		1010416-15	—		WIRE, ELECTRICAL, STRANDED, INSULATED 2" LG.			
	7	1		1010416-17	—		WIRE. ELECTRICAL, STRANDED, INSULATED 2" LG.			
	6	1		1010416-11	—		WIRE, ELECTRICAL, STRANDED, INSULATED 2" LG.			
	5	1		1010416-13	—		WIRE, ELECTRICAL, STRANDED, INSULATED 2" LG			
	4	AR	*	1011753	60035142001		TAPE, LACING AND TYING			
	3	1	*	1011757	68502018301		CONNECTOR, ELECTRICAL (P3)			
	2	1	*	1000123	—		CONNECTOR, ELECTRICAL (P9)			
	1	1	*	1010610	—		SERVO MOTOR-TACHOMETER, GENERATOR (MG1)			

LIST OF PARTS AND MATERIALS

*PURCHASE ITEM-SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

1011700	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/16; DECIMALS ± ~; ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900840
DRAWN [illegible] DATE 6-26-63
CHECKED [illegible]
APPROVAL [illegible] 8/23/63
APPROVAL [illegible] 8-24-63
NASA APPROVAL [illegible] 9/1/63
MIT APPROVAL [illegible] 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SERVO MOTOR & CONNECTOR, ASSY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011892
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011892 A

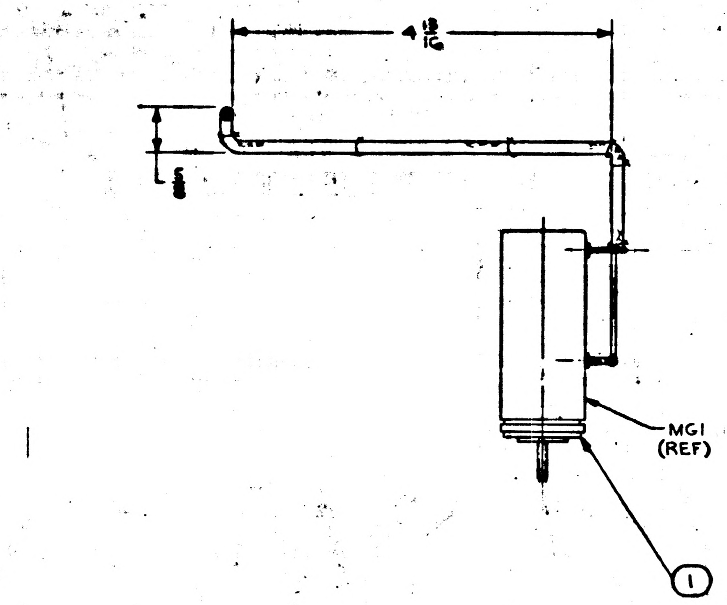
1011892 B

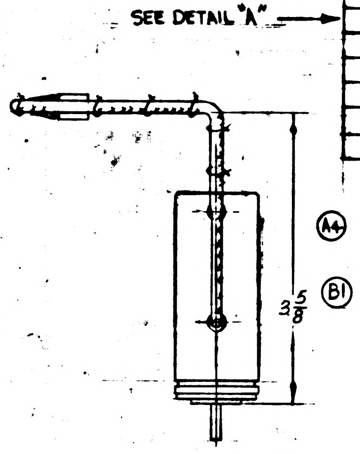
REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A11		REVISED PER TDRR NO. 07519	4-7-64	
B3		REVISED PER TDRR NO. 08596	6-19-64	

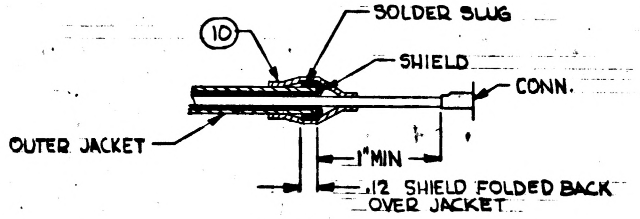
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING SCHEMATIC, NASA DWG. NO. 1015122.
3. TWIST CONDUCTORS, IN ACCORDANCE WITH ND-1002032. (A1)
4. SLIDE ITEM 9 OVER WIRES BEYOND STRIPPED ENDS.
5. SOLDER CONDUCTORS, PER WIRING LEGEND, WITH Sn60WRP2, PER QQ-S-571, PER MSFC-PROC-158.
6. LACE CONDUCTORS, USING ITEM 4, IN ACCORDANCE WITH ND-1002032.
7. PERFORM CONTINUITY CHECK.
8. SLIDE ITEM 9 OVER SOLDER JOINTS AND SHRINK.
9. POT IN ACCORDANCE WITH ND-1002009 METHOD C.
   A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
   B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
10. MARK REFERENCE DESIGNATIONS 1/8 INCH HIGH IN ACCORDANCE WITH ND1002019.

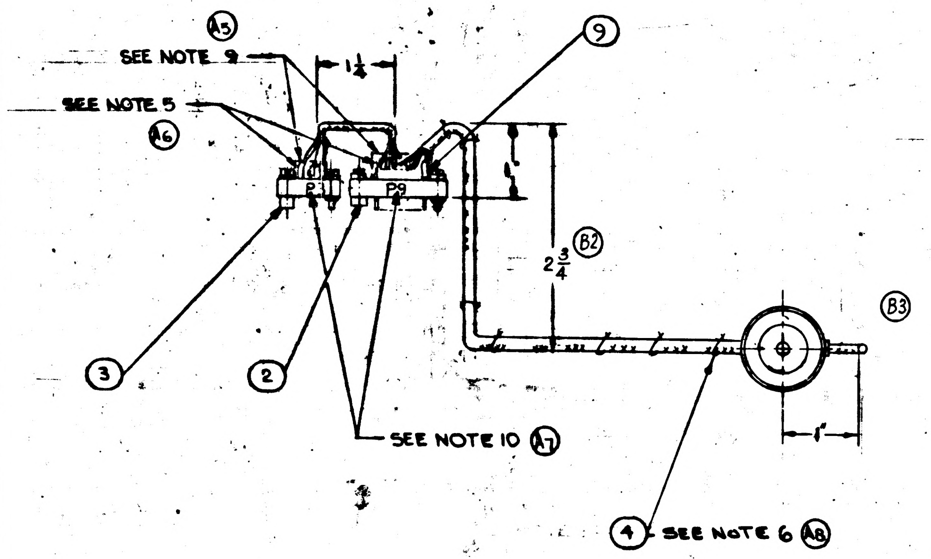
WIRING LEGEND						
	COND. NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 3
(A2)	E1	YELLOW		MG1-YELLOW	P9-H	8
(A3)	E2	WHITE		MG1-WHITE	P9-D	
	E3	RED		MG1-RED	P9-L	8
(A11)	E4	RED-BLACK		MG1-RED-BLACK	P9-A	
	E5	BLACK		MG1-BLACK	P9-P	
	E6	ORANGE		MG1-ORANGE	P9-T	8
	E7	GRAY		MG1-GRAY	P9-W	
	E8	BLUE		MG1-BLUE	P9-Y	8
	E9	BROWN		MG1-BROWN	P9-b	
	E10	YELLOW	8	P3-D	P9-C	8
	E11	BLUE	7	P3-C	P9-F	
	E12	BLACK	6	P3-B	P9-K	8
	E13	RED	5	P3-A	P9-N	







DETAIL "A" (A9)
SCALE: NONE
APPLIES TO MG1-BLUE LEAD



	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
(A10)	10	1	*	1010402-2	—		INSULATION, SOLDER ELECT. COND. INSUL. HEAT SHRINK			
	9	17	*	1010490-060	—		INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
	8	1		1010416-15	—		WIRE, ELECTRICAL, STRANDED, INSULATED 2" LG.			
	7	1		1010416-17	—		WIRE, ELECTRICAL, STRANDED, INSULATED 2" LG.			
	6	1		1010416-11	—		WIRE, ELECTRICAL, STRANDED, INSULATED 2" LG.			
	5	1		1010416-13	—		WIRE, ELECTRICAL, STRANDED, INSULATED 2" LG			
	4	AR	*	1011753	60035142001		TAPE, LACING AND TYING			
	3	1	*	1011757	68502018301		CONNECTOR, ELECTRICAL (P3)			
	2	1	*	1000123	—		CONNECTOR, ELECTRICAL (P9)			
	1	1	*	1010610	—		SERVO MOTOR - TACHOMETER, GENERATOR (MG-1)			

LIST OF PARTS AND MATERIALS

*PURCHASE ITEM-SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

NEXT ASSY	USED ON
1011700	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± 1/16 DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900840
DRAWN [illegible] DATE 6-21-63
CHECKED [illegible]
APPROVAL [illegible] 8/23/63
APPROVAL [illegible] 8-21-63
NASA APPROVAL [illegible] 9/5/63
MIT APPROVAL [illegible] 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SERVO MOTOR & CONNECTOR,
ASSY OF

CODE IDENT NO. SIZE D NASA NUMBER 1011892
SCALE 1/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

1011892 B

1011892 C

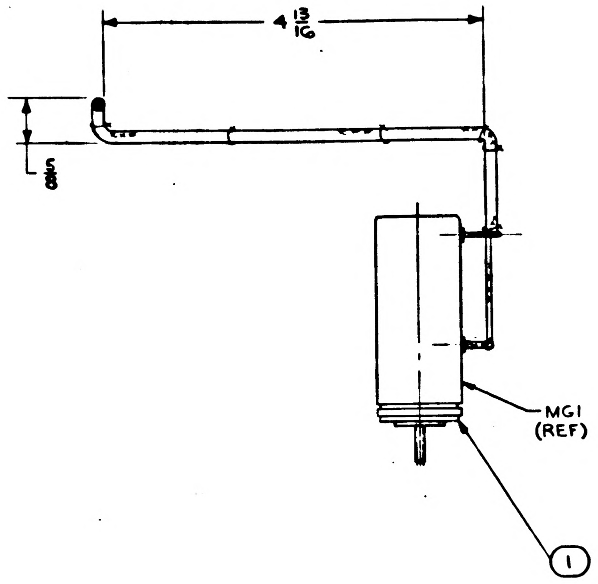
NOTES:

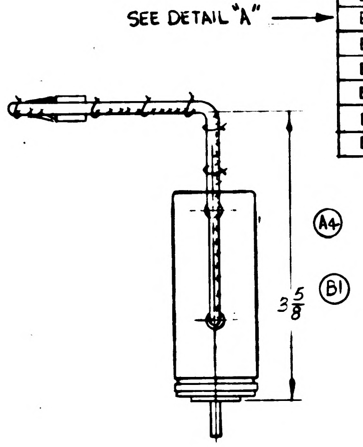
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING SCHEMATIC, NASA DWG. NO. 1015122.
3. TWIST CONDUCTORS, IN ACCORDANCE WITH ND-1002032. (A1)
4. SLIDE ITEM 9 OVER WIRES BEYOND STRIPPED ENDS.
5. SOLDER CONDUCTORS, PER WIRING LEGEND, WITH Sn60WRP2, PER QQ-S-571, PER MSFC-PROC-158.
6. LACE CONDUCTORS, USING ITEM 4, IN ACCORDANCE WITH ND-1002032.
7. PERFORM CONTINUITY CHECK.
8. SLIDE ITEM 9 OVER SOLDER JOINTS AND SHRINK.
9. POT IN ACCORDANCE WITH ND-1002009 METHOD C.
   A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
   B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
10. MARK REFERENCE DESIGNATIONS 1/8 INCH HIGH IN ACCORDANCE WITH ND1002019.

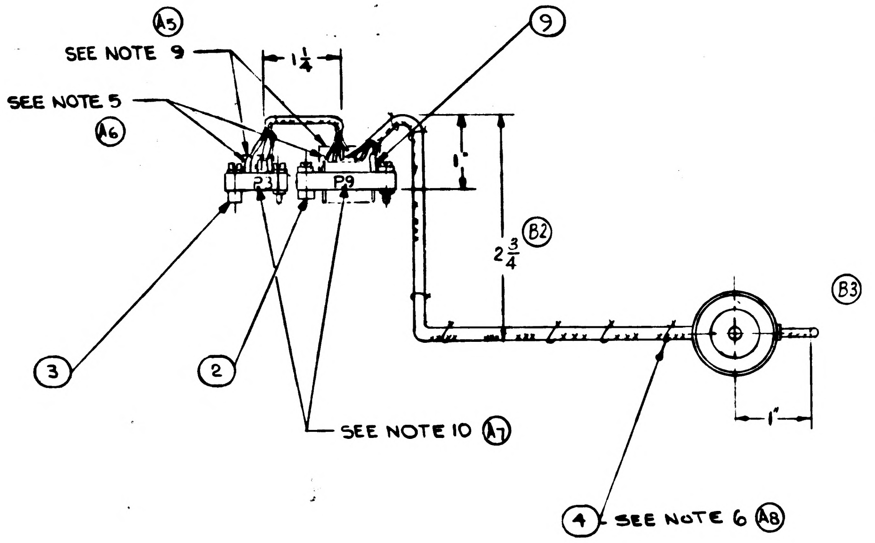
REVISIONS U2944				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A11		REVISED PER TDRR NO. 07519	4-7-64	
B3		REVISED PER TDRR NO. 08596	5-19-64	
C		REVISED PER TDRR NO. 08597	5/19/64	

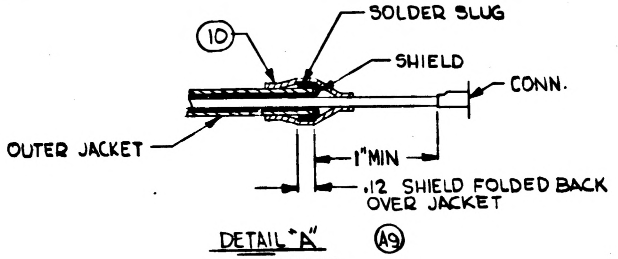
WIRING LEGEND

	COND. NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 3
(A2)	E1	YELLOW		MG1-YELLOW	P9-H	8
(A3)	E2	WHITE		MG1-WHITE	P9-D	
	E3	RED		MG1-RED	P9-L	8
(A11)	E4	RED-BLACK		MG1-RED-BLACK	P9-A	
	E5	BLACK		MG1-BLACK	P9-P	
	E6	ORANGE		MG1-ORANGE	P9-T	8
	E7	GRAY		MG1-GRAY	P9-W	
	E8	BLUE		MG1-BLUE	P9-Y	8
	E9	BROWN		MG1-BROWN	P9-b	
	E10	YELLOW	8	P3-D	P9-C	8
	E11	BLUE	7	P3-C	P9-F	
	E12	BLACK	6	P3-B	P9-K	8
	E13	RED	5	P3-A	P9-N	









DETAIL "A" (A9)
SCALE: NONE
APPLIES TO MG1-BLUE LEAD

	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
(A10)	10	1	*	1010402-2	-		INSULATION, SOLDER ELECT. COND. INSUL. HEAT SHRINK			
	9	17	*	1010490-060	—		INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
	8	1		1010416-15	—		WIRE, ELECTRICAL, STRANDED, INSULATED 2" LG.			
	7	1		1010416-17	—		WIRE, ELECTRICAL, STRANDED, INSULATED 2" LG.			
	6	1		1010416-11	—		WIRE, ELECTRICAL, STRANDED, INSULATED 2" LG.			
	5	1		1010416-13	—		WIRE, ELECTRICAL, STRANDED, INSULATED 2" LG			
	4	AR	*	1011753	60035142001		TAPE, LACING AND TYING			
	3	1	*	1011757	68502018301		CONNECTOR, ELECTRICAL (P3)			
	2	1	*	1000123	—		CONNECTOR, ELECTRICAL (P9)			
(C)	1	1	*	1010610-1	—		SERVO MOTOR-TACHOMETER, GENERATOR (MG-1)			

LIST OF PARTS AND MATERIALS

*PURCHASE ITEM-SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

NEXT ASSY	USED ON
1011700	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/16; DECIMALS ± ~; ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900840

DRAWN J. Schiller DATE 6-26-63
CHECKED Carl Pappalardo
APPROVAL 6-27-63
APPROVAL 8-24-63
NASA APPROVAL
MIT APPROVAL 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SERVO MOTOR & CONNECTOR, ASSY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011892
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

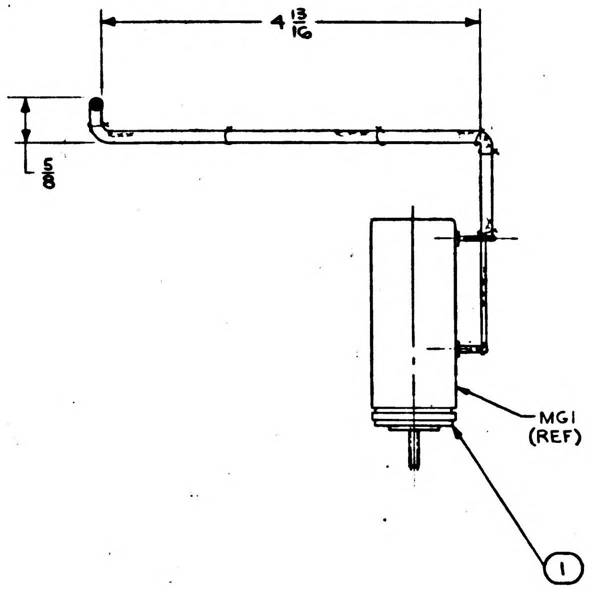
1011892

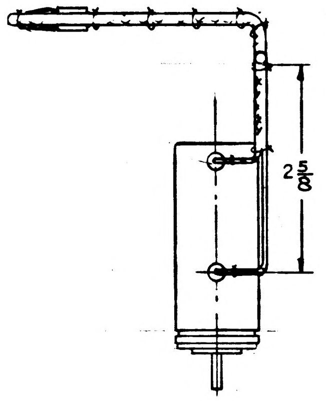
REVISIONS 62944

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

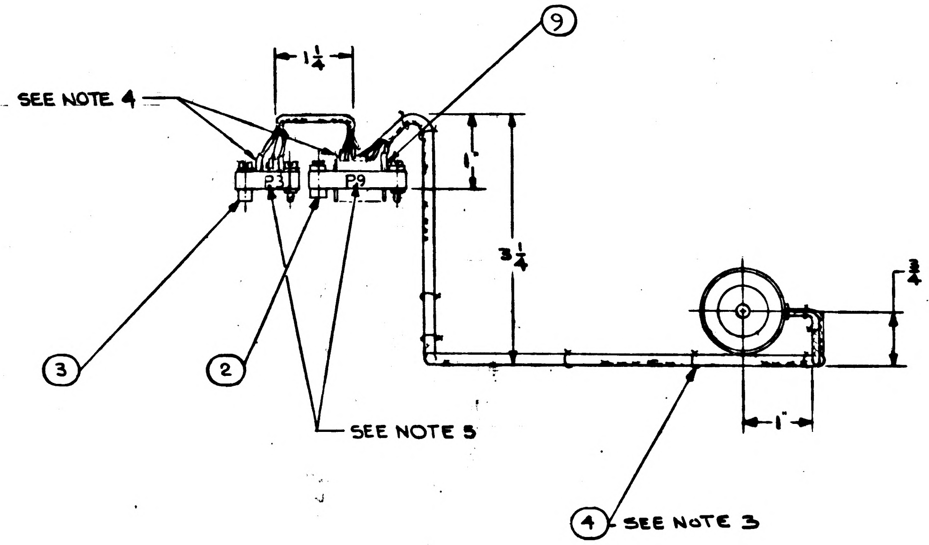
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING SCHEMATIC, NASA DWG. NO. 1015122.
3. LACE WIRES IN ACCORDANCE WITH ND 1002032 USING 1011753 (ITEM 4)
4. SOLDER WIRES TO CONNECTOR IN ACCORDANCE WITH MSFC-PROC-158, USING TYPE SN60 WAR P2 SOLDER PER QQ-S-571.
5. MARK CHARACTERS 1/8 HIGH PER ND 100201 AT LOCATIONS SHOWN.
6. TWISTED CONDUCTORS TO CONSIST OF FOUR (4) FULL TURNS PER INCH MINIMUM.





WIRING LEGEND

COND. NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 6
E1	YELLOW		MG1-YELLOW	P9-D	8
E2	WHITE		MG1-WHITE	P9-H	
E3	RED		MG1-RED	P9-L	8
E4	RED/BLACK		MG1-RED/BLACK	P9-A	
E5	BLACK		MG1-BLACK	P9-P	
E6	ORANGE		MG1-ORANGE	P9-T	8
E7	GRAY		MG1-GRAY	P9-W	
E8	BLUE		MG1-BLUE	P9-Y	8
E9	BROWN		MG1-BROWN	P9-b	
E10	YELLOW	8	P3-D	P9-C	8
E11	BLUE	7	P3-C	P9-F	
E12	BLACK	6	P3-B	P9-K	8
E13	RED	5	P3-A	P9-N	



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
9	AR	*	1010490-060	—		INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
8	1		1010416-15	—		WIRE, ELECTRICAL, STRANDED, INSULATED 2" LG.			
7	1		1010416-17	—		WIRE. ELECTRICAL, STRANDED, INSULATED 2" LG.			
6	1		1010416-11	—		WIRE, ELECTRICAL, STRANDED, INSULATED 2" LG.			
5	1		1010416-13	—		WIRE, ELECTRICAL, STRANDED, INSULATED 2" LG			
4	AR	*	1011753	60035142001		TAPE, LACING AND TYING			
3	1	*	1011757	68502018301		CONNECTOR, ELECTRICAL (P3)			
2	1	*	1000123	—		CONNECTOR, ELECTRICAL (P9)			
1	1	*	1010610	—		SERVO MOTOR-TACHOMETER, GENERATOR (MG1)			

LIST OF PARTS AND MATERIALS

*PURCHASE ITEM-SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

MASTER

NEXT ASSY	USED ON
1011700	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/16; DECIMALS ± ~; ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900840
DRAWN DATE 6-26-63
CHECKED
APPROVAL
APPROVAL 8-29-63
NASA APPROVAL 7/1/63
MIT APPROVAL 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SERVO MOTOR & CONNECTOR,
ASSY OF

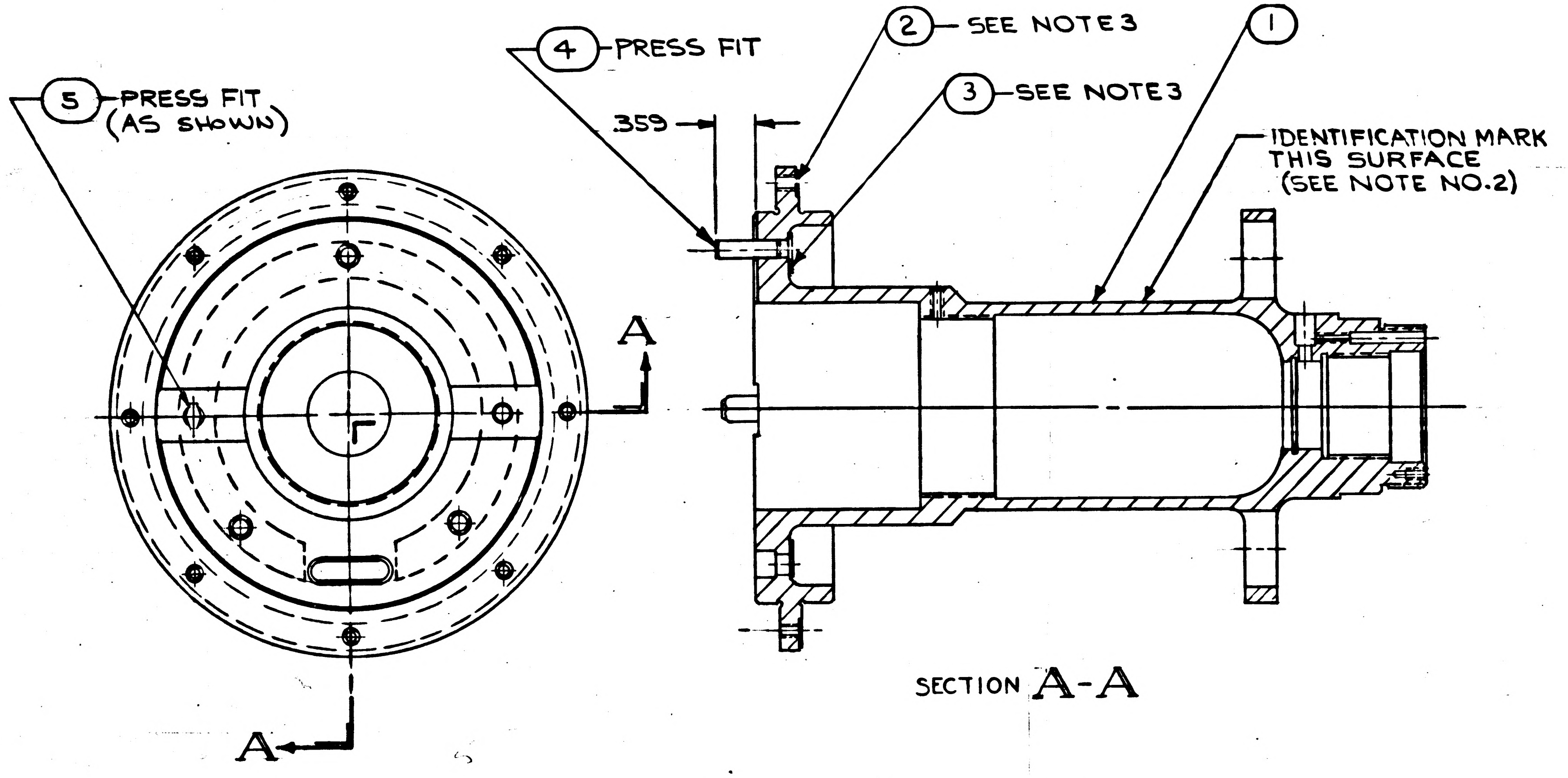
CODE IDENT NO. SIZE D NASA NUMBER 1011892
SCALE 1/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011893 A

REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR NO. 03361	9/25/63	9/26

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.
3. SECURE IN PLACE AS SHOWN USING EPOXY BONDMASTER M688 PER ND 1002004. OR EQUIVALENT. (PAR 3.1.1, "ROUGHEN THE SURFACES TO BE BONDED WITH NO.180 EMERY CLOTH OR SANDPAPER" TO BE SUBSTITUTED WITH "VAPOR DEGREASING")



SECTION A-A

5	1	*	1011769	74444028001		PIN, DIAMOND			
4	1	AN	122706			PIN-DOWEL, STEEL			
3	1		1011895	56386900570		PLATE, COVER			
2	1		1011894	56386900580		PLATE, COVER			
Ⓐ 1	1		1011293	57386900670		TUBE, TELESCOPE, SEXTANT			
ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

MASTER

* PURCHASE ITEM:- SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

APPLICATION	
NEXT ASSY	USED ON
1011797	1011000

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± —

DO NOT SCALE THIS DRAWING

MATERIAL —

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900750

DRAWN E. DRAPALA DATE 6-15-63
CHECKED Paul Pappenhuster
APPROVAL E. Ruselman 8-15-63
APPROVAL F.J. Siraco 8-15-63
NASA APPROVAL W.J. Blaine 8-16-63
MIT APPROVAL W Kupfer Aug 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
TELESCOPE TUBE
ASSY OF

CODE IDENT NO.
SIZE C
NASA NUMBER 1011893
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET OF

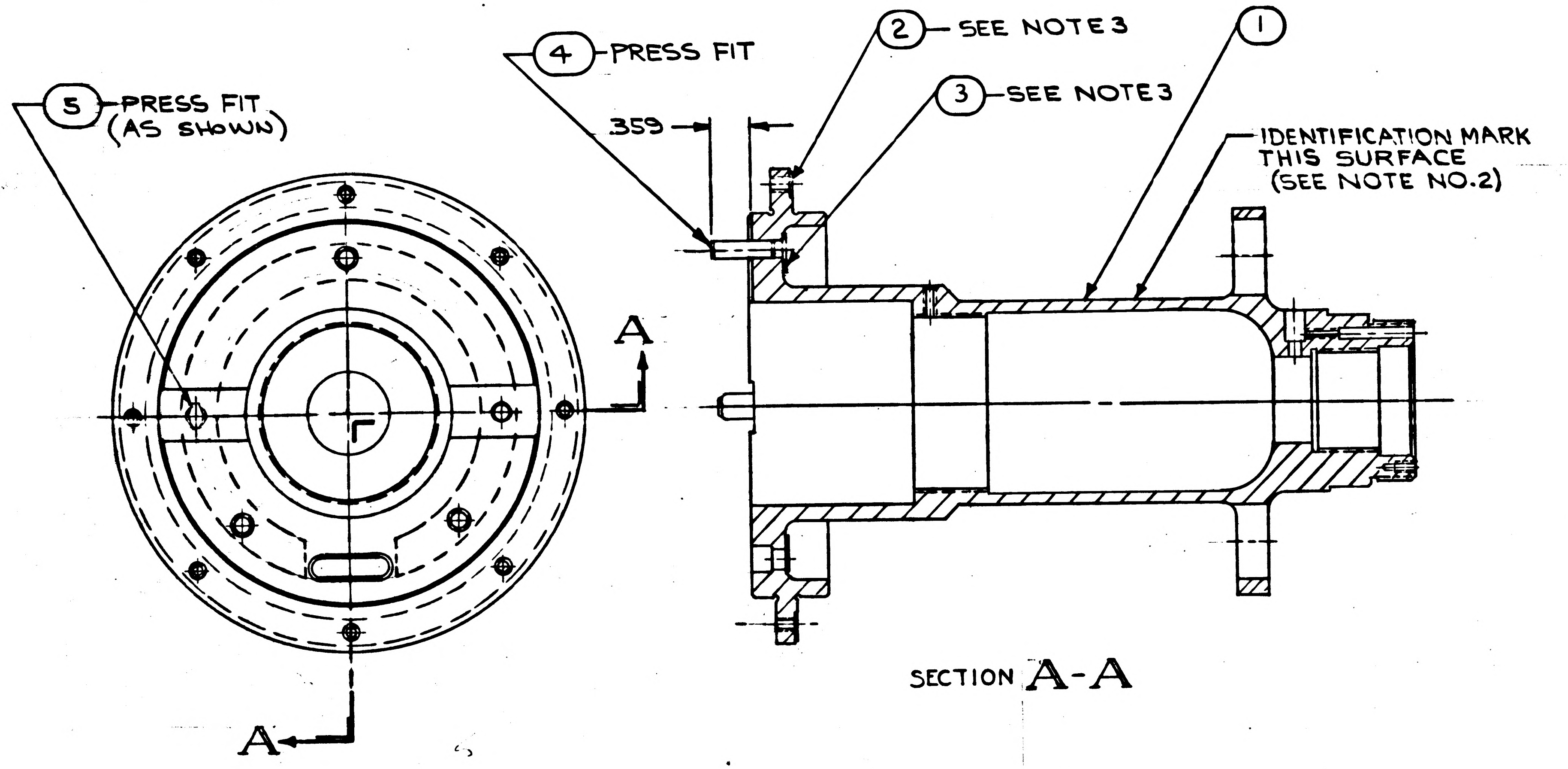
1011893A

INCHES 0 1 2 PHOTOGRAPHIC SCALE ONLY

1011893

REVISIONS		02623		
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019.
3. SECURE IN PLACE AS SHOWN USING EPOXY BONDMASTER M688 PER ND 1002004. OR EQUIVALENT. (PAR 3.1.1, "ROUGHEN THE SURFACES TO BE BONDED WITH NO. 180 EMERY CLOTH OR SANDPAPER" TO BE SUBSTITUTED WITH "VAPOR DEGREASING")



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
5	1	*	1011769	74444028001		PIN, DIAMOND			
4	1	AN	122706			PIN-DOWEL, STEEL			
3	1		1011895	56386900570		PLATE, COVER			
2	1		1011894	56386900580		PLATE, COVER			
1	1		1011293	57386900670		TUBE, TELESCOPE, SEXTANT			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM:- SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

NEXT ASSY	USED ON
1011797	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± —

DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900750

DRAWN E. DRAPALA DATE 6-15-63
CHECKED
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
TELESCOPE TUBE
ASSY OF

CODE IDENT NO. | SIZE C | NASA NUMBER 1011893
SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET OF

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

N09163 86

A	1011896

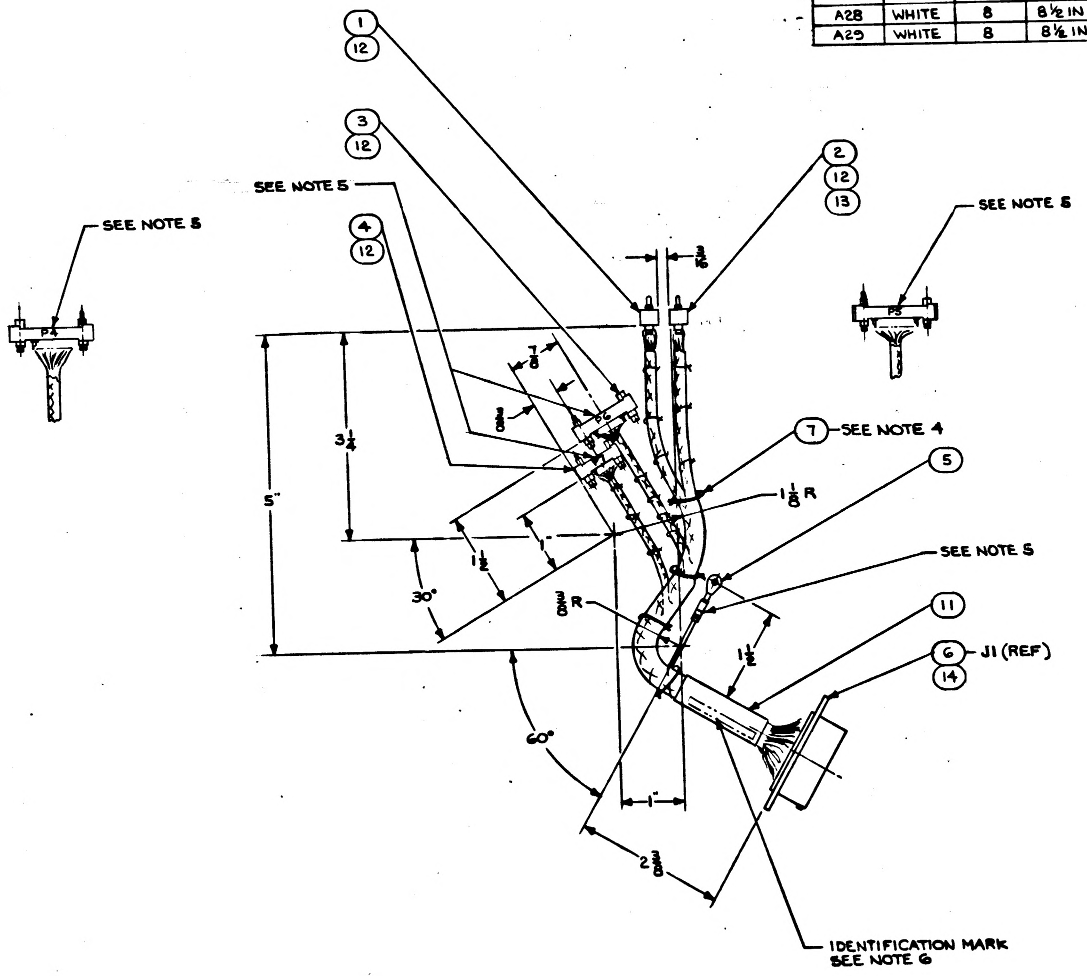
REVISIONS TDRR 03990				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO. 05922	1/22/64	EK

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING DIAGRAM, NASA DWG NO. 1015122.
3. SOLDER PER MSFC-PROC-158, USING TYPE SN60 WAR P2 PER QQ-S-571.
4. LACE WIRES TOGETHER USING ITEM ⑦ PER MIL-S-572. FORM S OR Y LOCKSTICH AT ½ INCH SPACING. (MIN)
5. MARK ELECTRICAL REFERENCE DESIGNATION PER ND1002019.
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND1002019.
7. WIRE, ND1002105, 24 AWG, TYPE I, WHITE, 34 FEET IN TOTAL LENGTH.
8. WIRE, ND1002105, 22 AWG, TYPE I, WHITE, 4 INCHES IN TOTAL LENGTH.
9. WIRE, ND1002105, 24 AWG TYPE VII-2 (WHITE) [BLUE, BROWN], 16 INCHES IN TOTAL LENGTH.
10. CONDUCTOR NO. SHALL BE MARKED ON EACH WIRE PER ND1002019. SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY TWO (2) INCHES MAXIMUM, SPIRALING OF THE MARKINGS IS ALLOWED.
11. TWISTED CONDUCTORS TO CONSIST OF THREE (3) FULL TURNS PER INCH MINIMUM.

WIRING LEGEND						
COND. NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 11
A1	WHITE	8	8½ IN.	J1 - W	P4 - D	8
(A1) A2	↑	↑	↑	J1 - X	P4 - C	
A3				J1 - Y	P4 - P	8
A4				J1 - Z	P4 - T	
A5				J1 - a	P4 - W	8
A6				J1 - b	P4 - V	
A7				J1 - c	P4 - Y	8
A8				J1 - d	P4 - b	
(A2) A9				J1 - e	P4 - s	8
A10				J1 - f	P4 - Z	
(A3) A11				J1 - g	P4 - e	8
A12				J1 - h	P4 - F	
A13				J1 - CC	P4 - H	8
A14				J1 - DD	P4 - L	
A15				J1 - t	P4 - K	
A16				J1 - F	P4 - N	
A17				J1 - P	P5 - A	8
A18				J1 - j	P5 - P	
A19				J1 - D	P5 - D	8
A20				J1 - E	P5 - H	
A21				J1 - i	P5 - L	
A22				J1 - K	P5 - T	8
A23		↓		J1 - J	P5 - W	
A24	↓	8		J1 - S	P5 - V	
A25	WHITE	10				(8)
A25A **	BLUE	—	↓	J1 - k	P5 - Y	
A25B **	BROWN	—	8½ IN.	J1 - m	P5 - b	
A25C **	SHIELD	—	A.R.	A25-SHIELD	J1 - S	
A26	WHITE	8	8½ IN.	J1 - n	P5 - C	8
A27	WHITE	8	8½ IN.	J1 - p	P5 - F	
A28	WHITE	8	8½ IN	J1 - q	P5 - K	8
A29	WHITE	8	8½ IN	J1 - r	P5 - N	

WIRING LEGEND						
COND. NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 11
A30	WHITE	8	8½ IN.	J1 - N	P5 - Z.	
(A4) A31	↑	↑	2 IN.	P5 - [illegible]	P5 - Y	
A32			7 IN.	J1 - B	P6 - A	8
A33			↑	J1 - C	P6 - E	
A34				J1 - D	P6 - B	8
A35				J1 - E	P6 - C	
A36				J1 - A	P6 - D	
A37		↓		J1 - K	P6 - F	8
A38	↓	8		J1 - J	P6 - H	
A39	WHITE	10				(8)
A39A **	BLUE	—	↓	J1 - u	P6 - J	
A39B **	BROWN	—	7 IN.	J1 - v	P6 - K	
A39C **	SHIELD	—	A.R.	A39-SHIELD	J1 - T	
A40	WHITE	8	7 IN.	J1 - T	P6 - L	
A41	↑	↑	↑	J1 - w	P6 - M	8
A42				J1 - x	P6 - N	
A43				J1 - y	P6 - P	8
A44				J1 - z	P6 - R	
A45				J1 - AA	P6 - S	8
A46				J1 - BB	P6 - T	
A47			↓	J1 - HH	P6 - U	
A48			7 IN.	J1 - G	P6 - W	
A49			6 IN.	J1 - FF	P7 - A	8
A50			↑	J1 - EE	P7 - B	
A51				J1 - DD	P7 - C	8
A52				J1 - CC	P7 - D	
A53				J1 - L	P7 - E	8
A54		↓	↓	J1 - M	P7 - F	
A55	↓	8	6 IN.	J1 - H	P7 - H	
A56	WHITE	9	3⅞ IN.	J1 - R	E1	

** CONDUCTOR NUMBER FOR REFERENCE ONLY - WIRE SHALL NOT BE MARKED.



14	1	*	1006776-10			INSULATION-SLEEVING, ELECTRICAL 25½ LG (51-½" LENGTH)			
13	1	*	1006776-13			INSULATION-SLEEVING, ELECTRICAL (½" LG)			
12	1	*	1006776-20			INSULATION-SLEEVING, ELECTRICAL 27" LG (54-½" LENGTH)			
11	1	*	1010490-336			INSULATION-SLEEVING, ELECTRICAL			
10	1	*	SEE NOTE 9			WIRE, IRRADIATED POLYOLEFIN, INSULATED			
9	1	*	SEE NOTE 8			WIRE, IRRADIATED POLYOLEFIN, INSULATED			
8	1	*	SEE NOTE 7			WIRE, IRRADIATED POLYOLEFIN, INSULATED			
7	AR	*	1011753			TAPE, LACING & TYING			
6	1	-	1011799	85386900670		PLATE AND CONNECTOR, ASSY OF			
5	1		MS25036-43			TERMINAL, LUG, CRIMP STYLE, COPPER			
4	1	*	1011757	68502018301		CONNECTOR, ELECTRICAL			
3	1	*	1011758	68502018201		CONNECTOR, ELECTRICAL			
2	1	*	1000121			CONNECTOR, ELECTRICAL, RECEPTACLE			
1	1	*	1000116			CONNECTOR, ELECTRICAL, RECEPTACLE			
ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

MASTER

1011891	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± 1/8 DECIMALS ± — ANGLES ± 5°
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80386900030
DRAWN [illegible] DATE 10-2-63
CHECKED [illegible] 10/7/63
APPROVAL [illegible] 10/7/63
APPROVAL [illegible] 10/15/63
NASA APPROVAL [illegible] 10/16
MIT APPROVAL W Kupfer 17 Oct 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SXT BASE HARNESS ASSEMBLY

CODE IDENT NO.
SIZE E
NASA NUMBER 1011896
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011896 A

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING DIAGRAM, NASA DWG NO. 1015122.
3. CONDUCTOR NO. SHALL BE MARKED ON EACH WIRE PER ND-1002019. SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY TWO (2) INCHES. MAXIUM. SPIRALING OF THE MARKINGS IS ALLOWED. (B1)
4. TWIST CONDUCTIONS IN ACCORDANCE WITH ND-1002032
5. CONNECT CONDUCTORS A25C AND A39C TO RESPECTIVE SHIELDS (PER WIRE LEGEND) USING ITEM 15.
6. SLIDLE ITEMS 11, 12, 13 & 14 OVER WIRES BEYOND STRIPPED ENDS.
7. SOLDER CONDUCTORS PER WIRING LEGEND WITH Sn60WRP2 PER QQ-S-571, PER MSFC-PROC-158.
8. LACE CONDUCTORS, USING ITEM 7, IN ACCORDANCE WITH ND-1002032.
9. PERFORM CONTINUITY CHECK.
10. SLIDE ITEMS 12, 13 & 14 OVER SOLDERED JOINTS AND SHRINK
11. SHRINK ITEM 11 AND IDENDIFY ASSEMBLY USING NASA. DRAWING NO. REVISION LETTER AND MANUFACTURER'S SYMBOL IN ACCORDANCE WITH ND-1002019.
12. POT IN ACCORDANCE WITH ND-1002009, METHOD C.
    - A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
    - B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
13. MARK REFERENCE DESIGNATION 1/8 INCH HIGH IN ACCORDANCE WITH ND-1002019

B 9681101

REVISIONS TDRR 0399

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO. 05922	1/3/64	
B16		REVISED PER TDRR NO. 07520	4-9-64	

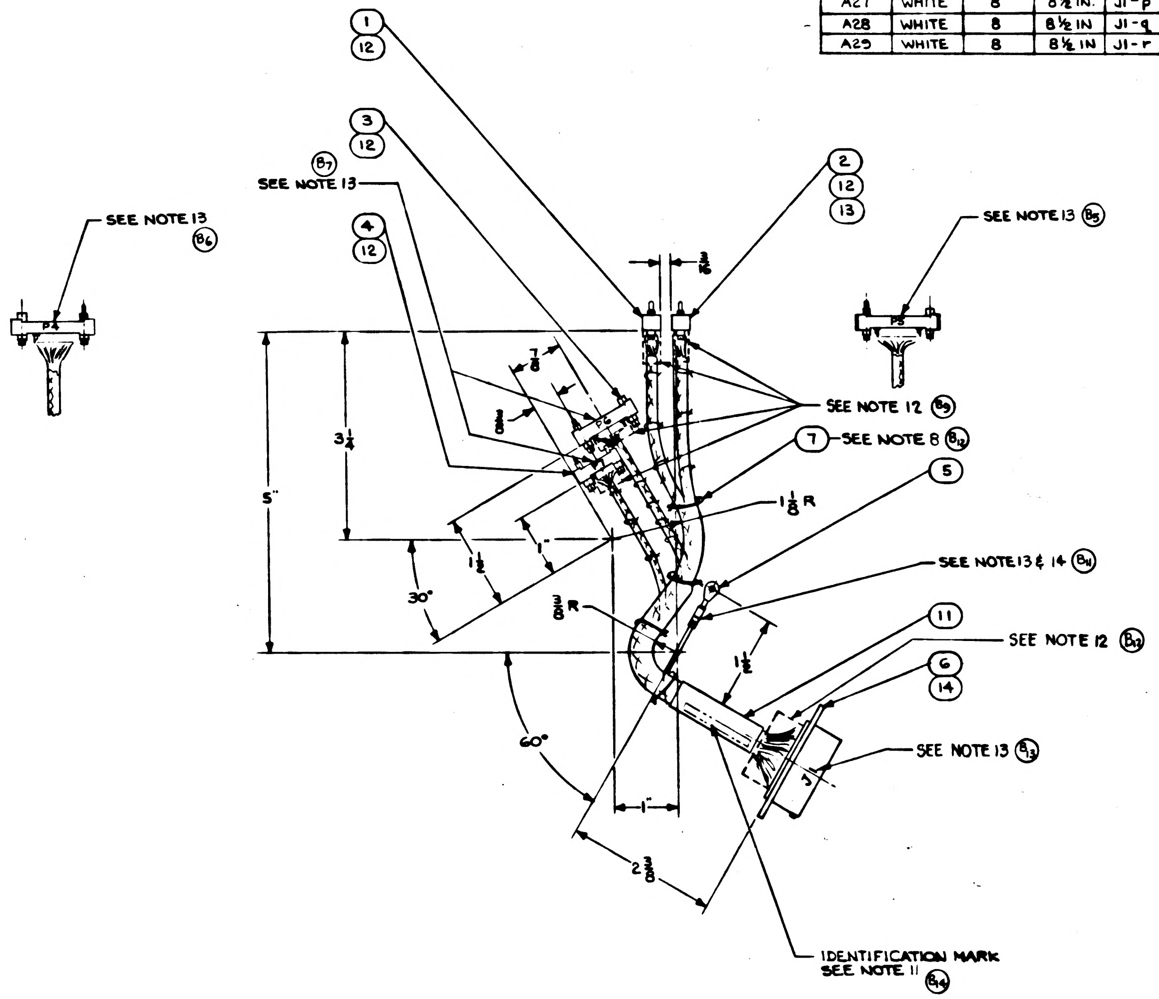
WIRING LEGEND

	COND. NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 4
	A1	WHITE	8	8½ IN.	J1 - W	P4 - D	8
(A1)	A2	↑	↑	↑	J1 - X	P4 - C	
	A3				J1 - Y	P4 - P	8
	A4				J1 - Z	P4 - T	
	A5				J1 - a	P4 - W	8
	A6				J1 - b	P4 - V	
	A7				J1 - c	P4 - Y	8
	A8				J1 - d	P4 - b	
(A2)	A9				J1 - e	P4 - S	8
	A10				J1 - f	P4 - Z	
(A3)	A11				J1 - g	P4 - e	8
	A12				J1 - h	P4 - F	
	A13				J1 - CC	P4 - H	8
	A14				J1 - DD	P4 - L	
	A15				J1 - t	P4 - K	
	A16				J1 - F	P4 - N	
	A17				J1 - P	P5 - A	8
	A18				J1 - j	P5 - P	
	A19				J1 - D	P5 - D	8
	A20				J1 - E	P5 - H	
	A21				J1 - i	P5 - L	
	A22				J1 - K	P5 - T	8
	A23		↓		J1 - J	P5 - W	
	A24	↓	8		J1 - S	P5 - V	
	A25	WHITE	10				8
	A25A **	BLUE	—	↓	J1 - k	P5 - Y	
	A25B **	BROWN	—	8½ IN.	J1 - m	P5 - b	
(B2)	A25C **	WHITE	8	2 IN.	A25-SHIELD	J1 - S	
	A26	WHITE	8	8½ IN.	J1 - n	P5 - C	8
	A27	WHITE	8	8½ IN.	J1 - p	P5 - F	
	A28	WHITE	8	8½ IN	J1 - q	P5 - K	8
	A29	WHITE	8	8½ IN	J1 - r	P5 - N	

WIRING LEGEND

	COND. NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 4
(B15)	A30	WHITE	8	8½ IN.	J1 - N	P5 - Z	
(A4)		↑	↑				
	A32			7 IN.	J1 - B	P6 - A	8
	A33			↑	J1 - C	P6 - E	
	A34				J1 - D	P6 - B	8
	A35				J1 - E	P6 - C	
	A36				J1 - A	P6 - D	
	A37		↓		J1 - K	P6 - F	8
	A38	↓	8		J1 - J	P6 - H	
	A39	WHITE	10				8
	A39A **	BLUE	—	↓	J1 - u	P6 - J	
	A39B **	BROWN	—	7 IN.	J1 - v	P6 - K	
(B2)	A39C **	WHITE	8	2 IN.	A39-SHIELD	J1 - T	
	A40	WHITE	8	7 IN.	J1 - T	P6 - L	
	A41	↑	↑	↑	J1 - w	P6 - M	8
	A42				J1 - x	P6 - N	
	A43				J1 - y	P6 - P	8
	A44				J1 - z	P6 - R	
	A45				J1 - AA	P6 - S	8
	A46				J1 - BB	P6 - T	
	A47			↓	J1 - HH	P6 - U	
	A48			7 IN.	J1 - G	P6 - W	
	A49			6 IN.	J1 - FF	P7 - A	8
	A50			↑	J1 - EE	P7 - B	
	A51				J1 - DD	P7 - C	8
	A52				J1 - CC	P7 - D	
	A53				J1 - L	P7 - E	8
	A54		↓	↓	J1 - M	P7 - F	
	A55	↓	8	6 IN.	J1 - H	P7 - H	
	A56	WHITE	9	3⅛ IN.	J1 - R	E1	

** CONDUCTOR NUMBER FOR REFERENCE ONLY - WIRE SHALL NOT BE MARKED.



(B4)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
15	4	*	1010402-2			SLEEVE, SOLDER, ELECT. COND INSUL HEATSHRINKA			
14	1	*	1010490-058			INSULATION-SLEEVING, ELECTRICAL, HEATSHRINKAB			
13	1	*	1010490-054			INSULATION-SLEEVING, ELECTRICAL, HEATSHRINKAB			
12	54	*	1010490-060			INSULATION-SLEEVING, ELECTRICAL, HEATSHRINKABLE			
11	1	*	1010490-336			INSULATION-SLEEVING, ELECTRICAL, HEATSRINKABLE			
10	1	*	1010685-7			WIRE, IRRADIATED POLYOLEFIN, INSULATED			
9	1	*	1010685-2			WIRE, IRRADIATED POLYOLEFIN, INSULATED (4			
8	1	*	1010685-1			WIRE, IRRADIATED POLYOLEFIN, INSULATED			
7	AR	*	1011753			TAPE, LACING & TYING			
6	1		1011799	85386900670		PLATE AND CONNECTOR, ASSY OF			
5	1		MS25036-43			TERMINAL, LUG, CRIMP STYLE, COPPER			
4	1	*	1011757	68502018301		CONNECTOR, ELECTRICAL			
3	1	*	1011758	68502018201		CONNECTOR, ELECTRICAL			
2	1	*	1000121			CONNECTOR, ELECTRICAL, RECEPTACLE			
1	1	*	1000116			CONNECTOR, ELECTRICAL, RECEPTACLE			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± 1/8 DECIMALS ± — ANGLES ± 5°
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80386900030
DRAWN DATE 10-3-63
CHECKED 10/7/63
APPROVAL 10/7/63
APPROVAL 10/15/63
NASA APPROVAL
MIT APPROVAL 17 Oct

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SXT BASE HARNESS ASSEMBLY

CODE IDENT NO.
SIZE E
NASA NUMBER 1011896
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011896 B

9681101

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
D		REDRAWN IN ACCORD. WITH TDRR 06437	5-12-64	

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING SCHEMATIC, NASA DRAWING NO. 1015122.
3. CONDUCTOR NO. SHALL BE MARKED ON EACH WIRE PER ND-1002019. SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY TWO (2) INCHES, MAXIMUM. SPIRALING OF THE MARKING IS ALLOWED.
4. TWIST CONDUCTORS IN ACCORDANCE WITH ND-1002032
5. CONNECT CONDUCTORS A25C AND A39C TO RESPECTIVE SHIELDS (PER WIRING LEGEND) USING ITEM ⑮.
6. APPLY ITEMS ⑪, ⑫, ⑬ AND ⑭ TO LEADS.
7. SOLDER CONDUCTORS, PER WIRING LEGEND, WITH SN 60WRP2, PER QQ-S-571, PER MSFC-PROC-158.
8. LACE CONDUCTORS, USING ITEM 7, IN ACCORDANCE WITH ND-1002032
9. PERFORM CONTINUITY CHECK.
10. PLACE ITEMS ⑫, ⑬ AND ⑭ OVER CONTACTS AND LEADS AND SHRINK.
11. SHRINK ITEM ⑪ AND IDENTIFY ASSEMBLY USING NASA DRAWING NO. REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND 1002019.
12. POT IN ACCORDANCE WITH ND-1002009, METHOD C.
    - A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION
    - B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH
13. MARK REFERENCE DESIGNATIONS 1/8 INCH HIGH IN ACCORDANCE WITH ND-1002019.
14. TERMINATE SHIELDED WIRE AS SHOWN IN DETAIL A.
15. ☐ SYMBOL ON HARNESS INDICATES APPROXIMATE LOCATION OF SOLDER SLEEVE.

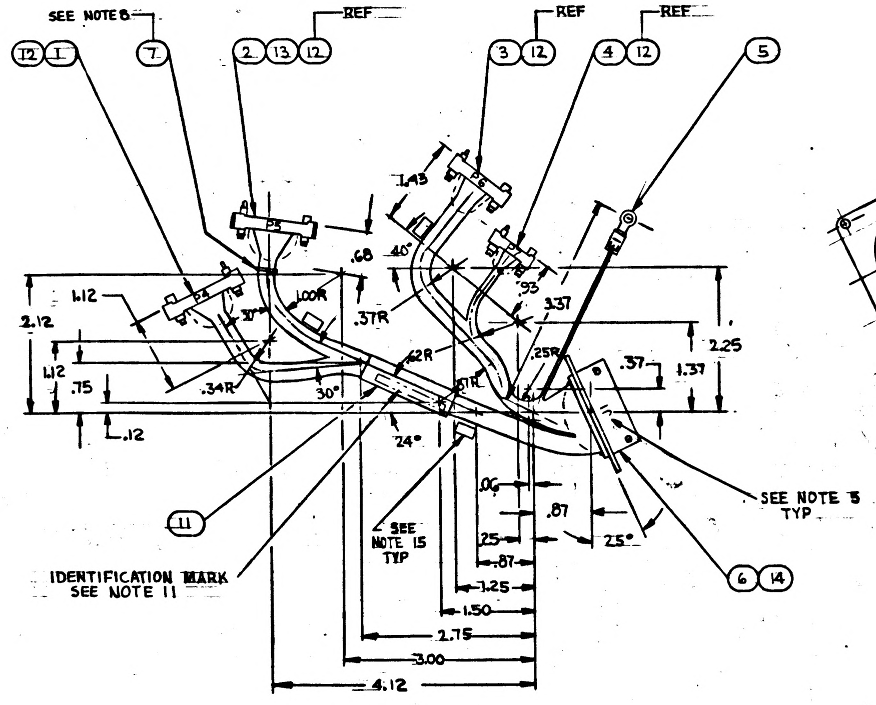
WIRING LEGEND

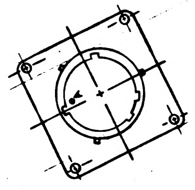
COND NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 4
A1	WHITE	8	8 1/2 IN.	J1-W	P4-D	8
A2				J1-X	P4-c	
A3				J1-Y	P4-P	8
A4				J1-Z	P4-T	
A5				J1-a	P4-W	8
A6				J1-b	P4-V	
A7				J1-c	P4-Y	8
A8				J1-d	P4-b	
A9				J1-e	P4-S	8
A10				J1-f	P4-Z	
A11				J1-g	P4-e	8
A12				J1-h	P4-F	
A13				J1-CC	P4-H	8
A14				J1-DD	P4-L	
A15				J1-t	P4-K	
A16				J1-F	P4-N	
A17				J1-P	P5-A	8
A18				J1-j	P5-P	
A19				J1-D	P5-D	8
A20				J1-E	P5-H	
A21				J1-i	P5-L	
A22				J1-K	P5-T	8
A23				J1-J	P5-W	
A24		8		J1-S	P5-V	
A25	WHITE	10				(8)
A25A **	BLUE			J1-k	P5-Y	
A25B **	BROWN		8 1/2 IN.	J1-m	P5-b	
A25C **	WHITE	8	2 IN.	A25-SHIELD	J1-S	
A26	WHITE	8	8 1/2 IN.	J1-n	P5-C	8
A27	WHITE	8	8 1/2 IN.	J1-p	P5-F	
A28	WHITE	8	8 1/2 IN.	J1-q	P5-K	8
A29	WHITE	8	8 1/2 IN.	J1-r	P5-N	

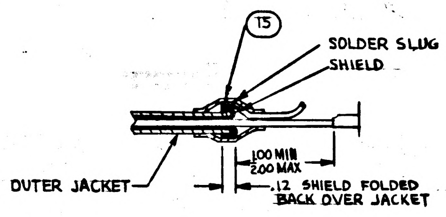
WIRING LEGEND

COND NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 4
A30	WHITE	8	8 1/2 IN.	J1-N	P5-Z	
A32	WHITE	8	7 IN.	J1-B	P6-A	8
A33				J1-C	P6-E	
A34				J1-D	P6-B	8
A35				J1-E	P6-C	
A36				J1-A	P6-D	
A37				J1-K	P6-F	8
A38		8		J1-J	P6-H	
A39	WHITE	10				(8)
A39A **	BLUE			J1-u	P6-J	
A39B **	BROWN		7 IN.	J1-v	P6-K	
A39C **	WHITE	8	2 IN.	A39-SHIELD	J1-T	
A40	WHITE		7 IN.	J1-T	P6-L	
A41				J1-w	P6-M	8
A42				J1-x	P6-N	
A43				J1-y	P6-P	8
A44				J1-z	P6-R	
A45				J1-AA	P6-S	8
A46				J1-BB	P6-T	
A47				J1-HH	P6-U	
A48			7 IN.	J1-G	P6-W	
A49			6 IN.	J1-FF	P7-A	8
A50				J1-EE	P7-B	
A51				J1-DD	P7-C	8
A52				J1-CC	P7-D	
A53				J1-L	P7-E	8
A54				J1-M	P7-F	
A55		8	6 IN.	J1-H	P7-H	
A56	WHITE	9	3 7/8 IN.	J1-R	E1	

** CONDUCTOR NUMBER FOR REFERENCE ONLY - WIRE SHALL NOT BE MARKED.







DETAIL A
SCALE: NONE

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
15	4	*	1010402-2			SLEEVE, SOLDER, ELECT. COND, INSUL., HEAT SHRINKABLE			
14	51	*	1010490-058			INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
13	1	*	1010490-054			INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
12	54	*	1010490-060			INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
11	1	*	1010490-336			INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
10	1	*	1010685-7			WIRE, IRRADIATED POLYOLFIN, INSULATED (16")			
9	1	*	1010685-2			WIRE, IRRADIATED POLYOLFIN, INSULATED (4")			
8	1	*	1010685-1			WIRE, IRRADIATED POLYOLFIN, INSULATED (34')			
7	AR	*	1011753			TAPE, LACING & TYING			
6	1		1011799	853869006710		PLATE AND CONNECTOR, ASSY OF			
5	1		MS25036-1			TERMINAL, LUG, CRIMP STYLE, COPPER			
4	1	*	1011757	68502018301		CONNECTOR, ELECTRICAL			
3	1	*	1011758	68502018201		CONNECTOR, ELECTRICAL			
2	1	*	1000121			CONNECTOR, ELECTRICAL, RECEPTACLE			
1	1	*	1000116			CONNECTOR, ELECTRICAL, RECEPTACLE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64 DECIMALS ± .25 ANGLES ± 5°
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80386900030
DRAWN J. MARGIOTTA DATE 2-28-64
CHECKED A.M. BUCHHOLZ
APPROVAL N. BRUNELLE /V.J.
APPROVAL E. Olsen 5/12/64
NASA APPROVAL W. J. 5-12-64
MIT APPROVAL 5/12/64

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SXT BASE HARNESS
ASSEMBLY

CODE IDENT NO.
SIZE E
NASA NUMBER 1011896
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

1011896 D

3 9681101

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. REFER TO WIRING SCHEMATIC, NASA DRAWING NO. 1015122.
3. CONDUCTOR NO. SHALL BE MARKED ON EACH WIRE PER ND-1002019. SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY TWO (2) INCHES, MAXIMUM. SPIRALING OF THE MARKING IS ALLOWED.
4. TWIST CONDUCTORS IN ACCORDANCE WITH ND-1002032
5. CONNECT CONDUCTORS A25C AND A39C TO RESPECTIVE SHIELDS (PER WIRING LEGEND) USING ITEM ⑮.
6. APPLY ITEMS ⑪, ⑫, ⑬ AND ⑭ TO LEADS.
7. SOLDER CONDUCTORS, PER WIRING LEGEND, WITH SN 60WRP2, PER QQ-S-571, PER MSFC-PROC-158.
8. LACE CONDUCTORS, USING ITEM 7, IN ACCORDANCE WITH ND-1002032
9. PERFORM CONTINUITY CHECK.
10. PLACE ITEMS ⑫, ⑬ AND ⑭ OVER CONTACTS AND LEADS AND SHRINK.
11. SHRINK ITEM ⑪ AND IDENTIFY ASSEMBLY USING NASA DRAWING NO. REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND 1002019.
12. POT IN ACCORDANCE WITH ND-1002209, METHOD C.
    - A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION
    - B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH
13. MARK REFERENCE DESIGNATIONS 1/8 INCH HIGH IN ACCORDANCE WITH ND-1002019.
14. TERMINATE SHIELDED WIRE AS SHOWN IN DETAIL A.
15. ☐ SYMBOL ON HARNESS INDICATES APPROXIMATE LOCATION OF SOLDER SLEEVE.

WIRING LEGEND

COND NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 4
A1	YEL	8	8 1/2 IN.	J1 - W	P4 - D	8
A2	↑	↑	↑	J1 - X	P4 - c	
A3				J1 - Y	P4 - P	8
A4				J1 - Z	P4 - T	
A5				J1 - a	P4 - W	8
A6				J1 - b	P4 - V	
A7				J1 - c	P4 - Y	8
A8				J1 - d	P4 - b	
A9				J1 - e	P4 - S	8
A10				J1 - f	P4 - Z	
A11				J1 - g	P4 - e	8
A12				J1 - h	P4 - F	
A13				J1 - CC	P4 - H	8
A14				J1 - DD	P4 - L	
A15				J1 - t	P4 - K	
A16				J1 - F	P4 - N	
A17				J1 - P	P5 - A	8
A18				J1 - j	P5 - P	
A19				J1 - D	P5 - D	8
A20				J1 - E	P5 - H	
A21				J1 - i	P5 - L	
A22				J1 - K	P5 - T	8
A23		↓		J1 - J	P5 - W	
A24	↓	8		J1 - S	P5 - V	
A25	YEL	10				
A25A **	RED		↓	J1 - k	P5 - Y	(8)
A25B **	YEL		8 1/2 IN.	J1 - m	P5 - b	
A25C **		8	2 1/2 IN.	A25 - SHIELD	J1 - S	
A26		8	8 1/2 IN.	J1 - n	P5 - C	8
A27		8	8 1/2 IN.	J1 - p	P5 - F	
A28		8	8 1/2 IN.	J1 - q	P5 - K	8
A29	↓	8	8 1/2 IN.	J1 - r	P5 - N	

(E2)

WIRING LEGEND

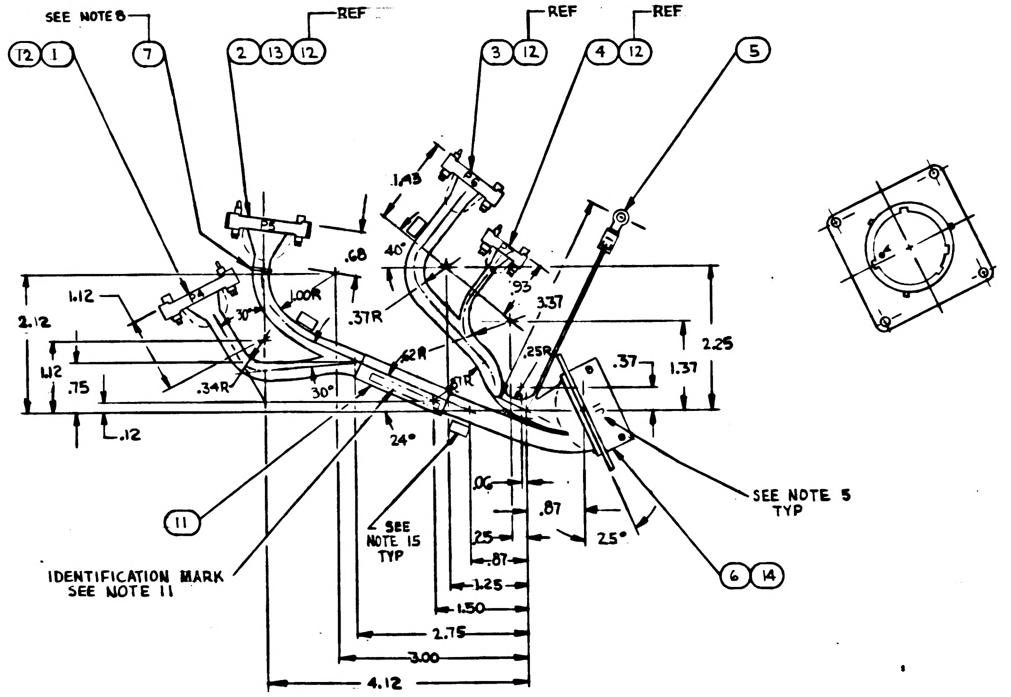
COND NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 4
A30	YEL	8	8 1/2 IN.	J1 - N	P5 - Z	
A32	YEL	8	7 IN.	J1 - B	P6 - A	8
A33	↑	↑	↑	J1 - C	P6 - E	
A34				J1 - D	P6 - B	8
A35				J1 - E	P6 - C	
A36				J1 - A	P6 - D	
A37		↓		J1 - K	P6 - F	8
A38	↓	8		J1 - J	P6 - H	
A39		10				
A39A **	RED		↓	J1 - u	P6 - J	(8)
A39B **	YEL		7 IN.	J1 - v	P6 - K	
A39C **	↑	8	2 1/2 IN.	A39 - SHIELD	J1 - T	
A40		↑	7 IN.	J1 - T	P6 - L	
A41			↑	J1 - w	P6 - M	8
A42				J1 - x	P6 - N	
A43				J1 - y	P6 - P	8
A44				J1 - z	P6 - R	
A45				J1 - AA	P6 - S	8
A46				J1 - BB	P6 - T	
A47			↓	J1 - HH	P6 - U	
A48			7 IN.	J1 - G	P6 - W	
A49			6 IN.	J1 - FF	P7 - A	8
A50			↑	J1 - EE	P7 - B	
A51				J1 - DD	P7 - C	8
A52				J1 - CC	P7 - D	
A53				J1 - L	P7 - E	8
A54		↓	↓	J1 - M	P7 - F	
A55	↓	8	6 IN.	J1 - H	P7 - H	
A56	YEL	9	3 7/8 IN.	J1 - R	E1	

** CONDUCTOR NUMBER FOR REFERENCE ONLY - WIRE SHALL NOT BE MARKED.

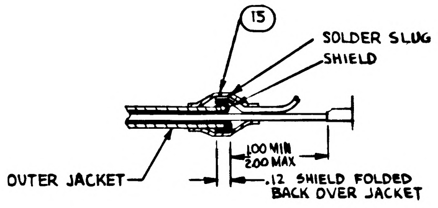
(E3)

REVISIONS

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
D		REPLACES REV C WITH CHANGES PER TDRR NO. 09437	5-12-64	
E3		REVISED PER TDRR 15589	4/10/65	



Ⓓ REPLACES REV C WITH CHANGES



DETAIL A
SCALE: NONE

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

(E1)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
15	4	*	1010402-2			SLEEVE, SOLDER, ELECT. COND. INSUL., HEAT SHRINKABLE			
14	51	*	1010490-058			INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
13	1	*	1010490-054			INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
12	54	*	1010490-060			INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
11	1	*	1010490-336			INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
10	1	*	1010789-012			WIRE, ELECT, TFE EXTRUDED INSUL POLYIMIDE CTD('2B')			
9	1	*	1010789-006			WIRE, ELECT, TFE EXTRUDED INSUL POLYIMIDE CTD('T')			
8	1	*	1010789-001			WIRE, ELECT, TFE EXTRUDED INSUL POLYIMIDE CTD('0')			
7	AR	*	1011753			TAPE, LACING & TYING			
6	1		1011799	35386900670		PLATE AND CONNECTOR, ASSY OF			
5	1		MS25036-1			TERMINAL, LUG, CRIMP STYLE, COPPER			
4	1	*	1011757	68502018301		CONNECTOR, ELECTRICAL			
3	1	*	1011758	68502018201		CONNECTOR, ELECTRICAL			
2	1	*	.000121			CONNECTOR, ELECTRICAL, RECEPTACLE			
1	1	*	1000116			CONNECTOR, ELECTRICAL, RECEPTACLE			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± 1/64 DECIMALS ± .12 ANGLES ± 5°
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 30386900030
DRAWN J. MARGIOTTA DATE 2-28-64
CHECKED A.M. BUCHHOLZ
APPROVAL N. BRUNELLE / U.A.
APPROVAL E. Olvany 5/12/64
NASA APPROVAL 5-12-64
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SXT BASE HARNESS ASSEMBLY

CODE IDENT NO.
SIZE E
NASA NUMBER 1011896
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011896

F 1011896

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
D		REPLACES REV C WITH CHANGES PER TORR NO. 66437	5-12-64	
E3		REVISED PER TORR 15589	9/19/65	
F2		REVISED PER TOR No. 16897		

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. REFER TO WIRING SCHEMATIC, NASA DRAWING NO. 1015122.
3. CONDUCTOR NO. SHALL BE MARKED ON EACH WIRE PER ND-1002019. SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY TWO (2) INCHES, MAXIMUM. SPIRALING OF THE MARKING IS ALLOWED.
4. TWIST CONDUCTORS IN ACCORDANCE WITH ND-1002032
5. CONNECT CONDUCTORS A25C AND A39C TO RESPECTIVE SHIELDS (PER WIRING LEGEND) USING ITEM ⑮.
6. APPLY ITEMS ⑪, ⑫, ⑬ AND ⑭ TO LEADS.
7. SOLDER CONDUCTORS, PER WIRING LEGEND, WITH SN 60 WRP2, PER QQ-S-571, PER MSFC-PROC-158.
8. LACE CONDUCTORS, USING ITEM 7, IN ACCORDANCE WITH ND-1002032
9. PERFORM CONTINUITY CHECK.
10. PLACE ITEMS ⑫, ⑬ AND ⑭ OVER CONTACTS AND LEADS AND SHRINK.
11. SHRINK ITEM ⑪ AND IDENTIFY ASSEMBLY USING NASA DRAWING NO. REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND 1002019.
12. POT 1011896-000 CONNECTORS PER ND 1002009, METHOD C. POT 1011896-001 CONNECTORS PER ND 1002240. (F1)
    - A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION
    - B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH
13. MARK REFERENCE DESIGNATIONS 1/8 INCH HIGH IN ACCORDANCE WITH ND-1002019.
14. TERMINATE SHIELDED WIRE AS SHOWN IN DETAIL A.
15. ☐ SYMBOL ON HARNESS INDICATES APPROXIMATE LOCATION OF SOLDER SLEEVE.

WIRING LEGEND

COND NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 4
A1	YEL	8	8½ IN.	J1-W	P4-D	8
A2	↑	↑	↑	J1-X	P4-c	
A3				J1-Y	P4-P	8
A4				J1-Z	P4-T	
A5				J1-a	P4-W	8
A6				J1-b	P4-V	
A7				J1-c	P4-Y	8
A8				J1-d	P4-b	
A9				J1-e	P4-S	8
A10				J1-f	P4-Z	
A11				J1-g	P4-e	8
A12				J1-h	P4-F	
A13				J1-CC	P4-H	8
A14				J1-DD	P4-L	
A15				J1-t	P4-K	
A16				J1-F	P4-N	
A17				J1-P	P5-A	8
A18				J1-j	P5-P	
A19				J1-D	P5-D	8
A20				J1-E	P5-H	
A21				J1-i	P5-L	
A22				J1-K	P5-T	8
A23		↓		J1-J	P5-W	
A24	↓	8		J1-S	P5-V	
A25	YEL	10				(8)
A25A **	RED		↓	J1-k	P5-Y	
A25B **	YEL		8½ IN.	J1-m	P5-b	
A25C **		8	2½ IN.	A25-SHIELD	J1-S	
A26		8	8½ IN.	J1-n	P5-C	8
A27		8	8½ IN.	J1-p	P5-F	
A28		8	8½ IN.	J1-q	P5-K	8
A29	↓	8	8½ IN.	J1-r	P5-N	

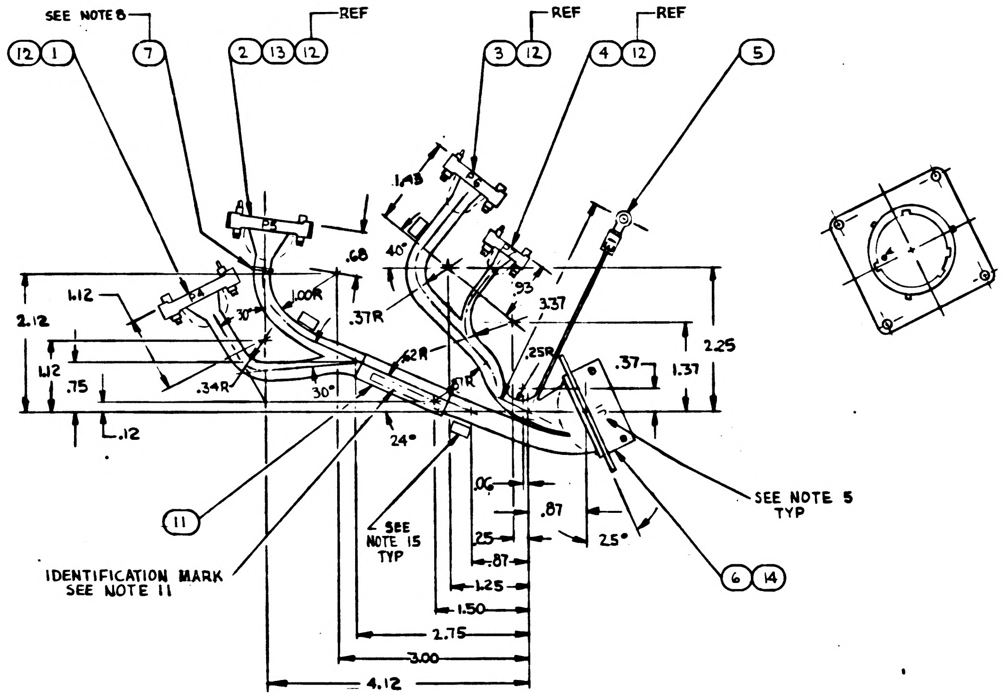
(E2)

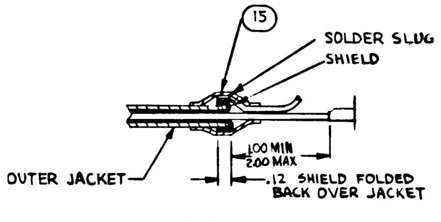
WIRING LEGEND

COND NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 4
A30	YEL	8	8½ IN.	J1-N	P5-Z	
A32	YEL	8	7 IN.	J1-B	P6-A	8
A33	↑	↑	↑	J1-C	P6-E	
A34				J1-D	P6-B	8
A35				J1-E	P6-C	
A36				J1-A	P6-D	
A37		↓		J1-K	P6-F	8
A38	↓	8		J1-J	P6-H	
A39		10				(8)
A39A **	RED		↓	J1-u	P6-J	
A39B **	YEL		7 IN.	J1-v	P6-K	
A39C **	↑	8	2½ IN.	A39-SHIELD	J1-T	
A40		↑	7 IN.	J1-T	P6-L	
A41			↑	J1-w	P6-M	8
A42				J1-x	P6-N	
A43				J1-y	P6-P	8
A44				J1-z	P6-R	
A45				J1-AA	P6-S	8
A46				J1-BB	P6-T	
A47			↓	J1-HH	P6-U	
A48			7 IN.	J1-G	P6-W	
A49			6 IN.	J1-FF	P7-A	8
A50			↑	J1-EE	P7-B	
A51				J1-DD	P7-C	8
A52				J1-CC	P7-D	
A53				J1-L	P7-E	8
A54		↓	↓	J1-M	P7-F	
A55	↓	8	6 IN.	J1-H	P7-H	
A56	YEL	9	3⅞ IN.	J1-R	E1	

** CONDUCTOR NUMBER FOR REFERENCE ONLY - WIRE SHALL NOT BE MARKED.

(E3)





DETAIL A
SCALE: NONE

Ⓓ REPLACES REV C WITH CHANGES

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

QTY REQD 001	QTY REQD 000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
4	4	15		*	1010402-2			SLEEVE, SOLDER, ELECT. COND, INSUL., HEAT SHRINKABLE			
51	51	14		*	1010490-058			INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
1	1	13		*	1010490-054			INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
54	54	12		*	1010490-060			INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
1	1	11		*	1010490-336			INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
1	1	10		*	1010789-012			WIRE, ELECT, TFE EXTRUDED INSUL POLYIMIDE CTD (28			
1	1	9		*	1010789-006			WIRE, ELECT, TFE EXTRUDED INSUL POLYIMIDE CTD (1			
1	1	8		*	1010789-001			WIRE, ELECT, TFE EXTRUDED INSUL POLYIMIDE CTD (5			
AR	AR	7		*	1011753			TAPE, LACING & TYING			
1	1	6			1011799	35386900670		PLATE AND CONNECTOR, ASSY OF			
1	1	5			MS25036-1			TERMINAL, LUG, CRIMP STYLE, COPPER			
1	1	4		*	1011757	68502018301		CONNECTOR, ELECTRICAL			
1	1	3		*	1011758	68502018201		CONNECTOR, ELECTRICAL			
1	1	2		*	1000121			CONNECTOR, ELECTRICAL, RECEPTACLE			
1	1	1		*	1000116			CONNECTOR, ELECTRICAL, RECEPTACLE			

(F2)

(E1)

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/64 DECIMALS ± .12 ANGLES ± 5°
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 30386900030

DRAWN MARGIOTTA DATE 2-28-64
CHECKED A.M. BUCHHOLZ
APPROVAL N. BRUNELLE / V.A.
APPROVAL 5/12/64
NASA APPROVAL 5-12-64
MIT APPROVAL 4/2/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SXT BASE HARNESS ASSEMBLY

CODE IDENT NO.
SIZE E
NASA NUMBER 1011896
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

9 9681101

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. REFER TO WIRING SCHEMATIC, NASA DRAWING NO. 1015122.
3. CONDUCTOR NO. SHALL BE MARKED ON EACH WIRE PER ND-1002019. SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY TWO (2) INCHES MAXIMUM. SPIRALING OF THE MARKING IS ALLOWED.
4. TWIST CONDUCTORS IN ACCORDANCE WITH ND-1002032
5. CONNECT CONDUCTORS A25C AND A39C TO RESPECTIVE SHIELDS (REF WIRING LEGEND) USING ITEM ⑮.
6. APPLY ITEMS ⑪, ⑫, ⑬ AND ⑭ TO LEADS.
7. SOLDER CONDUCTORS, PER WIRING LEGEND, WITH SN 60WRP2, PER QQ-S-571, PER MSFC-PROC-158.
8. LACE CONDUCTORS, USING ITEM 7, IN ACCORDANCE WITH ND-1002032
9. PERFORM CONTINUITY CHECK.
10. PLACE ITEMS ⑫, ⑬ AND ⑭ OVER CONTACTS AND LEADS AND SHRINK.
11. SHRINK ITEM ⑪ AND IDENTIFY ASSEMBLY USING NASA DRAWING NO. REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND 1002019.
12. POT 1011896-000 CONNECTORS PER ND 1002009, METHOD C. POT 1011896-001 CONNECTORS PER ND 1002240. (F1)
    A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION
    B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH
13. MARK REFERENCE DESIGNATIONS 1/8 INCH HIGH IN ACCORDANCE WITH ND-1002019.
14. TERMINATE SHIELDED WIRE AS SHOWN IN DETAIL A.
15. ☐ SYMBOL ON HARNESS INDICATES APPROXIMATE LOCATION OF SOLDER SLEEVE.

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
D		REPLACES REV C WITH CHANGES PER TORR NO. 08937	5-12-64	
E3		REVISED PER TORR 15589	4/19/65	
F2		REVISED PER TORR No 16897		
G		REVISED PER TORR 24036	2/8/67	

WIRING LEGEND

COND NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 4
A1	YEL	8	8 1/2 IN.	J1-W	P4-D	8
A2				J1-X	P4-c	
A3				J1-Y	P4-P	8
A4				J1-Z	P4-T	
A5				J1-a	P4-W	8
A6				J1-b	P4-V	
A7				J1-c	P4-Y	8
A8				J1-d	P4-b	
A9				J1-e	P4-S	8
A10				J1-f	P4-Z	
A11				J1-g	P4-e	8
A12				J1-h	P4-F	
A13				J1-CC	P4-H	8
A14				J1-DD	P4-L	
A15				J1-t	P4-K	
A16				J1-F	P4-N	
A17				J1-P	P5-A	8
A18				J1-j	P5-P	
A19				J1-D	P5-D	8
A20				J1-E	P5-H	
A21				J1-i	P5-L	
A22				J1-K	P5-T	8
A23				J1-J	P5-W	
A24		8		J1-S	P5-V	
A25	YEL	10				
A25A **	RED			J1-k	P5-Y	(8)
A25B **	YEL		8 1/2 IN.	J1-m	P5-b	
A25C **		8	2 1/2 IN.	A25-SHIELD	J1-S	
A26		8	8 1/2 IN.	J1-n	P5-C	8
A27		8	8 1/2 IN.	J1-p	P5-F	
A28		8	8 1/2 IN.	J1-q	P5-K	8
A29		8	8 1/2 IN.	J1-r	P5-N	

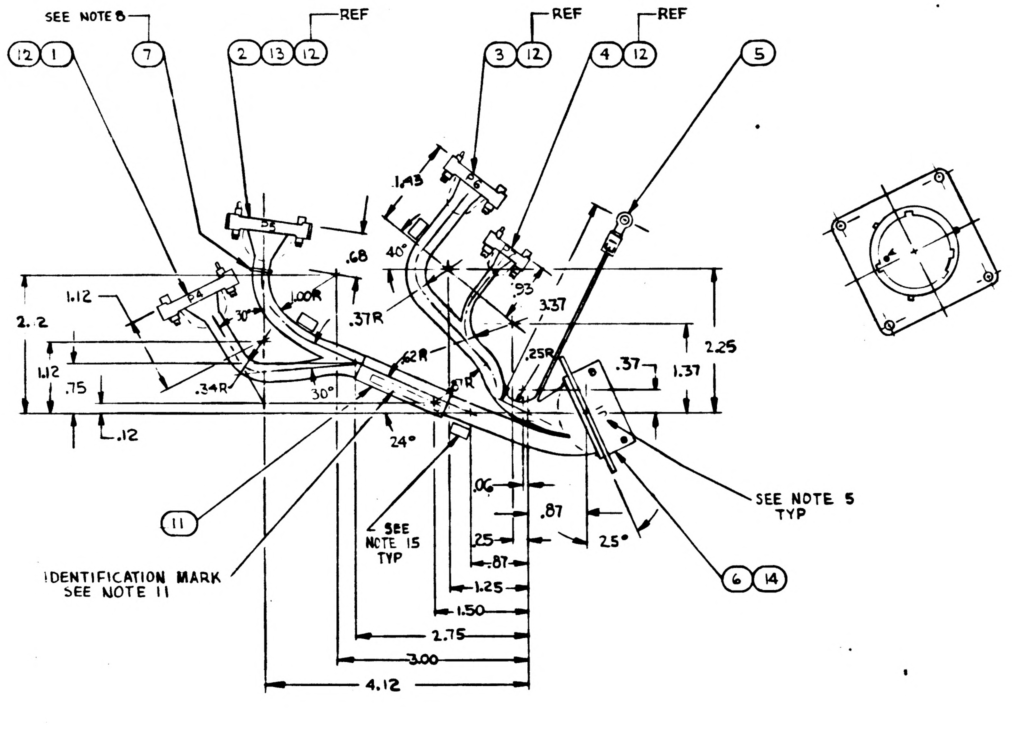
(E2)

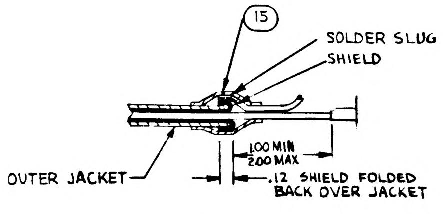
WIRING LEGEND

COND NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 4
A30	YEL	8	8 1/2 IN.	J1-N	P5-Z	
A32	YEL	8	7 IN.	J1-B	P6-A	8
A33				J1-C	P6-E	
A34				J1-D	P6-B	8
A35				J1-E	P6-C	
A36				J1-A	P6-D	
A37				J1-K	P6-F	8
A38		8		J1-J	P6-H	
A39		10				
A39A **	RED			J1-u	P6-J	(8)
A39B **	YEL		7 IN.	J1-v	P6-K	
A39C **		8	2 1/2 IN.	A39-SHIELD	J1-T	
A40			7 IN.	J1-T	P6-L	
A41				J1-w	P6-M	8
A42				J1-x	P6-N	
A43				J1-y	P6-P	8
A44				J1-z	P6-R	
A45				J1-AA	P6-S	8
A46				J1-BB	P6-T	
A47				J1-HH	P6-U	
A48			7 IN.	J1-G	P6-W	
A49			6 IN.	J1-FF	P7-A	8
A50				J1-EE	P7-B	
A51				J1-DD	P7-C	8
A52				J1-CC	P7-D	
A53				J1-L	P7-E	8
A54				J1-M	P7-F	
A55		8	6 IN.	J1-H	P7-H	
A56	YEL	9	3 7/8 IN.	J1-R	E1	

** CONDUCTOR NUMBER FOR REFERENCE ONLY - WIRE SHALL NOT BE MARKED.

(E3)





DETAIL A
SCALE: NONE

Ⓓ REPLACES REV C WITH CHANGES

* PURCHASE ITEM-SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

001 QTY REQD	000 QTY REQD	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
4	4	15		*	1010402-2			SLEEVE, SOLDER, ELECT. COND, INSUL., HEAT SHRINKABLE			
51	51	14		*	1010490-058			INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
1	1	13		*	1010490-054			INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
54	54	12		*	1010490-060			INSULATION-SLEEVING, ELECTRICAL HEAT SHRINKABLE			
1	1	11		*	1010490-336			INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
1	1	10		*	1010789-012			WIRE, ELECT, TFE EXTRUDED INSUL POLYIMIDE CTD (28")			
1	1	9		*	1010789-006			WIRE, ELECT, TFE EXTRUDED INSUL POLYIMIDE CTD (7)			
1	1	8		*	1010789-001			WIRE, ELECT, TFE EXTRUDED INSUL POLYIMIDE CTD			
AR	AR	7		*	1011753			TAPE, LACING & TYING			
1	1	6			1011799	85386900670		PLATE AND CONNECTOR, ASSY OF			
1	1	5			MS25036-1			TERMINAL, LUG, CRIMP STYLE, COPPER			
1	1	4		*	1011757-000	68502018301		CONNECTOR, ELECTRICAL			
1	1	3		*	1011758-1	68502018201		CONNECTOR, ELECTRICAL			
1	1	2		*	1000121			CONNECTOR, ELECTRICAL, RECEPTACLE			
1	1	1		*	1000116			CONNECTOR, ELECTRICAL, RECEPTACLE			

LIST OF PARTS AND MATERIALS

(F2) (E1)

1011891 | 1011000
NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ; DECIMALS ± .12 ; ANGLES ± 5°
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80386900030
DRAWN J. MARGIOTTA DATE 2-28-64
CHECKED A. M. BUCHHOLZ
APPROVAL N. BRUNELLE / U.A.
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SXT BASE HARNESS
ASSEMBLY

CODE IDENT NO. | SIZE E | NASA NUMBER 1011896
SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

1011896

N1011896

REVISIONS TDRR C3990				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

9681101

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING DIAGRAM, NASA DWG NO. 1015122.
3. SOLDER PER MSFC-PROC-158, USING TYPE SN60 WAR P2 PER QQ-S-571.
4. LACE WIRES TOGETHER USING ITEM ⑦ PER MIL-S-572. FORM S OR Y LOCKSTICH AT ½ INCH SPACING. (MIN)
5. MARK ELECTRICAL REFERENCE DESIGNATION PER ND1002019.
6. IDENTIFY USING NASA DWG NO., REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND1002019.
7. WIRE, ND1002105, 24 AWG, TYPE I, WHITE, 34 FEET IN TOTAL LENGTH.
8. WIRE, ND1002105, 22 AWG, TYPE I, WHITE, 4 INCHES IN TOTAL LENGTH.
9. WIRE, ND1002105, 24 AWG TYPE VII-2 (WHITE)[BLUE, BROWN], 16 INCHES IN TOTAL LENGTH.
10. CONDUCTOR NO. SHALL BE MARKED ON EACH WIRE PER ND1002019. SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY TWO (2) INCHES MAXIMUM, SPIRALING OF THE MARKINGS IS ALLOWED.
11. TWISTED CONDUCTORS TO CONSIST OF THREE (3) FULL TURNS PER INCH MINIMUM.

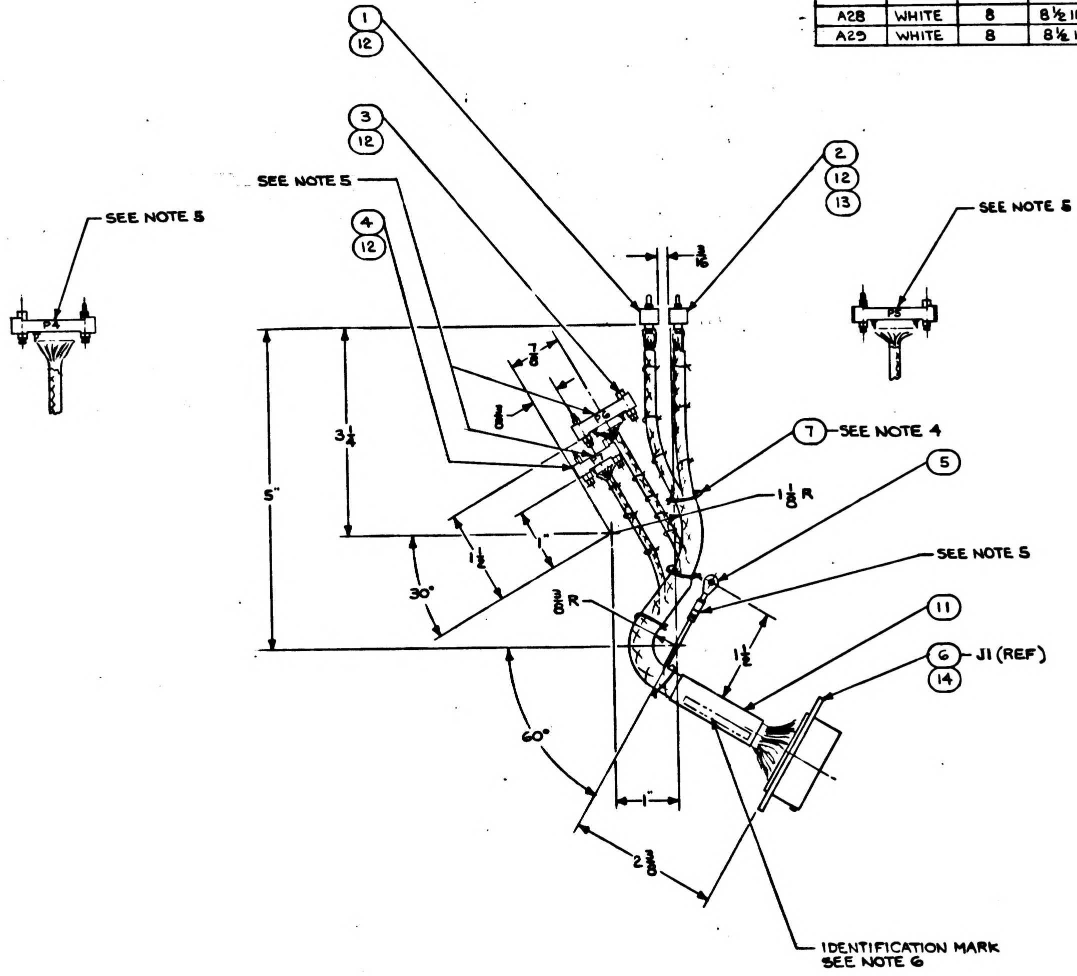
WIRING LEGEND

COND. NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 11
A1	WHITE	8	8½ IN.	J1 - W	P4 - D	8
A2	↑	↑	↑	J1 - X	P4 - A	
A3				J1 - Y	P4 - P	8
A4				J1 - Z	P4 - T	
A5				J1 - a	P4 - W	8
A6				J1 - b	P4 - V	
A7				J1 - c	P4 - Y	8
A8				J1 - d	P4 - b	
A9				J1 - e	P4 - d	8
A10				J1 - f	P4 - Z	
A11				J1 - g	P4 - C	8
A12				J1 - h	P4 - F	
A13				J1 - CC	P4 - H	8
A14				J1 - DD	P4 - L	
A15				J1 - t	P4 - K	
A16				J1 - F	P4 - N	
A17				J1 - P	P5 - A	8
A18				J1 - j	P5 - P	
A19				J1 - D	P5 - D	8
A20				J1 - E	P5 - H	
A21				J1 - i	P5 - L	
A22				J1 - K	P5 - T	8
A23		↓		J1 - J	P5 - W	
A24	↓	8		J1 - S	P5 - V	
A25	WHITE	10				
A25A **	BLUE	—	↓	J1 - k	P5 - Y	8
A25B **	BROWN	—	8½ IN.	J1 - m	P5 - b	
A25C **	SHIELD	—	A.R.	A25-SHIELD	J1 - S	
A26	WHITE	8	8½ IN.	J1 - n	P5 - C	8
A27	WHITE	8	8½ IN.	J1 - p	P5 - F	
A28	WHITE	8	8½ IN	J1 - q	P5 - K	8
A29	WHITE	8	8½ IN	J1 - r	P5 - N	

WIRING LEGEND

COND. NO.	COLOR	ITEM NO.	LENGTH (REF)	FROM	TO	SEE NOTE 11
A30	WHITE	8	8½ IN.	J1 - N	P5 - Z.	
A31	↑	↑	2 IN.	P5 - d	P5 - V	
A32			7 IN.	J1 - B	P6 - A	8
A33			↑	J1 - C	P6 - E	
A34				J1 - D	P6 - B	8
A35				J1 - E	P6 - C	
A36				J1 - A	P6 - D	
A37		↓		J1 - K	P6 - F	8
A38	↓	8		J1 - J	P6 - H	
A39	WHITE	10				
A39A **	BLUE	—	↓	J1 - u	P6 - J	8
A39B **	BROWN	—	7 IN.	J1 - v	P6 - K	
A39C **	SHIELD	—	A.R.	A39-SHIELD	J1 - T	
A40	WHITE	8	7 IN.	J1 - T	P6 - L	
A41	↑	↑	↑	J1 - w	P6 - M	8
A42				J1 - x	P6 - N	
A43				J1 - y	P6 - P	8
A44				J1 - z	P6 - R	
A45				J1 - AA	P6 - S	8
A46				J1 - BB	P6 - T	
A47			↓	J1 - HH	P6 - U	
A48			7 IN.	J1 - G	P6 - W	
A49			6 IN.	J1 - FF	P7 - A	8
A50			↑	J1 - EE	P7 - B	
A51				J1 - DD	P7 - C	8
A52				J1 - CC	P7 - D	
A53				J1 - L	P7 - E	8
A54		↓	↓	J1 - M	P7 - F	
A55	↓	8	6 IN.	J1 - H	P7 - H	
A56	WHITE	9	3⅞ IN.	J1 - R	E1	

** CONDUCTOR NUMBER FOR REFERENCE ONLY - WIRE SHALL NOT BE MARKED.



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
14	1	*	1006776-10			INSULATION-SLEEVING, ELECTRICAL 25¾ LG (51-½" LENGTHS)			
13	1	*	1006776-13			INSULATION-SLEEVING, ELECTRICAL (½" LG)			
12	1	*	1006776-20			INSULATION-SLEEVING, ELECTRICAL 27" LG (54-½" LENGTHS)			
11	1	*	1010490-336			INSULATION-SLEEVING, ELECTRICAL			
10	1	*	SEE NOTE 9			WIRE, IRRADIATED POLYOLEFIN, INSULATED			
9	1	*	SEE NOTE 8			WIRE, IRRADIATED POLYOLEFIN, INSULATED			
8	1	*	SEE NOTE 7			WIRE, IRRADIATED POLYOLEFIN, INSULATED			
7	AR	*	1011753			TAPE, LACING & TYING			
6	1		1011799	85386900670		PLATE AND CONNECTOR, ASSY OF			
5	1		MS25036-43			TERMINAL, LUG, CRIMP STYLE, COPPER			
4	1	*	1011757	68502018301		CONNECTOR, ELECTRICAL			
3	1	*	1011758	68502018201		CONNECTOR, ELECTRICAL			
2	1	*	1000121			CONNECTOR, ELECTRICAL, RECEPTACLE			
1	1	*	1000116			CONNECTOR, ELECTRICAL, RECEPTACLE			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

MASTER

1011891	1011000
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/8; DECIMALS ± —; ANGLES ± 5°
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80386900030
DRAWN DATE 10-3-63
CHECKED 10/7/63
APPROVAL 10/7/63
APPROVAL 10/15/63
NASA APPROVAL
MIT APPROVAL 17 Oct 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SXT BASE HARNESS
ASSEMBLY

CODE IDENT NO.
SIZE E
NASA NUMBER 1011896
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011896

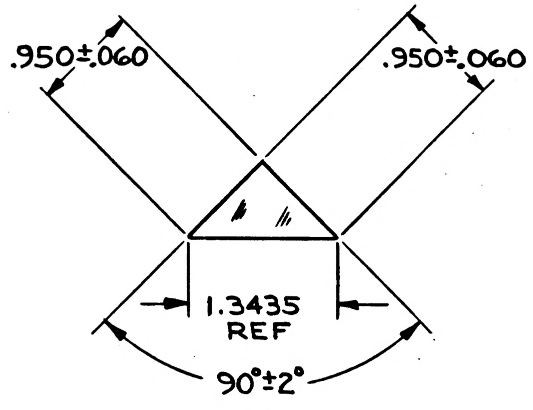
8681101

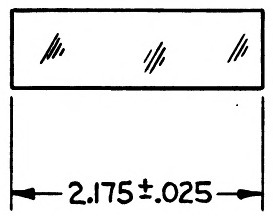
REVISIONS 06112			
SYM	DESCRIPTION	DATE	APPROVAL

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DWG IN ACCORDANCE PRESCRIBED BY MIL-D-70327
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404 CLASS 3
   - C. MARKING: PACKAGES AND INTERNAL CONTAINERS SHALL BE MARKED PER MIL-STD-129 AND SHALL INCLUDE THE NASA DWG NO., DASH NO. (IF ANY) AND REVISION LETTER, MANUFACTURER'S NAME AND PART NO.
2. INSPECTION AND ACCEPTANCE
   - A. DIMENSIONS AS SPECIFIED
3. DESIGN REQUIREMENTS
   - A. MATERIAL: BARIUM CROWN GLASS, TYPE 573-574, GRADE AA IN ACCORDANCE WITH SPEC JAN-G-174, PRECISION ANNEALED





[illegible]

MASTER

K.I.C. NO. 11386900010	
QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ±~ DECIMALS ±~ ANGLES ±~ DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DWG. NO. CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
MATERIAL SEE NOTE #2	DRAWN M.NEILL DATE 10-23-63 CHECKED 10-23-63 APPROVAL 10-29-63 APPROVAL E. Thang 12/12/63	PRISM BLANK SOURCE CONTROL DWG	
HEAT TREATMENT	NASA APPROVAL 2/4/64	CODE IDENT NO.	SIZE C / NASA DRAWING NO. 1011898
FINAL FINISH	MIT APPROVAL 2/4/64	SCALE	WT / SHEET 1 OF 1

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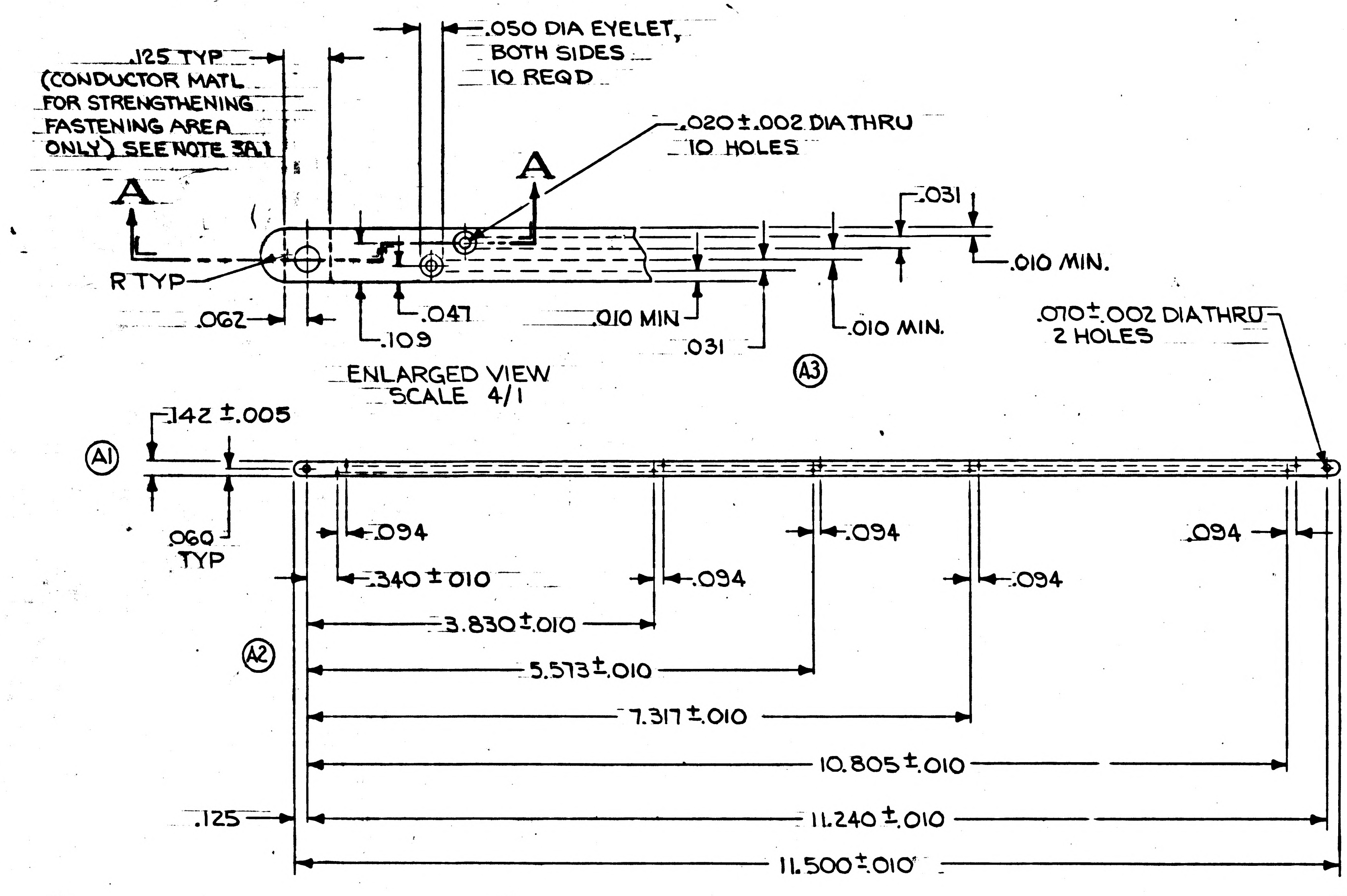
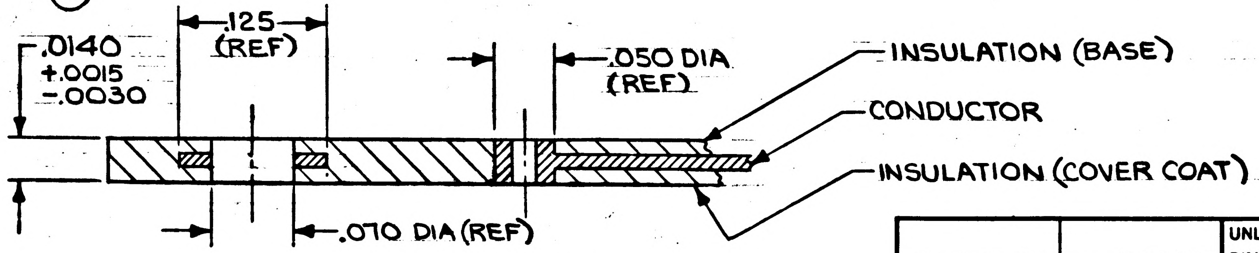
A 1011903

REVISIONS 03/45			
SYM	DESCRIPTION	DATE	APPROVAL
A4	REVISED PER TDRR NO. 05732	14 JAN 64	


.125 TYP (CONDUCTOR MATL FOR STRENGTHENING FASTENING AREA ONLY) SEE NOTE 3A.1
.050 DIA EYELET, BOTH SIDES 10 REQD
.020 ± .002 DIA THRU 10 HOLES
A
A
R TYP
.031
.010 MIN.
.062
.109
.047
.010 MIN
.031
.010 MIN.
ENLARGED VIEW SCALE 4/1
A3
.070 ± .002 DIA THRU 2 HOLES
.142 ± .005
A1
.060 TYP
.094
.340 ± .010
.094
.094
.094
.094
A2
3.830 ± .010
5.573 ± .010
7.317 ± .010
10.805 ± .010
.125
11.240 ± .010
11.500 ± .010

A	A
SHEET 1	SHEET 2
REVISION STATUS OF SHEETS	


A2
.0140 +.0015 -.0030
.125 (REF)
.050 DIA (REF)
INSULATION (BASE)
CONDUCTOR
INSULATION (COVER COAT)
.070 DIA (REF)

PARTIAL SECTION A-A

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ± .005 ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 3.A
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN MARINELLI DATE 8-26-63
CHECKED 8/28/63
APPROVAL 9/24/63
APPROVAL E. Mang 9-6-63
NASA APPROVAL
MIT APPROVAL 9/17/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FLEXPRINT
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011903
SCALE ~
WT
SHEET 1 OF 2

MASTE

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

A 1011903

REVISIONS 03145

SYM	DESCRIPTION	DATE	APPROVAL
A_4	REVISED PER TDRR NO. 05732	14 JAN 64	

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III. FLEXPRINT SHALL BE PACKAGED LAYING FLAT. THERE SHALL BE NO BENDS OR WRINKLES IN THE FLEXPRINT.
2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS
     - 1. EXTERNAL DIMENSIONS AS SHOWN.
   - B. ELECTRICAL REQUIREMENTS
     - 1. DIELECTRIC WITHSTANDING VOLTAGE: THE CIRCUIT SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-202, METHOD 301 WITH 500 VOLTS DC APPLIED TO (1) ADJACENT CONDUCTORS ~~AND (2)~~ BETWEEN EACH CONDUCTOR AND THE OUTER SURFACE OF THE INSULATION CLOSEST TO THE CONDUCTOR.
     - 2. INSULATION RESISTANCE: THE CIRCUIT SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-202, METHOD 302, CONDITION B AT POINTS IDENTICAL TO THOSE STATED IN SECTION 2.B.1 ABOVE.
     - (A6) 3. CONDUCTOR RESISTANCE: THE RESISTANCE OF EACH CONDUCTOR SHALL BE LESS THAN .075 OHMS DURING AND AFTER STIPULATION 2B.1 BELOW.
3. DESIGN REQUIREMENTS.
   - A. MATERIAL
     - 1. CONDUCTOR: COPPER STRIP CONFORMING TO FEDERAL SPECIFICATION QQ-C-576, TEMPER HALF HARD.
       - a. THICKNESS: .0040 ±.0004 IN.
       - b. WIDTH: .031 ±.005 IN.
     - 2. INSULATION: TEFLON FEP TYPE "A" OR EQUIVALENT IN CONFORMITY WITH ASTM SPECIFICATION D2116-62T.
       - a. THICKNESS: BASE - .0050 ±.0005.
         COVER COAT - .0050 ±.0005.
       - b. PEEL STRENGTH: 5 POUNDS/INCH WIDTH OF CONDUCTOR MINIMUM.
   - B. ENVIRONMENTAL REQUIREMENTS
     - 1. FLEXIBILITY: THE UNIT (EXCLUDING THE FASTENER AREA AT ENDS) BENT 180° AROUND A 2" INCH MANDREL BOTH BEFORE AND AFTER ALL TESTS SPECIFIED ON THIS DRAWING WITHOUT TAKING A PERMANENT SET.
     - 2. HUMIDITY: THE UNIT SHALL BE TESTED FOR HUMIDITY RESISTANCE IN ACCORDANCE WITH MIL-STD-180, METHOD 507 AND FOUND CAPABLE OF MEETING THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     - 3. HIGH TEMPERATURE RESISTANCE: THE UNIT SHALL BE TESTED FOR HIGH TEMPERATURE RESISTANCE WITH HIGHEST OPERATING TEMPERATURE OF 180°F IN ACCORDANCE WITH MIL-STD-810, METHOD 501, AND FOUND TO MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     - 4. LOW TEMPERATURE RESISTANCE: THE UNIT SHALL BE TESTED FOR LOW TEMPERATURE RESISTANCE WITH A LOWEST OPERATING TEMPERATURE OF -65°F IN ACCORDANCE WITH MIL-STD-810 (USAF) METHOD 502 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     - 5. TEMPERATURE SHOCK: THE UNIT SHALL BE TESTED FOR TEMPERATURE SHOCK IN ACCORDANCE WITH MIL-STD-810 (USAF) METHOD 503 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     - 6. TEMPERATURE - ALTITUDE: THE UNIT SHALL BE TESTED FOR TEMPERATURE-ALTITUDE RESISTANCE (CYCLING) IN ACCORDANCE WITH MIL-STD-810 (USAF), METHOD 504 FOR EQUIPMENT CLASS 2 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     - 7. LOW PRESSURE: THE UNIT SHALL BE TESTED FOR LOW PRESSURE RESISTANCE IN ACCORDANCE WITH MIL-STD-810 (USAF) METHOD 500 WITH A LOW PRESSURE OF 10^{9} MM HG AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     - 8. SUNSHINE RESISTANCE: THE UNIT SHALL BE TESTED FOR SUNSHINE RESISTANCE IN ACCORDANCE WITH MIL-STD-810 (USAF), METHOD 505 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     - 9. LOW PRESSURE - SOLAR ENERGY RESISTANCE: THE UNIT SHALL BE TESTED FOR LOW PRESSURE AND SOLAR ENERGY RESISTANCE IN ACCORDANCE WITH MIL-STD-810, METHOD 517 AND MEET FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

MASTE

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN MARINELLI DATE 8-26-63
CHECKED 8/28/63
APPROVAL 8/28/63
APPROVAL E. Mayo 9-6-63
NASA APPROVAL
MIT APPROVAL 9/17/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FLEXPRINT
SPECIFICATION CONTROL DRAWING

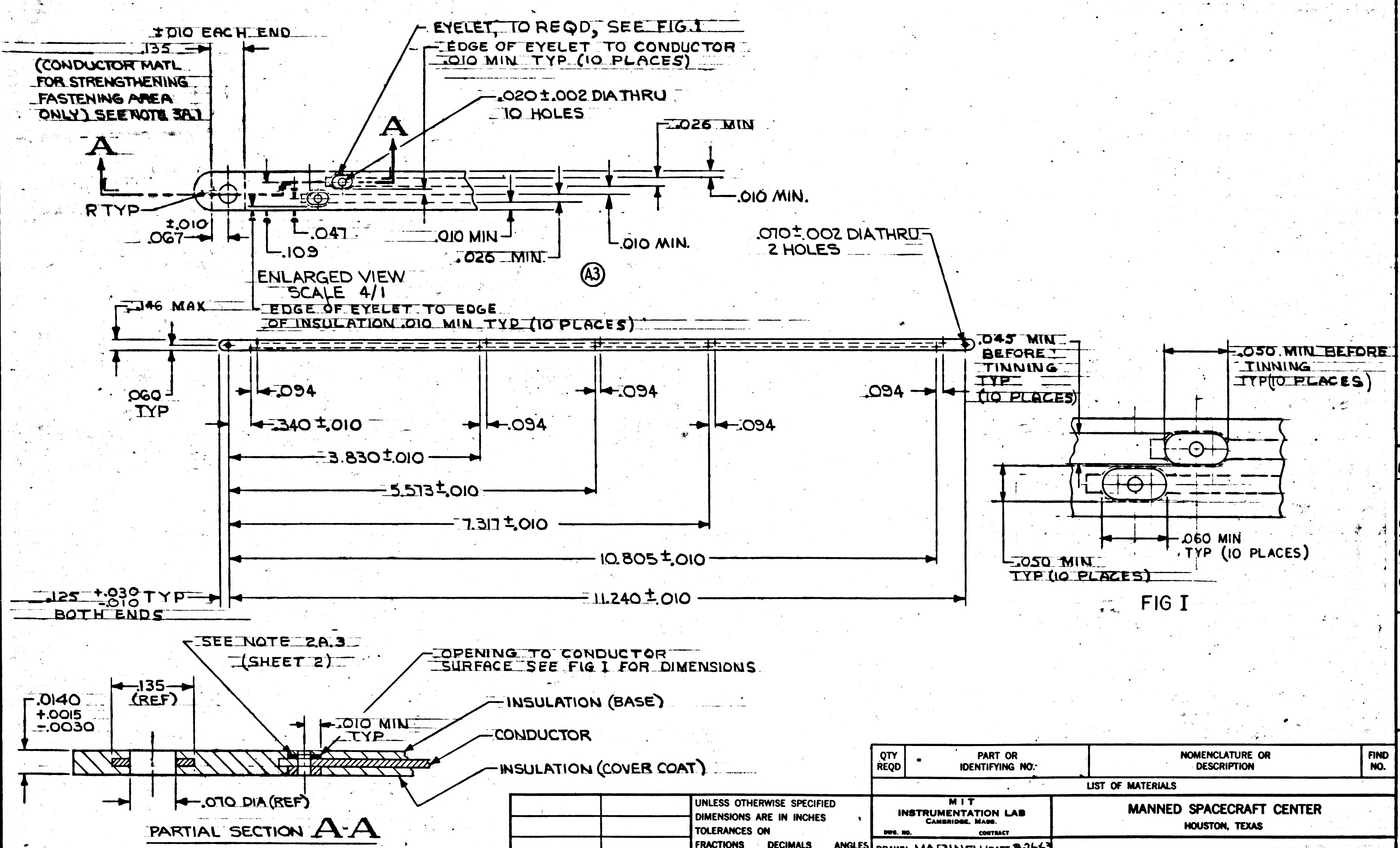
CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011903
SCALE
WT
SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

B 1011903

REVISIONS 03145

SYM	DESCRIPTION	DATE	APPROVAL
A4	REVISED PER TDRR NO. 05732	14 JAN 64	
B	REVISED PER TDRR 08926	6/2/64	


±.010 EACH END
.135
(CONDUCTOR MATL FOR STRENGTHENING FASTENING AREA ONLY) SEE NOTE 3B.1
EYELET, 10 REQD, SEE FIG.1
EDGE OF EYELET TO CONDUCTOR .010 MIN TYP (10 PLACES)
.020±.002 DIA THRU 10 HOLES
.026 MIN
.010 MIN.
A
R TYP
±.010 .067
.109
.047
.010 MIN
.026 MIN.
.010 MIN.
.070±.002 DIA THRU 2 HOLES
ENLARGED VIEW SCALE 4/1
A3
.146 MAX
EDGE OF EYELET TO EDGE OF INSULATION .010 MIN TYP (10 PLACES)
.045 MIN BEFORE TINNING TYP (10 PLACES)
.060 TYP
.094
.340±.010
3.830±.010
5.573±.010
7.317±.010
10.805±.010
11.240±.010
.125 +.030 -.010 TYP BOTH ENDS
.050 MIN BEFORE TINNING TYP (10 PLACES)
.060 MIN TYP (10 PLACES)
.050 MIN TYP (10 PLACES)
FIG I
SEE NOTE 2A.3 (SHEET 2)
OPENING TO CONDUCTOR SURFACE SEE FIG I FOR DIMENSIONS
.0140 +.0015 -.0030
.135 (REF)
.010 MIN TYP
INSULATION (BASE)
CONDUCTOR
INSULATION (COVER COAT)
.070 DIA (REF)
PARTIAL SECTION A-A

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ±.005 ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 3.A
HEAT TREATMENT
FINAL FINISH

NEXT ASSY	USED ON
APPLICATION	

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN MARINELLI DATE 8-26-63
CHECKED 8/28/63
APPROVAL 9/28/63
APPROVAL E. 9-6-63
NASA APPROVAL
MIT APPROVAL 9/17/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FLEXPRINT SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011903
SCALE ~
WT
SHEET 1 OF 2

MASTE

INCHES 0 1 2 PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

B	1011903

REVISIONS 03145

SYM	DESCRIPTION	DATE	APPROVAL
A4	REVISED PER TDRR NO. 05732	14 JAN 64	
B	REVISED PER TDRR 08926	6/2/64	

REQUIREMENTS

1. GENERAL

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III. FLEXPRINT SHALL BE PACKAGED LAYING FLAT. THERE SHALL BE NO BENDS OR WRINKLES IN THE FLEXPRINT.

2. INSPECTION AND ACCEPTANCE

A. MECHANICAL REQUIREMENTS

1. PARTS SHALL BE IDENTIFIED WITH NASA DWG NO. LATEST REV. LETTER & MFGRS. IDENT. PER ND1002019.
2. EXTERNAL DIMENSIONS AS SHOWN.
3. TIN .003 MAX WITH SN60 WRP-2 QQ-S-571 SOLDER IN ACCORDANCE WITH MSFC-PROC 158.
4. THE CIRCUIT SHALL HAVE .010 MIN INSULATION BETWEEN EYELETS.

B. ELECTRICAL REQUIREMENTS

1. DIELECTRIC WITHSTANDING VOLTAGE: THE CIRCUIT SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-202, METHOD 301 WITH 500 VOLTS DC APPLIED TO (1) ADJACENT CONDUCTORS, AND (2) BETWEEN EACH CONDUCTOR AND THE OUTER SURFACE OF THE INSULATION CLOSEST TO THE CONDUCTOR. LEAKAGE SHALL NOT EXCEED 1 MILLIAMP.

2. INSULATION RESISTANCE: 100 MEGOHM MIN. THE CIRCUIT SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-202, METHOD 302, CONDITION B AT POINTS IDENTICAL TO THOSE STATED IN SECTION 2.B.1 ABOVE.

3. CONDUCTOR RESISTANCE: THE RESISTANCE OF EACH CONDUCTOR SHALL BE LESS THAN .100 OHMS AFTER STIPULATION 3.B.

3. DESIGN REQUIREMENTS

A. MATERIAL

1. CONDUCTOR: COPPER STRIP CONFORMING TO FEDERAL SPECIFICATION QQ-C-576, TEMPER HALF HARD.
   a. THICKNESS: .0040 ±.0004 IN.
   b. WIDTH: .031 ±.005 IN.

2. INSULATION: TEFLON FEP TYPE "A" OR EQUIVALENT IN CONFORMITY WITH ASTM SPECIFICATION D2116-62T.
   a. THICKNESS: BASE - .0050 ±.0005.
   COVER COAT - .0050 ±.0005.
   b PEEL STRENGTH: 5 POUNDS/INCH WIDTH OF CONDUCTOR MINIMUM.

B. FLEXIBILITY: THE UNIT (EXCLUDING THE FASTENER AREA AT ENDS) BENT 180° AROUND A 2" INCH MANDREL BOTH BEFORE AND AFTER COMPLETION OF ALL TESTS SPECIFIED ON THIS DRAWING WITHOUT TAKING A PERMANENT SET.

C. ENVIRONMENTAL REQUIREMENTS

1. HUMIDITY: THE UNIT SHALL BE TESTED FOR HUMIDITY RESISTANCE IN ACCORDANCE WITH MIL-STD-180, METHOD 507 AND FOUND CAPABLE OF MEETING THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.

2. HIGH TEMPERATURE RESISTANCE: THE UNIT SHALL BE TESTED FOR HIGH TEMPERATURE RESISTANCE WITH HIGHEST OPERATING TEMPERATURE OF 180°F IN ACCORDANCE WITH MIL-STD-810, METHOD 501, AND FOUND TO MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.

3. LOW TEMPERATURE RESISTANCE: THE UNIT SHALL BE TESTED FOR LOW TEMPERATURE RESISTANCE WITH A LOWEST OPERATING TEMPERATURE OF -65°F IN ACCORDANCE WITH MIL-STD-810 (USAF) METHOD 502 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.

4. TEMPERATURE SHOCK: THE UNIT SHALL BE TESTED FOR TEMPERATURE SHOCK IN ACCORDANCE WITH MIL-STD-810 (USAF) METHOD 503 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.

5. TEMPERATURE - ALTITUDE: THE UNIT SHALL BE TESTED FOR TEMPERATURE-ALTITUDE RESISTANCE (CYCLING) IN ACCORDANCE WITH MIL-STD-810 (USAF), METHOD 504 FOR EQUIPMENT CLASS 2 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.

6. LOW PRESSURE: THE UNIT SHALL BE TESTED FOR LOW PRESSURE RESISTANCE IN ACCORDANCE WITH MIL-STD-810 (USAF) METHOD 500 WITH A LOW PRESSURE OF 10^7 MM HG AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.

7. SUNSHINE RESISTANCE: THE UNIT SHALL BE TESTED FOR SUNSHINE RESISTANCE IN ACCORDANCE WITH MIL-STD-810 (USAF), METHOD 505 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.

8. LOW PRESSURE - SOLAR ENERGY RESISTANCE: THE UNIT SHALL BE TESTED FOR LOW PRESSURE AND SOLAR ENERGY RESISTANCE IN ACCORDANCE WITH MIL-STD-810, METHOD 517 AND MEET FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MASTE

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN MARINELLI DATE 8-26-63
CHECKED 8/28/63
APPROVAL
APPROVAL E. 9-6-63
NASA APPROVAL
MIT APPROVAL 9/17/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FLEXPRINT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011903
SCALE
WT
SHEET 2 OF 2

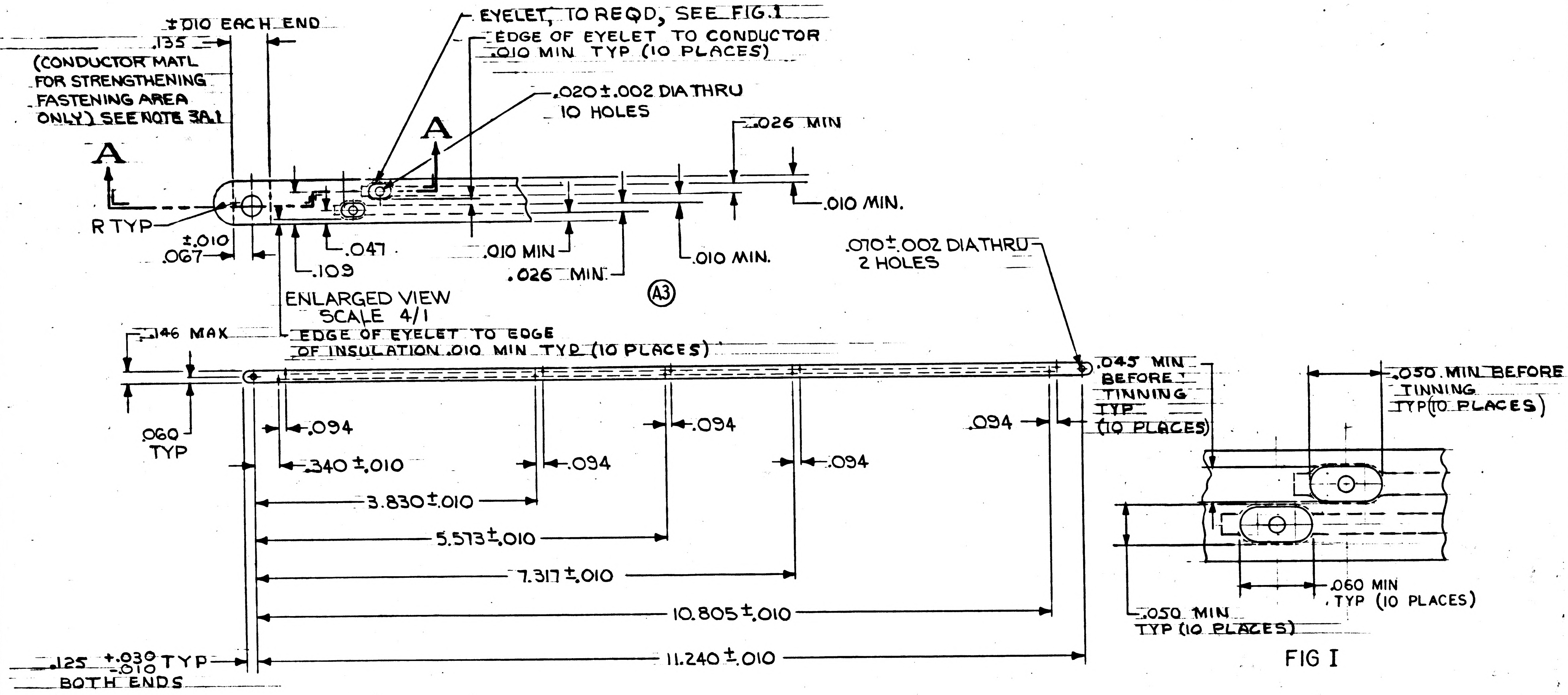
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

C 1011903

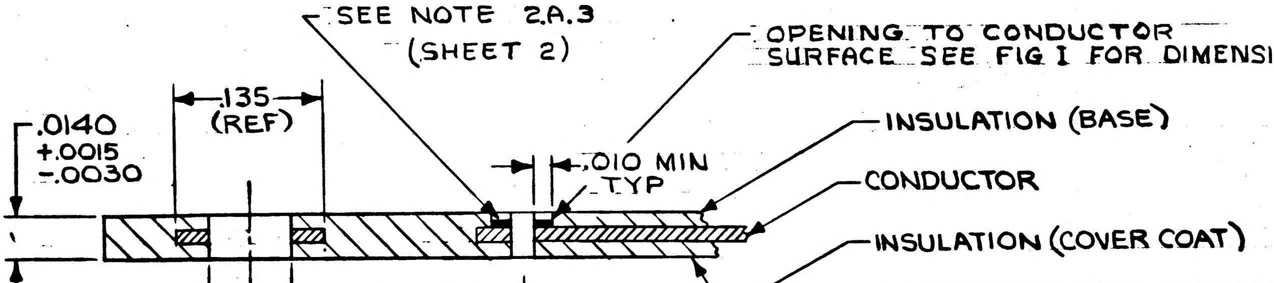
REVISIONS 03/45

SYM	DESCRIPTION	DATE	APPROVAL
A4	REVISED PER TDRR NO. 05732	14 JAN 64	
B	REVISED PER TDRR 08926	6/2/64	WK
C	REVISED PER TDRR 14039	11-12-64	WR



±.010 EACH END
.135
(CONDUCTOR MATL FOR STRENGTHENING FASTENING AREA ONLY) SEE NOTE 3A.1
EYELET, TO REQD, SEE FIG.1
EDGE OF EYELET TO CONDUCTOR .010 MIN TYP (10 PLACES)
.020±.002 DIA THRU 10 HOLES
A
A
.026 MIN
.010 MIN.
R TYP
±.010 .067
.047
.109
.010 MIN
.026 MIN
.010 MIN.
A3
.070±.002 DIA THRU 2 HOLES
ENLARGED VIEW SCALE 4/1
.146 MAX
EDGE OF EYELET TO EDGE OF INSULATION .010 MIN TYP (10 PLACES)
.045 MIN BEFORE TINNING TYP (10 PLACES)
.060 TYP
.094
.094
.094
.340±.010
.094
.094
3.830±.010
5.573±.010
7.317±.010
10.805±.010
.125 +.030 -.010 TYP BOTH ENDS
11.240±.010
.050 MIN BEFORE TINNING TYP (10 PLACES)
.060 MIN TYP (10 PLACES)
.050 MIN TYP (10 PLACES)

FIG I



SEE NOTE 2.A.3 (SHEET 2)
OPENING TO CONDUCTOR SURFACE SEE FIG I FOR DIMENSIONS
.0140 +.0015 -.0030
.135 (REF)
.010 MIN TYP
INSULATION (BASE)
CONDUCTOR
INSULATION (COVER COAT)
.070 DIA (REF)

PARTIAL SECTION A-A

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ±.005 ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 3.A
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN MARINELLI DATE 8-26-63
CHECKED 8/28/63
APPROVAL 8/28/63
APPROVAL E. 9-6-63
NASA APPROVAL Jack Barnard
MIT APPROVAL R. Nagel 9/17/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FLEXPRINT
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011903
SCALE ~
WT
SHEET 1 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 03145

SYM	DESCRIPTION	DATE	APPROVAL
A 4	REVISED PER TDRR NO. 05732	14 JAN 64	
B	REVISED PER TDRR 08926	6/2/64	
C	REVISED PER TDRR 14039	11-13-64	WR

REQUIREMENTS

1. GENERAL

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

   C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III. FLEXPRINT SHALL BE PACKAGED LAYING FLAT. THERE SHALL BE NO BENDS OR WRINKLES IN THE FLEXPRINT.

2. INSPECTION AND ACCEPTANCE

   A. MECHANICAL REQUIREMENTS

      1. PARTS SHALL BE IDENTIFIED WITH NASA DWG NO. LATEST REV. LETTER & MFGRS. IDENT. PER ND1002019.
      2. EXTERNAL DIMENSIONS AS SHOWN.
      3. TIN .003 MAX WITH SN60 WRP-~~2~~, QQ-S-571 SOLDER IN ACCORDANCE WITH MSFC-PROC 158.
      4. THE CIRCUIT SHALL HAVE .010 MIN INSULATION BETWEEN EYELETS.

   B. ELECTRICAL REQUIREMENTS

      1. DIELECTRIC WITHSTANDING VOLTAGE: THE CIRCUIT SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-202, METHOD 301 WITH 500 VOLTS DC APPLIED TO (1) ADJACENT CONDUCTORS AND (2) BETWEEN EACH CONDUCTOR AND THE OUTER SURFACE OF THE INSULATION CLOSEST TO THE CONDUCTOR. LEAKAGE SHALL NOT EXCEED 1 MILLIAMP.

      2. INSULATION RESISTANCE: 100 MEGOHM MIN. THE CIRCUIT SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-202, METHOD 302, CONDITION B AT POINTS IDENTICAL TO THOSE STATED IN SECTION 2.B.1 ABOVE.

      3. CONDUCTOR RESISTANCE: THE RESISTANCE OF EACH CONDUCTOR SHALL BE LESS THAN, 100 OHMS AFTER STIPULATION 3.B.T.

   C. ENVIRONMENTAL REQUIREMENTS

      1. HUMIDITY: THE UNIT SHALL BE TESTED FOR HUMIDITY RESISTANCE IN ACCORDANCE WITH MIL-STD-180, METHOD 507 AND FOUND CAPABLE OF MEETING THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.

      2. HIGH TEMPERATURE RESISTANCE: THE UNIT SHALL BE TESTED FOR HIGH TEMPERATURE RESISTANCE WITH HIGHEST OPERATING TEMPERATURE OF 180°F IN ACCORDANCE WITH MIL-STD-810, METHOD 501, AND FOUND TO MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.

      3. LOW TEMPERATURE RESISTANCE: THE UNIT SHALL BE TESTED FOR LOW TEMPERATURE RESISTANCE WITH A LOWEST OPERATING TEMPERATURE OF -65°F IN ACCORDANCE WITH MIL-STD-810 (USAF) METHOD 502 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.

      4. TEMPERATURE SHOCK: THE UNIT SHALL BE TESTED FOR TEMPERATURE SHOCK IN ACCORDANCE WITH MIL-STD-810 (USAF) METHOD 503 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.

      5. TEMPERATURE - ALTITUDE: THE UNIT SHALL BE TESTED FOR TEMPERATURE-ALTITUDE RESISTANCE (CYCLING) IN ACCORDANCE WITH MIL-STD-810 (USAF), METHOD 504 FOR EQUIPMENT CLASS 2 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.

      6. LOW PRESSURE: THE UNIT SHALL BE TESTED FOR LOW PRESSURE RESISTANCE IN ACCORDANCE WITH MIL-STD-810 (USAF) METHOD 500 WITH A LOW PRESSURE OF 10^9 MM HG AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.

      7. SUNSHINE RESISTANCE: THE UNIT SHALL BE TESTED FOR SUNSHINE RESISTANCE IN ACCORDANCE WITH MIL-STD-810 (USAF), METHOD 505 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.

      8. LOW PRESSURE - SOLAR ENERGY RESISTANCE: THE UNIT SHALL BE TESTED FOR LOW PRESSURE AND SOLAR ENERGY RESISTANCE IN ACCORDANCE WITH MIL-STD-810, METHOD 517 AND MEET FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.

3. DESIGN REQUIREMENTS

   A. MATERIAL

      1. CONDUCTOR: COPPER STRIP CONFORMING TO FEDERAL SPECIFICATION QQ-C-576, TEMPER HALF HARD.

         a. THICKNESS: .0040 ±.0004 IN.

         b. WIDTH: .031 ±.005 IN.

      2. INSULATION: TEFLON FEP TYPE "A" OR EQUIVALENT IN CONFORMITY WITH ASTM SPECIFICATION D2116-62T.

         a. THICKNESS: BASE - .0050 ±.0005.
         COVER COAT - .0050 ±.0005.

         b PEEL STRENGTH: 5 POUNDS/INCH WIDTH OF CONDUCTOR MINIMUM.

   B. FLEXIBILITY: THE UNIT (EXCLUDING THE FASTENER AREA AT ENDS) BENT 180° AROUND A 2" INCH MANDREL BOTH BEFORE AND AFTER COMPLETION OF ALL TESTS SPECIFIED ON THIS DRAWING WITHOUT TAKING A PERMANENT SET.

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MASTE

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT
DRAWN MARINELLI DATE 8-26-63
CHECKED 8/28/63
APPROVAL 8/28/63
APPROVAL E. 9-6-63
NASA APPROVAL
MIT APPROVAL 9/17/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FLEXPRINT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011903
SCALE
WT
SHEET 2 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

A	9061101

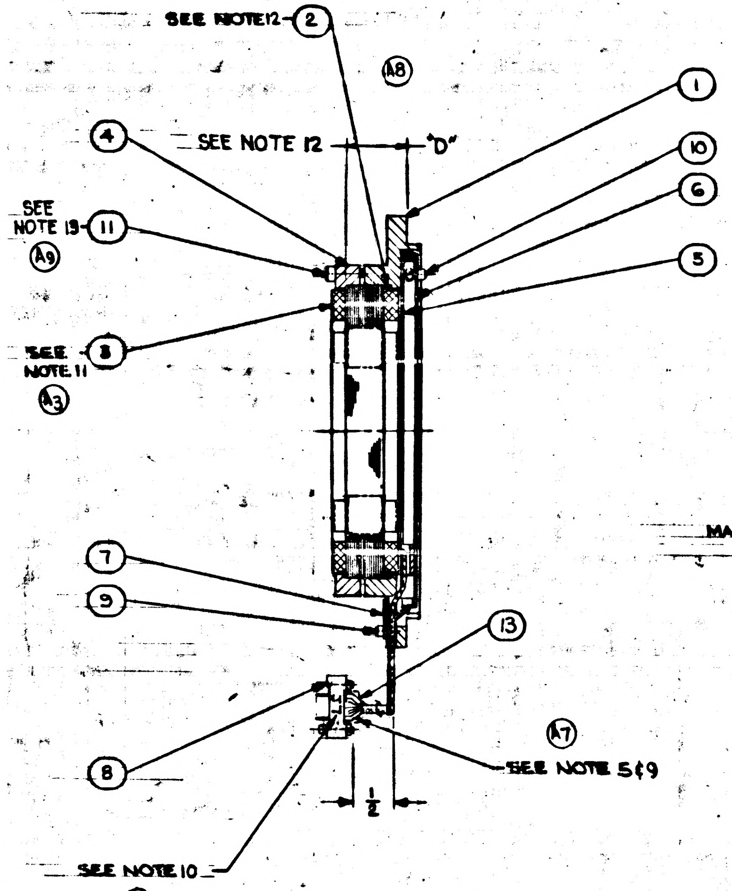
REVISIONS 02944				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A9		REVISED PER TDRR NO. 08476	5/14/66	

NOTES:

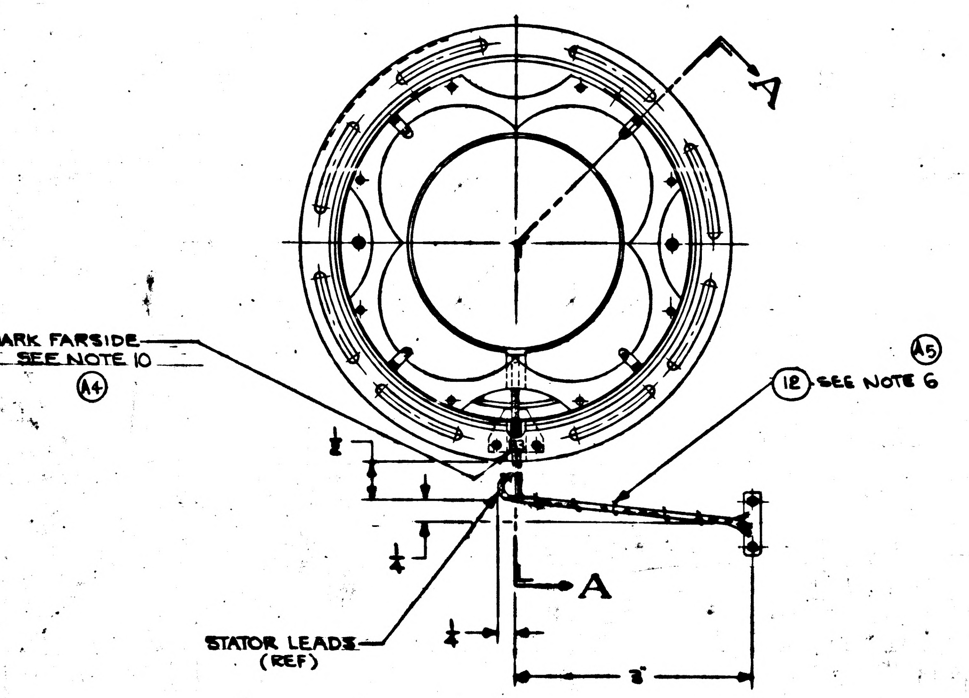
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING SCHEMATIC NASA DRAWING NO. 1015122.
3. TWIST CONDUCTORS IN ACCORDANCE WITH ND-1002032. (A1)
4. APPLY ITEM 13 TO LEADS.
5. SOLDER CONDUCTORS PER WIRING LEGEND, WITH Sn60WRP2, PER QQ-S-571, PER MSFC-PROC-158.
6. LACE CONDUCTORS, USING ITEM 12, IN ACCORDANCE WITH ND1002032.
7. PERFORM CONTINUITY CHECK.
8. PLACE ITEM 13 OVER CONTACTS AND LEADS AND SHRINK.
9. POT IN ACCORDANCE WITH ND1002009, METHOD C.
   A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
   B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.

WIRING LEGEND (A2)

COND. NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 3
C1	BLUE		B3-P4	J7-A	8
C2	YELLOW		B3-P2	J7-B	
C3	RED		B3-P1	J7-C	8
C4	BLACK		B3-P3	J7-D	
C5	GREEN		GREEN	J7-E	8
C6	WHITE		WHITE	J7-F	



SECTION A-A



VIEW WITH LAMP COVER PLATE (ITEM 6) REMOVED

10. MARK REF. DESIGNATIONS 1/8 INCH HIGH IN ACCORDANCE WITH ND-1002019.
11. ITEM NO. 3 (RESOLVER) ROTOR AND STATOR TO BE KEPT AS A MATCHED PAIR. REFER TO DRAWING NO. 1011797 FOR ROTOR ASSEMBLY.
12. SELECT SPACER BY REFERENCE TO DIMENSION "C" FROM ASSEMBLY 1011889 FOR CORRESPONDING RESOLVER ROTOR DIMENSION "D" TO BE EQUAL TO BE EQUAL TO 0.014 ±.013 + "C". (A1)
13. SCREW TORQUE REQUIREMENTS FOR ITEM 11 TO BE 4.5 IN. LBS ±10%.

MASTER

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

(A6)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
13	6	*	1010490-060	—		INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
12	AR	*	1011753	60035142001		TAPE, LACING & TYING			
11	6	NAS	1352C04LL10	74455157016		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
10	8	NAS	1352C02LL6	74455157007		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
9	2	NAS	1352C02LL4	74455157006		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
8	1	*	1011741	68502017001		CONNECTOR, ELECTRICAL (J7)			
7	1		1011343	56386900230		PLATE, STRAP			
6	1		1011335	56386900220		PLATE, COVER, LAMP			
5	1		1011563	85386900320		LAMP & PLATE, ASSY OF			
4	1		1011327	57386900780		RETAINER, STATOR			
3	1	*	1000160	—		RESOLVER, 16 SPEED TRANSMITTER (STATOR) (B-3)			
2	1		1011638-A,R	573869010-AR		SPACER, STATOR			
1	1		1011325	57386900770		HOUSING, STATOR			

LIST OF PARTS AND MATERIALS

APPLICATION	
NEXT ASSY	USED ON
1011890	1011000

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/16	± —	± —

DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900890

DRAWN J. Schiller DATE 7-3-63
CHECKED
APPROVAL
APPROVAL 9-3-63
NASA APPROVAL 9/5/63
MIT APPROVAL 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, STATOR & LAMP, ASSEMBLY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011906
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011906

R-100

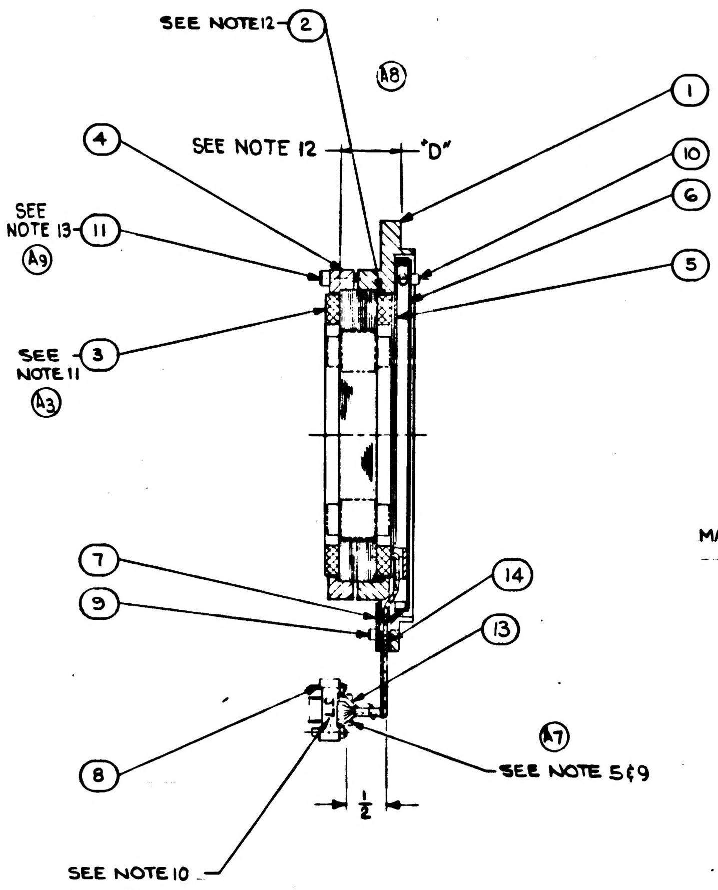
NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING SCHEMATIC NASA DRAWING NO. 1015122.
3. TWIST CONDUCTORS IN ACCORDANCE WITH ND-1002032. Ⓐ1
4. APPLY ITEM 13 TO LEADS.
5. SOLDER CONDUCTORS PER WIRING LEGEND, WITH Sn60WRP2, PER QQ-S-571, PER MSFC-PROC-158.
6. LACE CONDUCTORS, USING ITEM 12, IN ACCORDANCE WITH ND1002032.
7. PERFORM CONTINUITY CHECK.
8. PLACE ITEM 13 OVER CONTACTS AND LEADS AND SHRINK.
9. POT IN ACCORDANCE WITH ND1002009, METHOD C.
   - A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
   - B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.

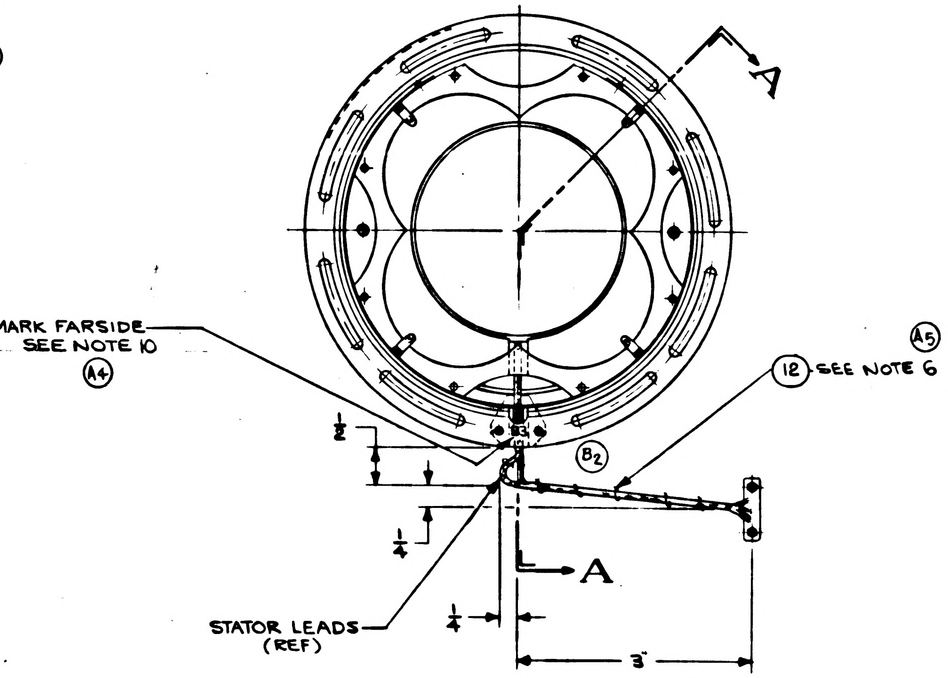
B 9061101

WIRING LEGEND					
COND. NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 3 Ⓐ2
C1	BLUE		B3-P4	J7-A	8
C2	YELLOW		B3-P2	J7-B	
C3	RED		B3-P1	J7-C	8
C4	BLACK		B3-P3	J7-D	
C5	GREEN		GREEN	J7-E	8
C6	WHITE		WHITE	J7-F	

REVISIONS 02744				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A9		REVISED PER TDRR NO. 08476	5/14/64	
B2		REVISED PER TDRR NO. 09065	5/27/64	Jnb



SECTION A-A



VIEW WITH LAMP COVER PLATE (ITEM 6) REMOVED

10. MARK REF. DESIGNATIONS 1/8 INCH HIGH IN ACCORDANCE WITH ND-1002019.
11. ITEM NO. 3 (RESOLVER) ROTOR AND STATOR TO BE KEPT AS A MATCHED PAIR. REFER TO DRAWING NO. 1011797 FOR ROTOR ASSEMBLY.
12. SELECT SPACER BY REFERENCE TO DIMENSION "C" FROM ASSEMBLY 1011889 FOR CORRESPONDING RESOLVER ROTOR DIMENSION "D" TO BE EQUAL TO BE EQUAL TO 0.014 ±.013 + "C". Ⓐ1
13. SCREW TORQUE REQUIREMENTS FOR ITEM 11 TO BE 4.5 IN. LBS ±10%.

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

	ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
Ⓑ1	14	2		1012118	26386900070		GROMMET, HALF			
Ⓐ6	13	6	*	1010490-060	—		INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
	12	AR	*	1011753	60035142001		TAPE, LACING & TYING			
	11	6	NAS	1352C04LL10	74455157016		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
	10	8	NAS	1352C02LL6	74455157007		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
	9	2	NAS	1352C02LL4	74455157006		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
	8	1	*	1011741	68502017001		CONNECTOR, ELECTRICAL (J7)			
	7	1		1011343	56386900230		PLATE, STRAP			
	6	1		1011335	56386900220		PLATE, COVER, LAMP			
	5	1		1011563	85386900320		LAMP & PLATE, ASSY OF			
	4	1		1011327	57386900780		RETAINER, STATOR			
	3	1	*	1000160	—		RESOLVER, 16 SPEED TRANSMITTER (STATOR) (B-3)			
	2	1		1011638-A,R	573869010-AR		SPACER, STATOR			
	1	1		1011325	57386900770		HOUSING, STATOR			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/16; DECIMALS ± —; ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900890
DRAWN J. Schiller DATE 7-3-63
CHECKED Paul Pappashnitz
APPROVAL F. Kirchmann
APPROVAL E. J. Swiaw 9-3-63
NASA APPROVAL K. Wadsch 7-5-63
MIT APPROVAL C. Hagel 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, STATOR & LAMP, ASSEMBLY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011906
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011906 B

C 9061101

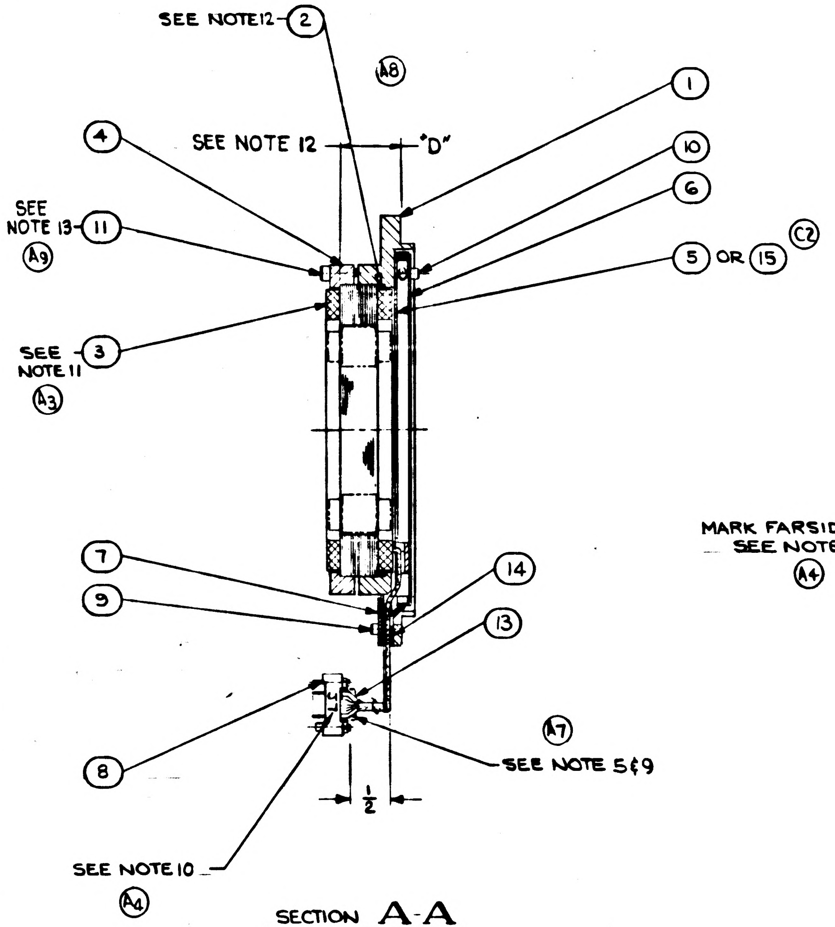
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A9		REVISED PER TDRR NO. 08476	5/14/64	
B2		REVISED PER TDRR NO. 09065	5/27/64	
C2		REVISED PER TDRR NO. 15859	1/27/65	

REVISIONS 02744

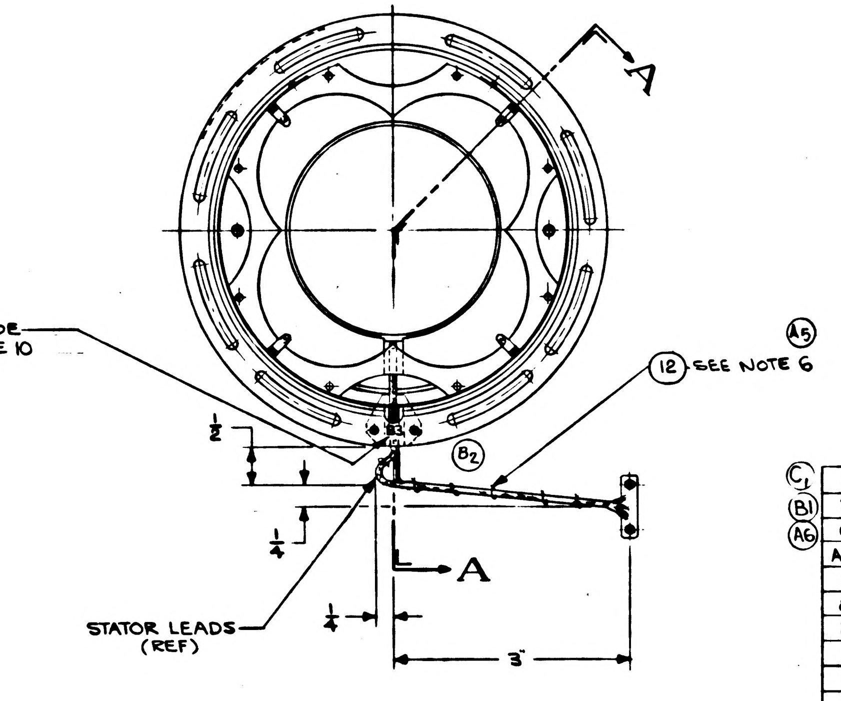
NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING SCHEMATIC NASA DRAWING No. 1015122.
3. TWIST CONDUCTORS IN ACCORDANCE WITH ND-1002032. (A1)
4. APPLY ITEM 13 TO LEADS.
5. SOLDER CONDUCTORS PER WIRING LEGEND, WITH Sn60WRP2, PER QQ-S-571, PER MSFC-PROC-158.
6. LACE CONDUCTORS, USING ITEM 12, IN ACCORDANCE WITH ND1002032.
7. PERFORM CONTINUITY CHECK.
8. PLACE ITEM 13 OVER CONTACTS AND LEADS AND SHRINK.
9. POT IN ACCORDANCE WITH ND1002009, METHOD C.
   A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
   B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.

WIRING LEGEND (A2)

COND. NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 3
C1	BLUE		B3-P4	J7-A	8
C2	YELLOW		B3-P2	J7-B	
C3	RED		B3-P1	J7-C	8
C4	BLACK		B3-P3	J7-D	
C5	GREEN		GREEN	J7-E	8
C6	WHITE		WHITE	J7-F	



SECTION A-A



VIEW WITH LAMP COVER PLATE (ITEM 6) REMOVED

10. MARK REF. DESIGNATIONS 1/8 INCH HIGH IN ACCORDANCE WITH ND-1002019.
11. ITEM NO. 3 (RESOLVER) ROTOR AND STATOR TO BE KEPT AS A MATCHED PAIR. REFER TO DRAWING NO. 1011797 FOR ROTOR ASSEMBLY.
12. SELECT SPACER BY REFERENCE TO DIMENSION "C" FROM ASSEMBLY 1011889 FOR CORRESPONDING RESOLVER ROTOR DIMENSION "D" TO BE EQUAL TO BE EQUAL TO 0.014 ±.013 + "C". (A1)
13. SCREW TORQUE REQUIREMENTS FOR ITEM 11 TO BE 4.5 IN. LBS ±10%.

	QTY REQD 001	QTY REQD 000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
C1	1	0	15			1011563-001			LAMP AND PLATE ASSY OF			
B1	2	2	14			1012118	26386900070		GROMMET, HALF			
A6	6	6	13		*	1010490-060	—		INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
	AR	AR	12		*	1011753	60035142001		TAPE, LACING & TYING			
	6	6	11		NAS	1352C04LL10	74455157016		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
	8	8	10		NAS	1352C02LL6	74455157007		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
	2	2	9		NAS	1352C02LL4	74455157006		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
	1	1	8		*	1011741	68502017001		CONNECTOR, ELECTRICAL (J7)			
	1	1	7			1011343	56386900230		PLATE, STRAP			
	1	1	6			1011335	56386900220		PLATE, COVER, LAMP			
	0	1	5			1011563-000	85386900320		LAMP & PLATE, ASSY OF			
	1	1	4			1011327	57386900780		RETAINER, STATOR			
	1	1	3		*	1000160	—		RESOLVER, 16 SPEED TRANSMITTER (STATOR) (B-3)			
	1	1	2			1011638-A.R.	573869010-AR		SPACER, STATOR			
	1	1	1			1011325	57386900770		HOUSING, STATOR			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
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TOL ON: FRACTIONS ± 1/16; DECIMALS ± —; ANGLES ± —
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MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900890
DRAWN J. Schilling DATE 7-3-63
CHECKED Paul Pappachristo
APPROVAL F. Reichmann
APPROVAL E. J. Swan 9-3-63
NASA APPROVAL 9/5/63
MIT APPROVAL 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, STATOR & LAMP,
ASSEMBLY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011906
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011906

	9061101

REVISIONS 02744

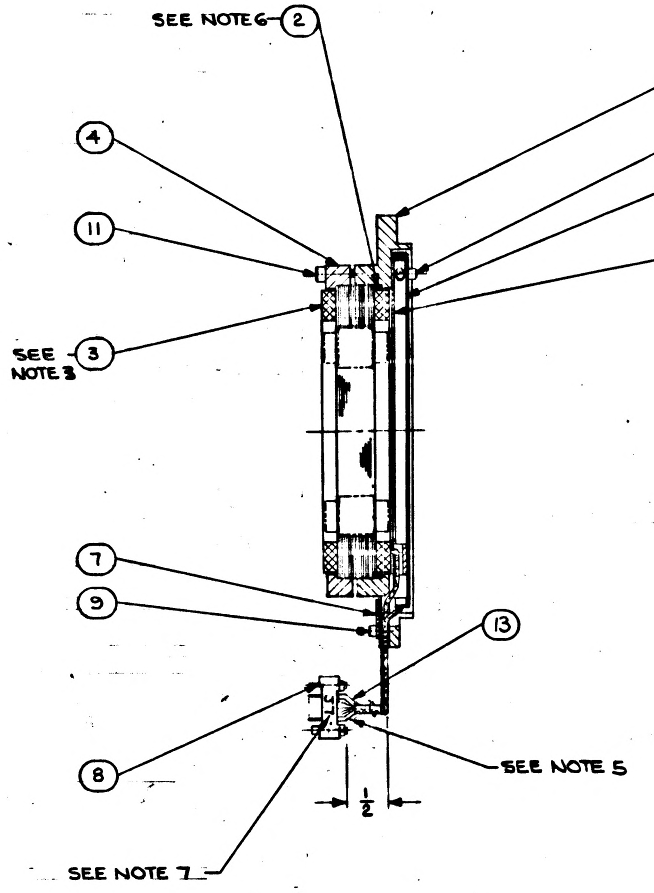
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

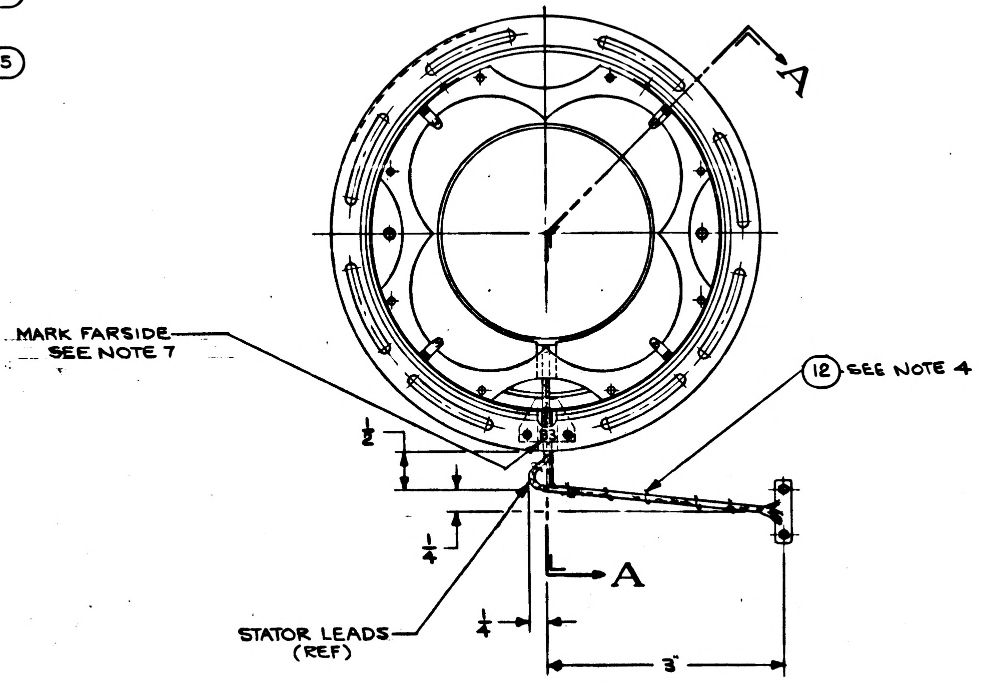
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING SCHEMATIC DWG. 1015122.
3. ITEM NO. 3 (RESOLVER) ROTOR & STATOR TO BE KEPT AS A MATCHED PAIR, REFER TO DWG 1011797 FOR ROTOR ASSY.
4. LACE WIRES IN ACCORDANCE WITH ND1002032 USING 1011753 (ITEM 12)
5. SOLDER WIRES IN ACCORDANCE WITH MSFC-PROC-158, USING TYPE SN60 WAR P2 SOLDER PER QQ-S-571.
6. ASSEMBLE PER ATP 1011906.
7. MARK CHARACTERS 1/8 HIGH PER ND1002019 AT LOCATIONS SHOWN.
8. TWISTED CONDUCTORS TO CONSIST OF FOUR (4) FULL TURNS PER INCH MINIMUM.

WIRING LEGEND

COND. NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 8
C1	BLUE		B3-P4	J7-A	8
C2	YELLOW		B3-P2	J7-B	
C3	RED		B3-P1	J7-C	8
C4	BLACK		B3-P3	J7-D	
C5	GREEN		GREEN	J7-E	8
C6	WHITE		WHITE	J7-F	



SECTION A-A



VIEW WITH LAMP COVER PLATE (ITEM 6) REMOVED

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
13	AR	*	1010490-060	—		INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
12	AR	*	1011753	60035142001		TAPE, LACING & TYING			
11	6	NAS	1352C04LL10	74455157016		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
10	8	NAS	1352C02LL6	74455157007		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
9	2	NAS	1352C02LL4	74455157006		SCREW, CAP, SOCKET HEAD, SELF-LOCKING			
8	1	*	1011741	68502017001		CONNECTOR, ELECTRICAL (J7)			
7	1		1011343	56386900230		PLATE, STRAP			
6	1		1011335	56386900220		PLATE, COVER, LAMP			
5	1		1011563	85386900320		LAMP & PLATE, ASSY OF			
4	1		1011327	57386900780		RETAINER, STATOR			
3	1	*	1000160	—		RESOLVER, 16 SPEED TRANSMITTER (STATOR) (B-3)			
2	1		1011638-A,R	573869010-AR		SPACER, STATOR			
1	1		1011325	57386900770		HOUSING, STATOR			

LIST OF PARTS AND MATERIALS

MASTER

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

NEXT ASSY	USED ON
1011890	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/16; DECIMALS ± —; ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900890
DRAWN J. Schiller DATE 7-3-63
CHECKED Paul Pappashnitz
APPROVAL
APPROVAL 9-3-63
NASA APPROVAL 9/5/63
MIT APPROVAL 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, STATOR & LAMP, ASSEMBLY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011906
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
0 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 02919

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR NO. 05918	21 JAN 64	WK

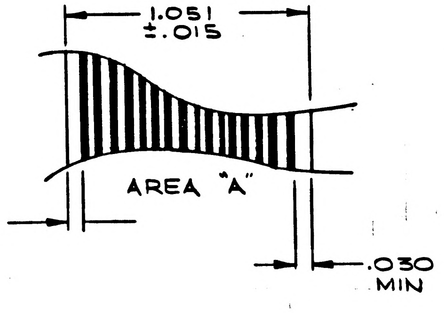
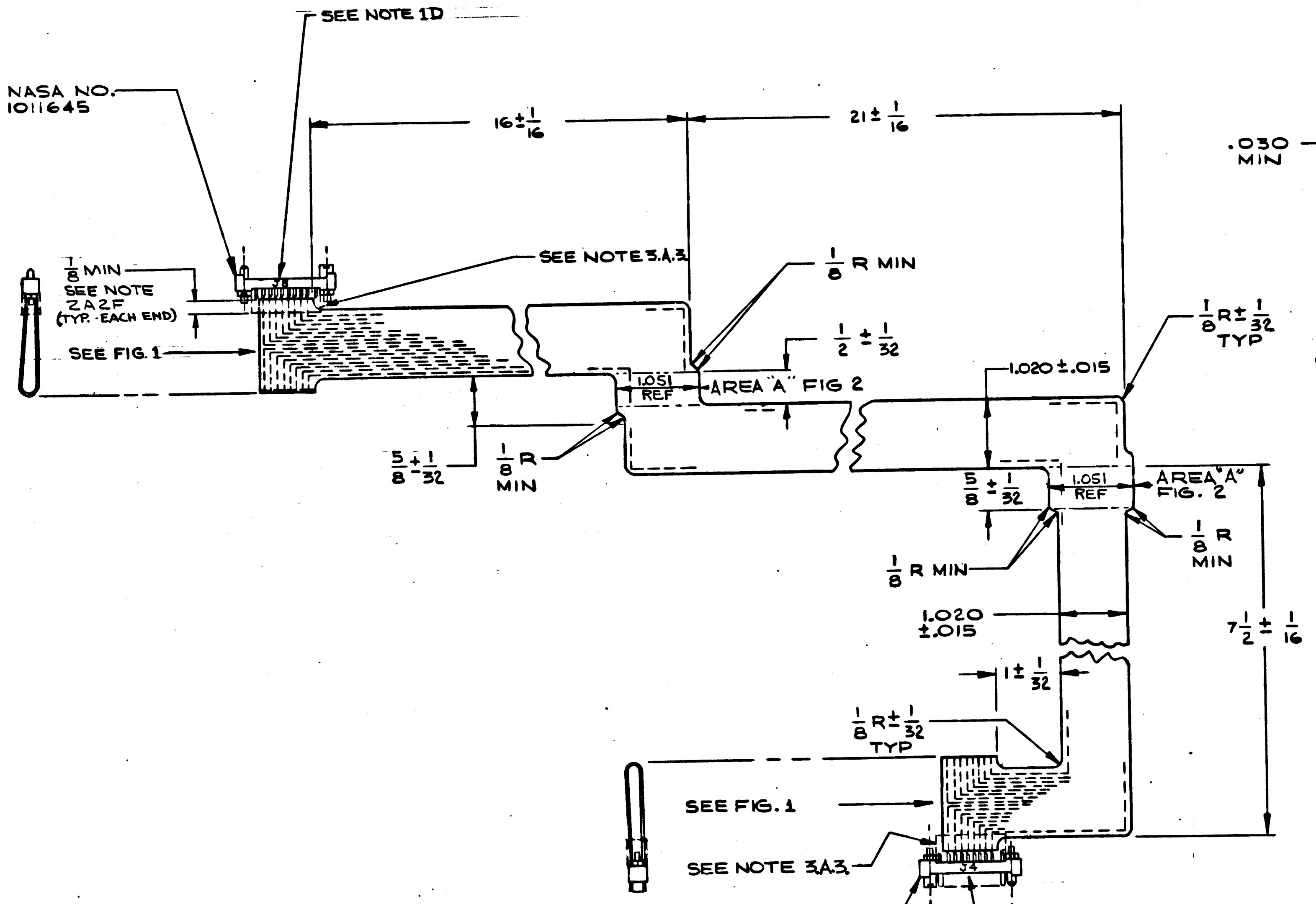

1.051 ±.015
AREA "A"
.030 MIN
.030 MIN

FIG. 2


SEE NOTE 1D
NASA NO. 1011645
16 ± 1/16
21 ± 1/16
SEE NOTE 3.A.3
1/8 MIN
SEE NOTE 2A2F (TYP. EACH END)
SEE FIG. 1
1/8 R MIN
1/2 ± 1/32
1.051 REF
AREA "A" FIG 2
5/8 ± 1/32
1/8 R MIN
1/8 R ± 1/32 TYP
1.020 ±.015
5/8 ± 1/32
1.051 REF
AREA "A" FIG. 2
1/8 R MIN
1/8 R MIN
1.020 ±.015
7 1/2 ± 1/16
1 ± 1/32
1/8 R ± 1/32 TYP
SEE FIG. 1
SEE NOTE 3A3
J4

NASA NO. 1000117

SEE NOTE 1D

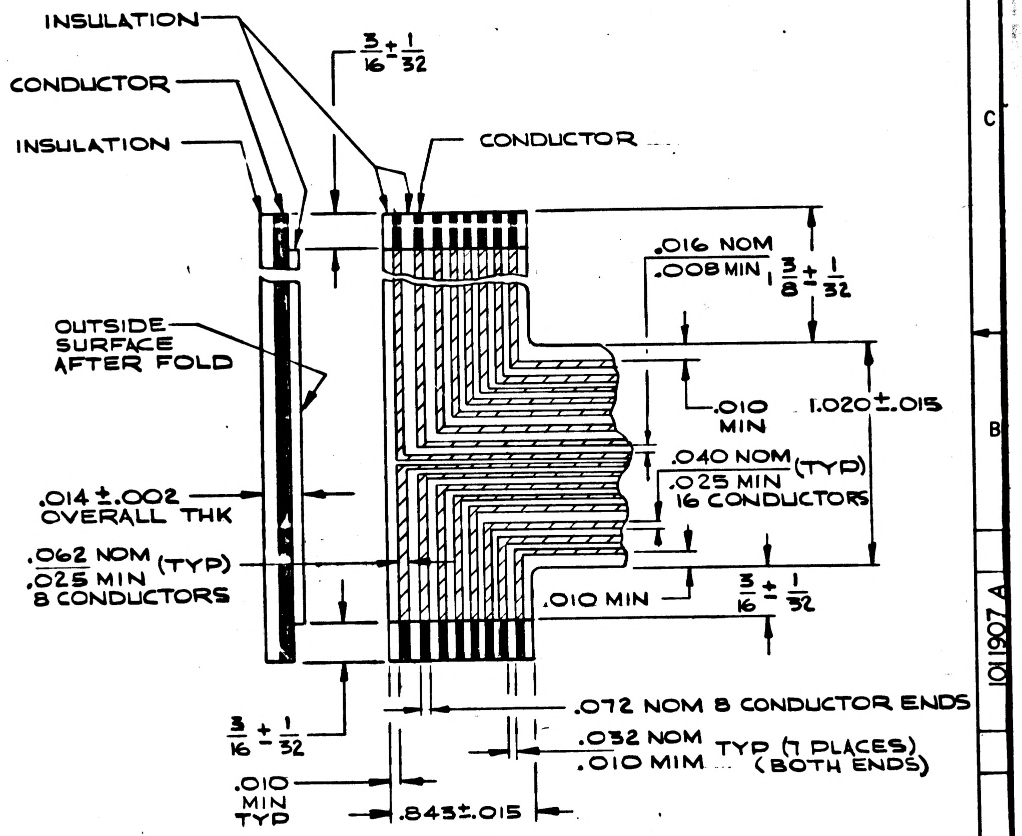
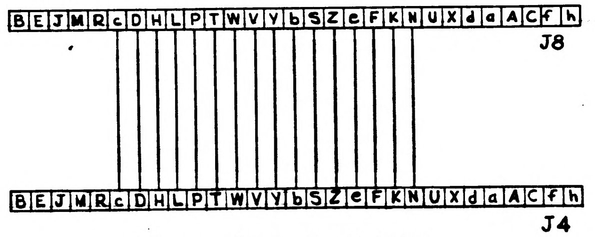

INSULATION
CONDUCTOR
INSULATION
3/16 ± 1/32
CONDUCTOR
.016 NOM
.008 MIN
3/8 ± 1/32
OUTSIDE SURFACE AFTER FOLD
.010 MIN
1.020 ±.015
.040 NOM (TYP)
.025 MIN
16 CONDUCTORS
.014 ±.002 OVERALL THK
.062 NOM (TYP)
.025 MIN
8 CONDUCTORS
.010 MIN
3/16 ± 1/32
3/16 ± 1/32
.072 NOM 8 CONDUCTOR ENDS
.032 NOM
.010 MIM
TYP (7 PLACES) (BOTH ENDS)
.010 MIN TYP
.843±.015

FIG. 1


B E J M R c D H L P T W V Y b S Z e F K N U X d a A C f h
J8
B E J M R c D H L P T W V Y b S Z e F K N U X d a A C f h
J4

WIRING SCHEMATIC

Ⓐ1

A	A
SHEET 1	SHEET 2

REVISION STATUS OF SHEETS

Ⓐ2

MASTER

KIC
P N 85386900900

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/32 DECIMALS ±.005 ANGLES ± ~
DO NOT SCALE THIS DRAWING

MATERIAL

HEAT TREATMENT

FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT

DRAWN E. Pizzo DATE 7-19-63
CHECKED
APPROVAL J. E. Costey 8/23/63
APPROVAL E. Thorup 8/26/63
NASA APPROVAL
MIT APPROVAL 9/5/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FLEXPRINT & CONNECTOR
ASSEMBLY OF (SXT)
SOURCE CONTROL DRAWING

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1011907
SCALE ~
WT
SHEET 1 OF 2

1011907 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1011907 A

REVISIONS 02919			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR NO. 05918	21 JAN 64	Wk

REQUIREMENTS:

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III
   - D. CHARACTERS TO BE $\frac{1}{8}$ HIGH IN ACCORDANCE WITH ND 1002019.
2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS
     - 1. EXTERNAL DIMENSIONS AS SHOWN.
     - 2. INTERNAL DIMENSIONS AS FOLLOWS:
       - a. IN ALL SECTIONS OF THE FLEXPRINT THE DISTANCE FROM THE EDGE OF THE END CONDUCTORS AND THE CLOSEST EDGE OF THE FLEXPRINT SHALL BE GREATER THAN .010 IN. AS SHOWN IN FIGURE 1.
       - b. IN THE 2 FLEXPRINT AREAS MARKED "A", THE CLOSEST APPROACH OF A CONDUCTOR TO THE CLOSEST FLEXPRINT EDGE IS TO BE A MINIMUM OF .030 IN. AS SHOWN IN FIGURE 2.
       - c. THE MIDDLE ROW OF PINS ON 3 ROW CONNECTORS SHALL NOT BE CONNECTED TO THE FLEXPRINT AND SHALL REMAIN UNUSED.
       - d. CONDUCTORS ARE SOLDERED TO CONNECTOR PINS PER MSFC-PROC-158.
       - e. THE POTTING OF THE FLEXPRINT-CONNECTOR AREAS SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
       - f. THE POTTING SHALL COVER THE OUTSIDE SURFACES OF BOTH THE CONNECTOR BASE AND FLEXPRINT INSULATION COATS. THE POTTING SHALL COVER THE FLEXPRINT INSULATION COATS FOR A MINIMUM DISTANCE OF 1/8 INCH
   - B. ELECTRICAL REQUIREMENTS
     - 1. DIELECTRIC WITHSTANDING VOLTAGE: THE CIRCUIT SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-202, METHOD 301 WITH 500 VOLTS DC APPLIED TO (1) ADJACENT CONDUCTORS AT THEIR ENDS, AND (2) BETWEEN EACH CONDUCTOR AND THE OUTER SURFACE OF THE INSULATION CLOSEST TO THE CONNECTED CONDUCTOR.
     - 2. INSULATION RESISTANCE: THE CIRCUIT SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-202, METHOD 302, CONDITION B AT POINTS IDENTICAL TO THOSE STATED IN SECTION 2.B.1 ABOVE.
3. DESIGN REQUIREMENTS
   - A. MATERIAL
     - 1. CONDUCTOR: COPPER STRIP CONFORMING TO FEDERAL SPECIFICATION QQ-C-576. HALF HARD
       - a. THICKNESS .0040±.0004 IN.
       - b. WIDTH: AS SHOWN IN FIGURE 1.
     - 2. INSULATION: E. I. DUPONT TEFLON FEP TYPE "A" OR EQUIVALENT IN CONFORMITY WITH ASTM SPECIFICATION D2116-62T
       - a. THICKNESS: .0050±.0005
       - b. PEEL STRENGTH: 5 POUND/INCH WIDTH OF CABLE, MIN.
     - 3. POT USING GENERAL ELECTRIC RTV-11 SILICONE RUBBER, OR EQUIVALENT.
   - B. ENVIRONMENTAL REQUIREMENTS
     - 1. FLEXIBILITY: THE CIRCUIT SHALL BE CAPABLE OF BEING BENT 180° AROUND A 3/8 INCH MANDREL BOTH BEFORE AND AFTER ALL TESTS SPECIFIED ON THIS DRAWING WITHOUT TAKING A PERMANENT SET
     - 2. HUMIDITY: THE CIRCUIT SHALL BE TESTED FOR HUMIDITY RESISTANCE IN ACCORDANCE WITH MIL-STD-810, METHOD 507 AND FOUND CAPABLE OF MEETING THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     - 3. HIGH TEMPERATURE RESISTANCE: THE CIRCUIT SHALL BE TESTED FOR HIGH TEMPERATURE RESISTANCE WITH HIGHEST OPERATING TEMPERATURE OF 180°F IN ACCORDANCE WITH MIL-STD-810, METHOD 501, AND FOUND TO MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     - 4. LOW TEMPERATURE RESISTANCE: THE CIRCUIT SHALL BE TESTED FOR LOW TEMPERATURE RESISTANCE WITH A LOWEST OPERATING TEMPERATURE OF -65°F IN ACCORDANCE WITH MIL-STD-810 (USAF) METHOD 502 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     - 5. TEMPERATURE SHOCK: THE CIRCUIT SHALL BE TESTED FOR TEMPERATURE SHOCK IN ACCORDANCE WITH MIL-STD-810 (USAF), METHOD 503 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     - 6. TEMPERATURE - ALTITUDE: THE CIRCUIT SHALL BE TESTED FOR TEMPERATURE-ALTITUDE RESISTANCE (CYCLING) IN ACCORDANCE WITH MIL-STD-810 (USAF), METHOD 504 FOR EQUIPMENT CLASS 2 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     - 7. LOW PRESSURE: THE CIRCUIT SHALL BE TESTED FOR LOW PRESSURE RESISTANCE IN ACCORDANCE WITH MIL-STD-810 (USAF), METHOD 500 WITH A LOW PRESSURE OF 10^{9} MM Hg AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     - 8. SUNSHINE RESISTANCE: THE CIRCUIT SHALL BE TESTED FOR SUNSHINE RESISTANCE IN ACCORDANCE WITH MIL-STD-810 (USAF), METHOD 505 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     - 9. LOW PRESSURE - SOLAR ENERGY RESISTANCE: THE CIRCUIT SHALL BE TESTED FOR LOW PRESSURE AND SOLAR ENERGY RESISTANCE IN ACCORDANCE WITH MIL-STD-810, METHOD 517 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.

(A3)

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

KIC PN 85386900900

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ±1/32 DECIMALS ±.005 ANGLES ±~
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 3A
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN F Pizzo DATE 7-22-63
CHECKED
APPROVAL 8/23/63
APPROVAL 8/28/63
NASA APPROVAL
MIT APPROVAL 9/5/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FLEXPRINT & CONNECTOR ASSEMBLY OF (SXT)
SOURCE CONTROL DRAWING

CODE IDENT NO. SIZE D NASA DRAWING NO. 1011907
SCALE ~ WT SHEET 2 OF 2

1011907 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1011907

SYM	DESCRIPTION	DATE	APPROVAL

REVISIONS 02917

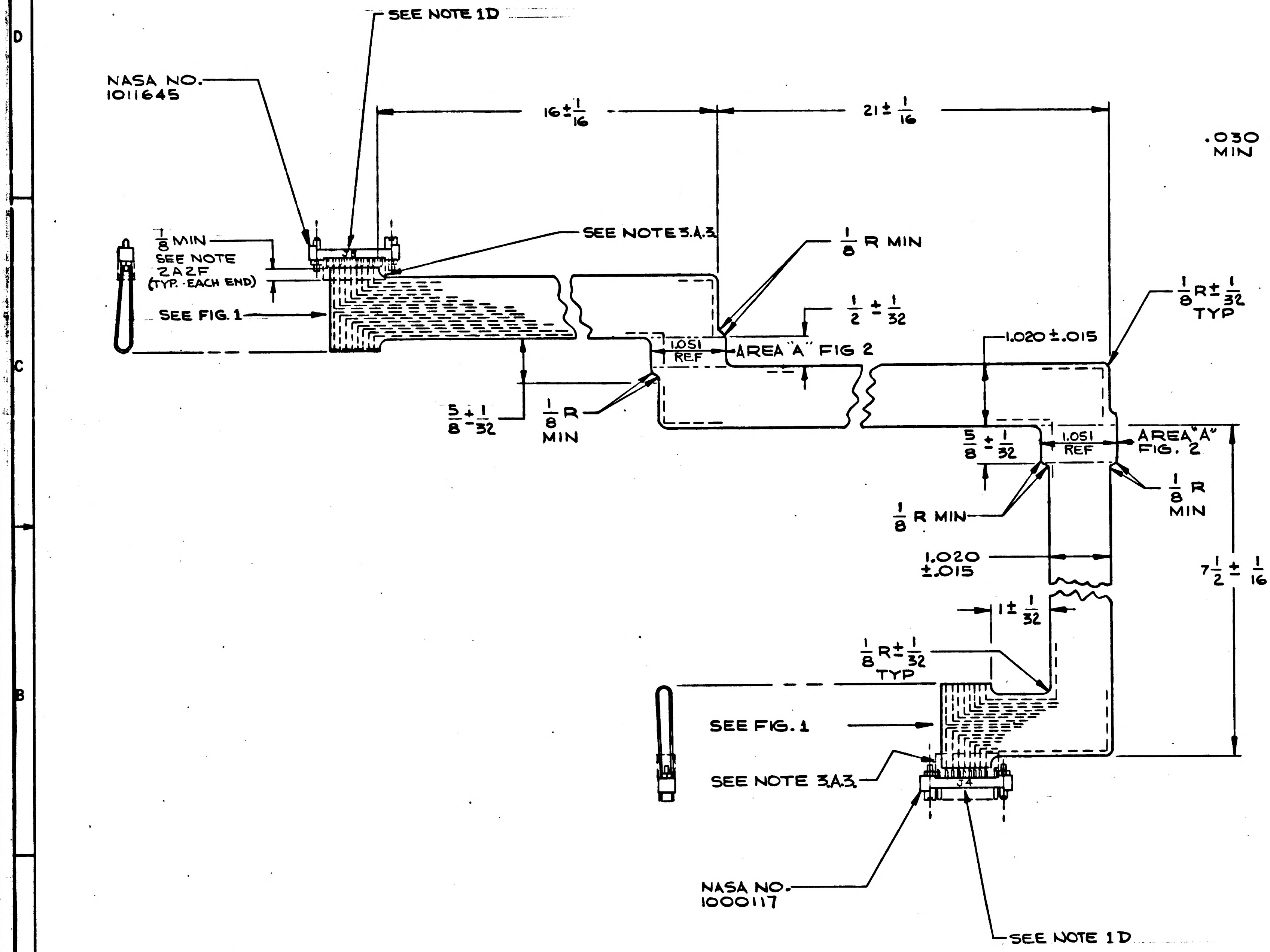
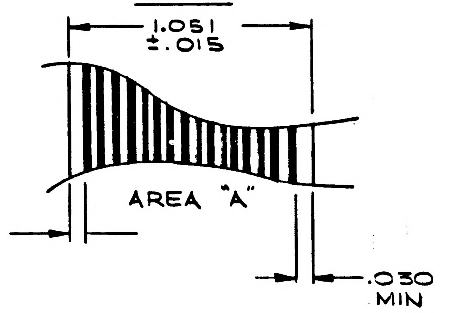

SEE NOTE 1D
NASA NO. 1011645
16 ± 1/16
21 ± 1/16
1/8 MIN
SEE NOTE 2A2F (TYP. EACH END)
SEE NOTE 3.A.3
1/8 R MIN
SEE FIG. 1
1/2 ± 1/32
1.051 REF
AREA "A" FIG 2
1/8 R ± 1/32 TYP
1.020 ± .015
5/8 ± 1/32
1/8 R MIN
5/8 ± 1/32
1.051 REF
AREA "A" FIG. 2
1/8 R MIN
1/8 R MIN
1.020 ±.015
7 1/2 ± 1/16
1 ± 1/32
1/8 R ± 1/32 TYP
SEE FIG. 1
SEE NOTE 3A3
NASA NO. 1000117
SEE NOTE 1D

FIG. 2


1.051 ±.015
AREA "A"
.030 MIN
.030 MIN

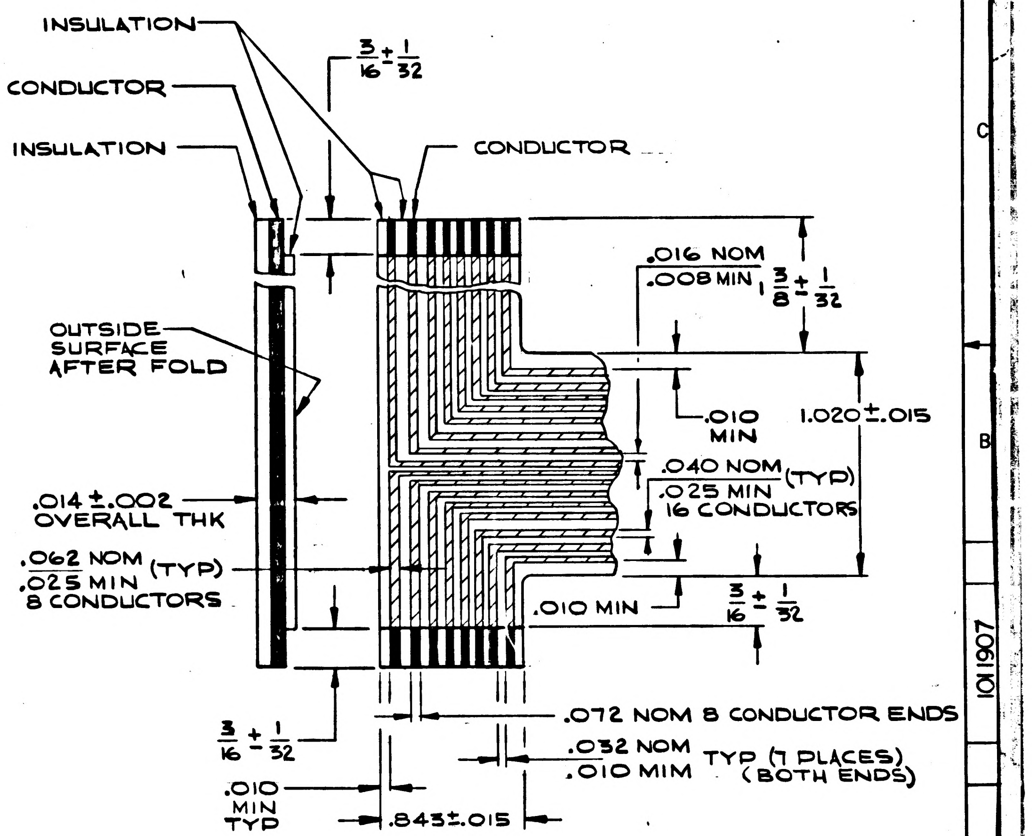

INSULATION
CONDUCTOR
INSULATION
3/16 ± 1/32
CONDUCTOR
OUTSIDE SURFACE AFTER FOLD
.016 NOM
.008 MIN
3/8 ± 1/32
.010 MIN
1.020 ±.015
.040 NOM (TYP)
.025 MIN
16 CONDUCTORS
.014 ±.002 OVERALL THK
.062 NOM (TYP)
.025 MIN
8 CONDUCTORS
.010 MIN
3/16 ± 1/32
3/16 ± 1/32
.072 NOM 8 CONDUCTOR ENDS
.032 NOM
.010 MIM
TYP (7 PLACES) (BOTH ENDS)
.010 MIN TYP
.843 ±.015

FIG. 1

KIC
P N 85386900900

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/32 DECIMALS ±.005 ANGLES ± ~
DO NOT SCALE THIS DRAWING

MATERIAL

HEAT TREATMENT

FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN E. Pizzo DATE 7/9/63
CHECKED
APPROVAL J. E. Costey 8/23/63
APPROVAL

NASA APPROVAL

MIT APPROVAL 9/5/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FLEXPRINT & CONNECTOR
ASSEMBLY OF (SXT)
SOURCE CONTROL DRAWING

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1011907
SCALE ~
WT
SHEET 1 OF 2

1011907

MASTER

INCHES
0 1 2
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1011907

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

REQUIREMENTS:

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III
   - D. CHARACTERS TO BE $\frac{1}{8}$ HIGH IN ACCORDANCE WITH ND 1002019.
2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS
     1. EXTERNAL DIMENSIONS AS SHOWN.
     2. INTERNAL DIMENSIONS AS FOLLOWS:
        - a. IN ALL SECTIONS OF THE FLEXPRINT THE DISTANCE FROM THE EDGE OF THE END CONDUCTORS AND THE CLOSEST EDGE OF THE FLEXPRINT SHALL BE GREATER THAN .010 IN. AS SHOWN IN FIGURE 1.
        - b. IN THE 2 FLEXPRINT AREAS MARKED "A", THE CLOSEST APPROACH OF A CONDUCTOR TO THE CLOSEST FLEXPRINT EDGE IS TO BE A MINIMUM OF .030 IN. AS SHOWN IN FIGURE 2.
        - c. THE MIDDLE ROW OF PINS ON 3 ROW CONNECTORS SHALL NOT BE CONNECTED TO THE FLEXPRINT AND SHALL REMAIN UNUSED.
        - d. CONDUCTORS ARE SOLDERED TO CONNECTOR PINS PER MSFC-PROC-158.
        - e. THE POTTING OF THE FLEXPRINT-CONNECTOR AREAS SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
        - f. THE POTTING SHALL COVER THE OUTSIDE SURFACES OF BOTH THE CONNECTOR BASE AND FLEXPRINT INSULATION COATS. THE POTTING SHALL COVER THE FLEXPRINT INSULATION COATS FOR A MINIMUM DISTANCE OF 1/8 INCH
   - B. ELECTRICAL REQUIREMENTS
     1. DIELECTRIC WITHSTANDING VOLTAGE: THE CIRCUIT SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-202, METHOD 301 WITH 500 VOLTS DC APPLIED TO (1) ADJACENT CONDUCTORS AT THEIR ENDS, AND (2) BETWEEN EACH CONDUCTOR AND THE OUTER SURFACE OF THE INSULATION CLOSEST TO THE CONNECTED CONDUCTOR.
     2. INSULATION RESISTANCE: THE CIRCUIT SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-202, METHOD 302, CONDITION B AT POINTS IDENTICAL TO THOSE STATED IN SECTION 2.B.1 ABOVE.
3. DESIGN REQUIREMENTS
   - A. MATERIAL
     1. CONDUCTOR: COPPER STRIP CONFORMING TO FEDERAL SPECIFICATION QQ-C-576. HALF HARD
        - a. THICKNESS .0040±.0004 IN.
        - b. WIDTH: AS SHOWN IN FIGURE 1.
     2. INSULATION: E. I. DUPONT TEFLON FEP TYPE "A" OR EQUIVALENT IN CONFORMITY WITH ASTM SPECIFICATION D2116-62T
        - a. THICKNESS: .0050±.0005
        - b. PEEL STRENGTH: 5 POUND/INCH WIDTH OF CABLE, MIN.
     3. POT USING GENERAL ELECTRIC RTV-11 SILICONE RUBBER, OR EQUIVALENT.
   - B. ENVIRONMENTAL REQUIREMENTS
     1. FLEXIBILITY: THE CIRCUIT SHALL BE CAPABLE OF BEING BENT 180° AROUND A 3/8 INCH MANDREL BOTH BEFORE AND AFTER ALL TESTS SPECIFIED ON THIS DRAWING WITHOUT TAKING A PERMANENT SET
     2. HUMIDITY: THE CIRCUIT SHALL BE TESTED FOR HUMIDITY RESISTANCE IN ACCORDANCE WITH MIL-STD-810, METHOD 507 AND FOUND CAPABLE OF MEETING THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     3. HIGH TEMPERATURE RESISTANCE: THE CIRCUIT SHALL BE TESTED FOR HIGH TEMPERATURE RESISTANCE WITH HIGHEST OPERATING TEMPERATURE OF 180°F IN ACCORDANCE WITH MIL-STD-810, METHOD 501, AND FOUND TO MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     4. LOW TEMPERATURE RESISTANCE: THE CIRCUIT SHALL BE TESTED FOR LOW TEMPERATURE RESISTANCE WITH A LOWEST OPERATING TEMPERATURE OF -65°F IN ACCORDANCE WITH MIL-STD-810 (USAF) METHOD 502 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     5. TEMPERATURE SHOCK: THE CIRCUIT SHALL BE TESTED FOR TEMPERATURE SHOCK IN ACCORDANCE WITH MIL-STD-810 (USAF), METHOD 503 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     6. TEMPERATURE - ALTITUDE: THE CIRCUIT SHALL BE TESTED FOR TEMPERATURE-ALTITUDE RESISTANCE (CYCLING) IN ACCORDANCE WITH MIL-STD-810 (USAF), METHOD 504 FOR EQUIPMENT CLASS 2 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     7. LOW PRESSURE: THE CIRCUIT SHALL BE TESTED FOR LOW PRESSURE RESISTANCE IN ACCORDANCE WITH MIL-STD-810 (USAF), METHOD 500 WITH A LOW PRESSURE OF 10^{-9} MM Hg AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     8. SUNSHINE RESISTANCE: THE CIRCUIT SHALL BE TESTED FOR SUNSHINE RESISTANCE IN ACCORDANCE WITH MIL-STD-810 (USAF), METHOD 505 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     9. LOW PRESSURE - SOLAR ENERGY RESISTANCE: THE CIRCUIT SHALL BE TESTED FOR LOW PRESSURE AND SOLAR ENERGY RESISTANCE IN ACCORDANCE WITH MIL-STD-810, METHOD 517 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

SHEET 1	SHEET 2
REVISION STATUS OF SHEETS	

MASTER

KIC PN 85386900900

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/32 DECIMALS ±.005 ANGLES ± ~
DO NOT SCALE THIS DRAWING

MATERIAL: SEE NOTE 3A
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN F Pizzo DATE 7-22-63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL 9/5/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FLEXPRINT & CONNECTOR ASSEMBLY OF (SXT)
SOURCE CONTROL DRAWING

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1011907
SCALE ~
WT
SHEET 2 OF 2

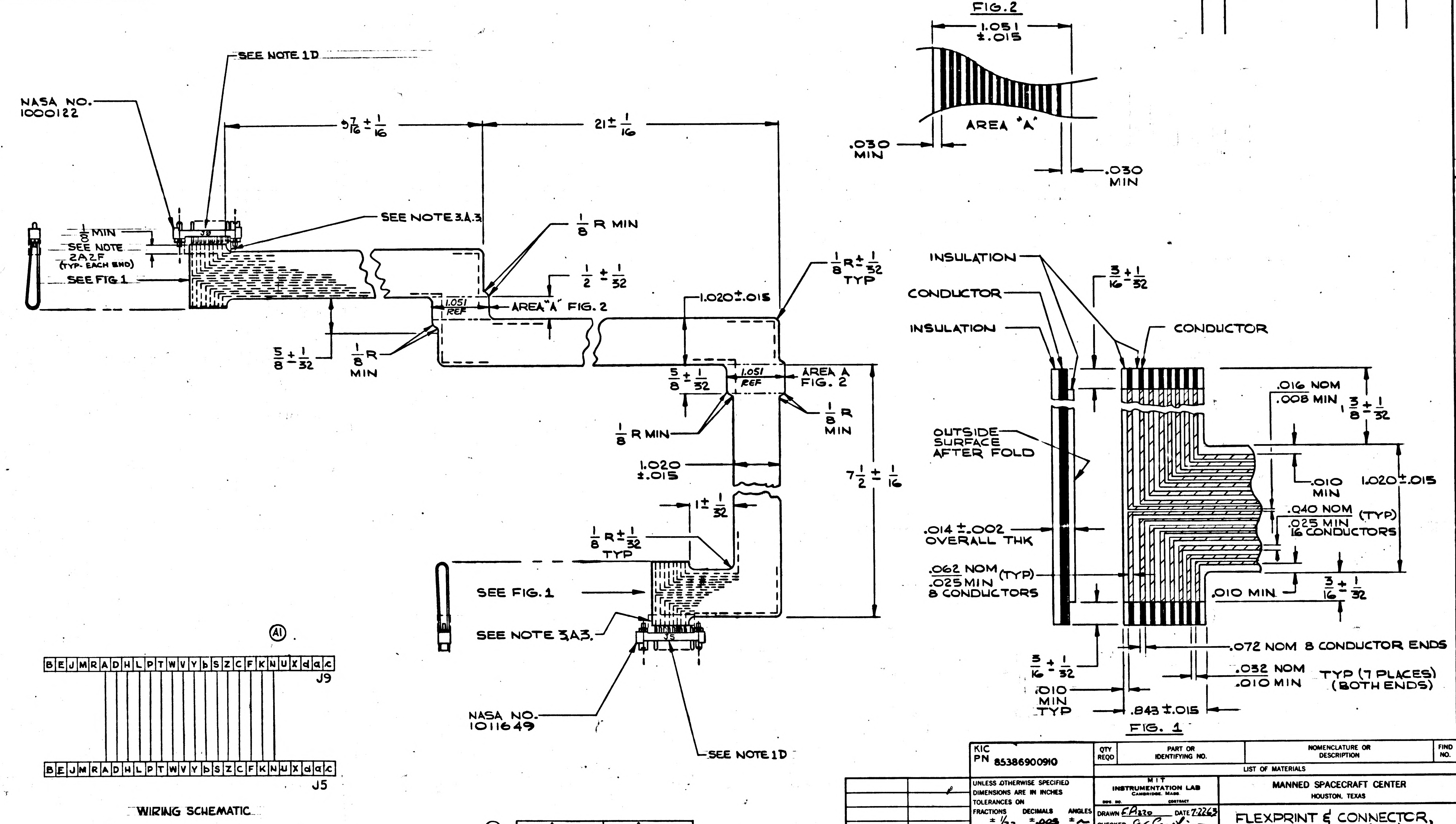
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

A 8061101

REVISIONS 02919

SYM	DESCRIPTION	DATE	APPROVAL
A_3	REVISED PER TDRR NO. 05992	1/25/64	WK


SEE NOTE 1D
NASA NO. 1000122
$5\frac{7}{16} \pm \frac{1}{16}$
$21 \pm \frac{1}{16}$
SEE NOTE 3.A.3
$\frac{1}{8}$ R MIN
$\frac{1}{8}$ MIN
SEE NOTE 2A2F (TYP- EACH END)
SEE FIG 1
J9
$\frac{1}{2} \pm \frac{1}{32}$
1.051 REF
AREA "A" FIG. 2
$\frac{5}{8} \pm \frac{1}{32}$
$\frac{1}{8}$ R MIN
1.020 ± .015
$\frac{1}{8} R \pm \frac{1}{32}$ TYP
$\frac{5}{8} \pm \frac{1}{32}$
1.051 REF
AREA A FIG. 2
$\frac{1}{8}$ R MIN
$\frac{1}{8}$ R MIN
1.020 ±.015
$7\frac{1}{2} \pm \frac{1}{16}$
$1 \pm \frac{1}{32}$
$\frac{1}{8} R \pm \frac{1}{32}$ TYP
SEE FIG. 1
SEE NOTE 3A3.
J5
NASA NO. 1011649
SEE NOTE 1D
FIG. 2
1.051 ±.015
AREA "A"
.030 MIN
.030 MIN
INSULATION
CONDUCTOR
INSULATION
$\frac{3}{16} \pm \frac{1}{32}$
CONDUCTOR
.016 NOM
.008 MIN
$\frac{3}{8} \pm \frac{1}{32}$
OUTSIDE SURFACE AFTER FOLD
.010 MIN
1.020 ±.015
.040 NOM (TYP)
.025 MIN
16 CONDUCTORS
.014 ±.002 OVERALL THK
.062 NOM (TYP)
.025 MIN
8 CONDUCTORS
.010 MIN
$\frac{3}{16} \pm \frac{1}{32}$
.072 NOM 8 CONDUCTOR ENDS
$\frac{3}{16} \pm \frac{1}{32}$
.032 NOM
.010 MIN
TYP (7 PLACES) (BOTH ENDS)
.010 MIN TYP
.843 ±.015
FIG. 1
A1
B E J M R A D H L P T W V Y b S Z C F K N U X d a c
J9
B E J M R A D H L P T W V Y b S Z C F K N U X d a c
J5
WIRING SCHEMATIC

A2

A	A
SHEET 1	SHEET 2
REVISION STATUS OF SHEETS	

MASTER

KIC PN 85386900910

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/32 DECIMALS ±.005 ANGLES ± ~
DO NOT SCALE THIS DRAWING

MATERIAL

HEAT TREATMENT

FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN E. Pizzo DATE 7-22-63
CHECKED
APPROVAL C. F. Coslar 8/23/63
APPROVAL

NASA APPROVAL

MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FLEXPRINT & CONNECTOR, ASSEMBLY OF (SXT)

SOURCE CONTROL DRAWING

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1011908
SCALE ~
WT
SHEET 1 OF 2

1011908

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A 8061101

SYM	DESCRIPTION	DATE	APPROVAL
REVISIONS 02919			
A3	REVISED PER TDRR NO 05952	28 JAN 64	WK.

REQUIREMENTS:

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III.
   - D. CHARACTERS TO BE 1/8 HIGH IN ACCORDANCE WITH ND 1002019
2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS
     - 1. EXTERNAL DIMENSIONS AS SHOWN.
     - 2. INTERNAL DIMENSIONS AS FOLLOWS:
       - a. IN ALL SECTIONS OF THE FLEXPRINT THE DISTANCE FROM THE EDGE OF THE END CONDUCTORS AND THE CLOSEST EDGE OF THE FLEXPRINT SHALL BE GREATER THAN .010 IN. AS SHOWN IN FIGURE 1.
       - b. IN THE 2 FLEXPRINT AREAS MARKED "A", THE CLOSEST APPROACH OF A CONDUCTOR TO THE CLOSEST FLEXPRINT EDGE IS TO BE A MINIMUM OF .030 IN. AS SHOWN IN FIGURE 2.
       - c. THE MIDDLE ROW OF PINS ON 3 ROW CONNECTORS SHALL NOT BE CONNECTED TO THE FLEXPRINT AND SHALL REMAIN UNUSED.
       - d. CONDUCTORS ARE SOLDERED TO CONNECTOR PINS PER MSFC-PROC-158.
       - e. THE POTTING OF THE FLEXPRINT-CONNECTOR AREAS SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
       - f. THE POTTING SHALL COVER THE OUTSIDE SURFACES OF BOTH THE CONNECTOR BASE AND FLEXPRINT INSULATION COATS. THE POTTING SHALL COVER THE FLEXPRINT INSULATION COATS FOR A MINIMUM DISTANCE OF 1/8 INCH
   - B. ELECTRICAL REQUIREMENTS
     - 1. DIELECTRIC WITHSTANDING VOLTAGE: THE CIRCUIT SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-202, METHOD 301 WITH 500 VOLTS DC APPLIED TO (1) ADJACENT CONDUCTORS AT THEIR ENDS, AND (2) BETWEEN EACH CONDUCTOR AND THE OUTER SURFACE OF THE INSULATION CLOSEST TO THE CONNECTED CONDUCTOR.
     - 2. INSULATION RESISTANCE: THE CIRCUIT SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-202, METHOD 302, CONDITION B AT POINTS IDENTICAL TO THOSE STATED IN SECTION 2.B.1 ABOVE.
3. DESIGN REQUIREMENTS
   - A. MATERIAL
     - 1. CONDUCTOR: COPPER STRIP CONFORMING TO FEDERAL SPECIFICATION QQ-C-576, HALF HARD.
       - a. THICKNESS .0040±.0004 IN.
       - b. WIDTH: AS SHOWN IN FIGURE 1.
     - 2. INSULATION: E. I. DUPONT TEFLON FEP TYPE "A" OR EQUIVALENT IN CONFORMITY WITH ASTM SPECIFICATION D2116-62T
       - a. THICKNESS: .0050±.0005
       - b. PEEL STRENGTH: 5 POUND/INCH WIDTH OF CABLE, MIN.
     - 3. POT USING GENERAL ELECTRIC RTV-11 SILICONE RUBBER, OR EQUIVALENT.
   - B. ENVIRONMENTAL REQUIREMENTS
     - 1. FLEXIBILITY: THE CIRCUIT SHALL BE CAPABLE OF BEING BENT 180° AROUND A 3/8 INCH MANDREL BOTH BEFORE AND AFTER ALL TESTS SPECIFIED ON THIS DRAWING. WITHOUT TAKING A PERMANENT SET
     - 2. HUMIDITY: THE CIRCUIT SHALL BE TESTED FOR HUMIDITY RESISTANCE IN ACCORDANCE WITH MIL-STD-810, METHOD 507 AND FOUND CAPABLE OF MEETING THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     - 3. HIGH TEMPERATURE RESISTANCE: THE CIRCUIT SHALL BE TESTED FOR HIGH TEMPERATURE RESISTANCE WITH HIGHEST OPERATING TEMPERATURE OF 180°F IN ACCORDANCE WITH MIL-STD-810, METHOD 501, AND FOUND TO MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     - 4. LOW TEMPERATURE RESISTANCE: THE CIRCUIT SHALL BE TESTED FOR LOW TEMPERATURE RESISTANCE WITH A LOWEST OPERATING TEMPERATURE OF -65°F IN ACCORDANCE WITH MIL-STD-810 (USAF) METHOD 502 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     - 5. TEMPERATURE SHOCK: THE CIRCUIT SHALL BE TESTED FOR TEMPERATURE SHOCK IN ACCORDANCE WITH MIL-STD-810 (USAF), METHOD 503 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     - 6. TEMPERATURE - ALTITUDE: THE CIRCUIT SHALL BE TESTED FOR TEMPERATURE-ALTITUDE RESISTANCE (CYCLING) IN ACCORDANCE WITH MIL-STD-810 (USAF), METHOD 504 FOR EQUIPMENT CLASS 2 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     - 7. LOW PRESSURE: THE CIRCUIT SHALL BE TESTED FOR LOW PRESSURE RESISTANCE IN ACCORDANCE WITH MIL-STD-810 (USAF), METHOD 500 WITH A LOW PRESSURE OF 10^{-9} MM Hg AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     - 8. SUNSHINE RESISTANCE: THE CIRCUIT SHALL BE TESTED FOR SUNSHINE RESISTANCE IN ACCORDANCE WITH MIL-STD-810 (USAF), METHOD 505 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     - 9. LOW PRESSURE - SOLAR ENERGY RESISTANCE: THE CIRCUIT SHALL BE TESTED FOR LOW PRESSURE AND SOLAR ENERGY RESISTANCE IN ACCORDANCE WITH MIL-STD-810, METHOD 517 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.

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MASTER

KIC. PN 85386900910

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/32 DECIMALS ±.005 ANGLES ± ½
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 3A
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN F. Pizzo DATE 7-22-63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL 9/5/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FLEXPRINT & CONNECTOR ASSEMBLY OF (SXT)
SOURCE CONTROL DRAWING

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1011908
SCALE ½
WT
SHEET 2 OF 2

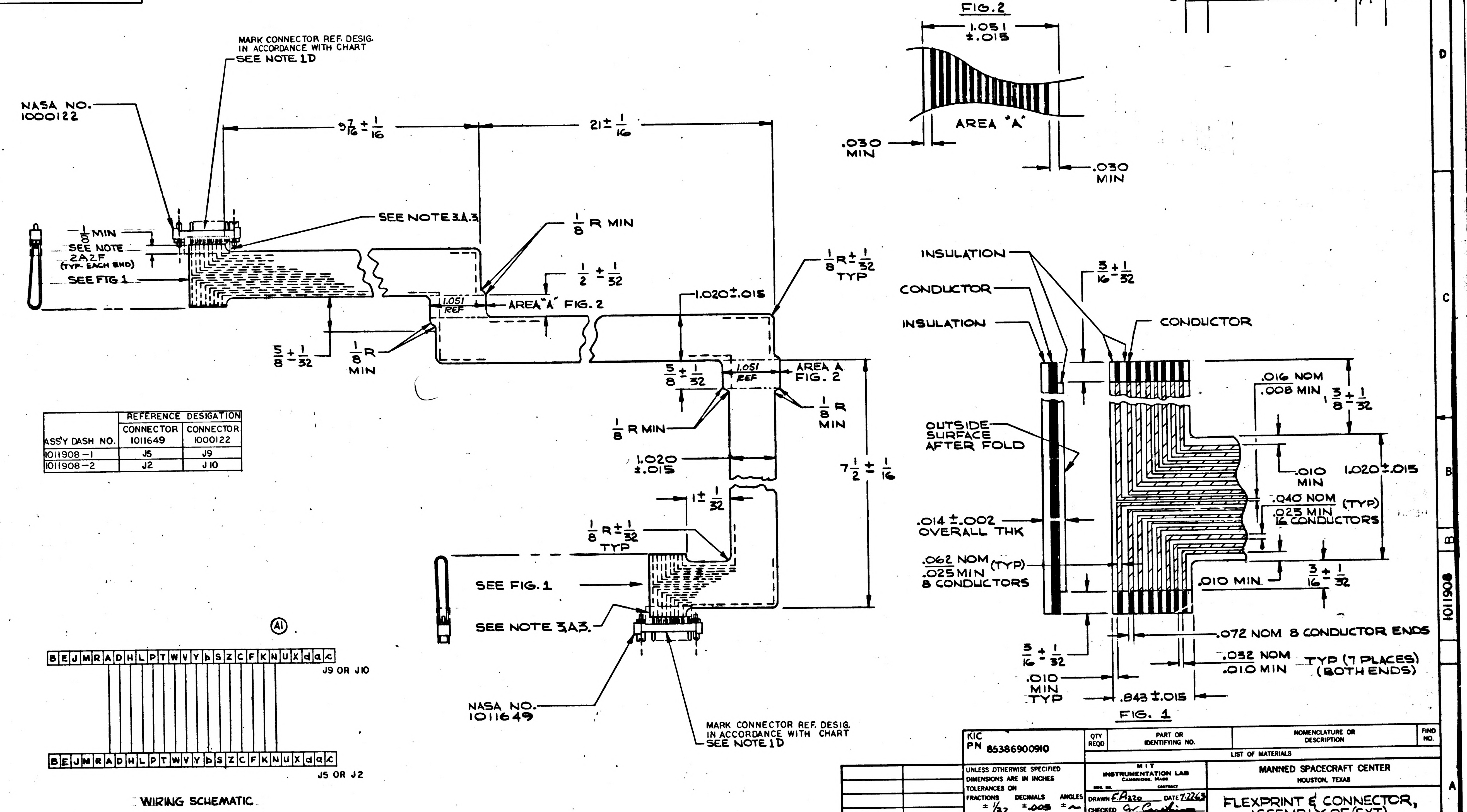
A 1011908

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

B	8061101

REVISIONS 02919

SYM	DESCRIPTION	DATE	APPROVAL
A3	REVISED PER TDRR NO. 05992	1/28/64	
B	REVISED PER TDRR 10484	4/23/64	


MARK CONNECTOR REF. DESIG. IN ACCORDANCE WITH CHART SEE NOTE 1D
NASA NO. 1000122
9 7/16 ± 1/16
21 ± 1/16
1/8 MIN
SEE NOTE 2A2F (TYP. EACH END)
SEE FIG 1
SEE NOTE 3A.3
1/8 R MIN
1/2 ± 1/32
1.051 REF
AREA "A" FIG. 2
5/8 ± 1/32
1/8 R MIN
1/8 R ± 1/32 TYP
1.020 ± .015
5/8 ± 1/32
1.051 REF
AREA A FIG. 2
1/8 R MIN
1/8 R MIN
1.020 ±.015
7 1/2 ± 1/16
1 ± 1/32
1/8 R ± 1/32 TYP
SEE FIG. 1
SEE NOTE 3A3.
NASA NO. 1011649
MARK CONNECTOR REF. DESIG. IN ACCORDANCE WITH CHART SEE NOTE 1D
FIG. 2
1.051 ±.015
AREA "A"
.030 MIN
.030 MIN
INSULATION
CONDUCTOR
INSULATION
CONDUCTOR
3/16 ± 1/32
OUTSIDE SURFACE AFTER FOLD
.016 NOM
.008 MIN
3/8 ± 1/32
.010 MIN
1.020 ±.015
.040 NOM
.025 MIN (TYP)
16 CONDUCTORS
.014 ±.002 OVERALL THK
.062 NOM
.025 MIN (TYP)
8 CONDUCTORS
.010 MIN
3/16 ± 1/32
3/16 ± 1/32
.072 NOM 8 CONDUCTOR ENDS
.032 NOM
.010 MIN
TYP (7 PLACES) (BOTH ENDS)
.010 MIN TYP
.843 ±.015
FIG. 1
A1
B E J M R A D H L P T W V Y b S Z C F K N U X d a c
J9 OR J10
B E J M R A D H L P T W V Y b S Z C F K N U X d a c
J5 OR J2
WIRING SCHEMATIC

ASS'Y DASH NO.	REFERENCE DESIGATION CONNECTOR 1011649	 CONNECTOR 1000122
1011908-1	J5	J9
1011908-2	J2	J10

MASTER

KIC PN 85386900910			

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/32 DECIMALS ±.005 ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN F.A. 220 DATE 7-22-63
CHECKED
APPROVAL 8/23/63
APPROVAL
NASA APPROVAL 7/5/
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FLEXPRINT & CONNECTOR, ASSEMBLY OF (SXT)
SOURCE CONTROL DRAWING

CODE IDENT NO. SIZE D NASA DRAWING NO. 1011908
SCALE ~ WT SHEET 1 OF 2

1011908 B

INCHES 0 1 2 PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

B 8061101

REVISIONS 02919			
SYM	DESCRIPTION	DATE	APPROVAL
A3	REVISED PER TDRR NO 05952	28 JAN 64	WK.
B	REVISED PER TDRR 10484	6/23/64	

REQUIREMENTS:

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III.
   - D. CHARACTERS TO BE ⅛ HIGH IN ACCORDANCE WITH ND 1002019
2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS
     1. EXTERNAL DIMENSIONS AS SHOWN.
     2. INTERNAL DIMENSIONS AS FOLLOWS:
        - a. IN ALL SECTIONS OF THE FLEXPRINT THE DISTANCE FROM THE EDGE OF THE END CONDUCTORS AND THE CLOSEST EDGE OF THE FLEXPRINT SHALL BE GREATER THAN .010 IN. AS SHOWN IN FIGURE 1.
        - b. IN THE 2 FLEXPRINT AREAS MARKED "A", THE CLOSEST APPROACH OF A CONDUCTOR TO THE CLOSEST FLEXPRINT EDGE IS TO BE A MINIMUM OF .030 IN. AS SHOWN IN FIGURE 2.
        - c. THE MIDDLE ROW OF PINS ON 3 ROW CONNECTORS SHALL NOT BE CONNECTED TO THE FLEXPRINT AND SHALL REMAIN UNUSED.
        - d. CONDUCTORS ARE SOLDERED TO CONNECTOR PINS PER MSFC-PROC-158.
        - e. THE POTTING OF THE FLEXPRINT-CONNECTOR AREAS SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
        - f. THE POTTING SHALL COVER THE OUTSIDE SURFACES OF BOTH THE CONNECTOR BASE AND FLEXPRINT INSULATION COATS. THE POTTING SHALL COVER THE FLEXPRINT INSULATION COATS FOR A MINIMUM DISTANCE OF 1/8 INCH
   - B. ELECTRICAL REQUIREMENTS
     1. DIELECTRIC WITHSTANDING VOLTAGE: THE CIRCUIT SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-202, METHOD 301 WITH 500 VOLTS DC APPLIED TO (1) ADJACENT CONDUCTORS AT THEIR ENDS, AND (2) BETWEEN EACH CONDUCTOR AND THE OUTER SURFACE OF THE INSULATION CLOSEST TO THE CONNECTED CONDUCTOR.
     2. INSULATION RESISTANCE: THE CIRCUIT SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-202, METHOD 302, CONDITION B AT POINTS IDENTICAL TO THOSE STATED IN SECTION 2.B.1 ABOVE.
3. DESIGN REQUIREMENTS
   - A. MATERIAL
     1. CONDUCTOR: COPPER STRIP CONFORMING TO FEDERAL SPECIFICATION QQ-C-576, HALF HARD.
        - a. THICKNESS .0040±.0004 IN.
        - b. WIDTH: AS SHOWN IN FIGURE 1.
     2. INSULATION: E. I. DUPONT TEFLON FEP TYPE "A" OR EQUIVALENT IN CONFORMITY WITH ASTM SPECIFICATION D2116-62T
        - a. THICKNESS: .0050±.0005
        - b. PEEL STRENGTH: 5 POUND/INCH WIDTH OF CABLE, MIN.
     3. POT USING GENERAL ELECTRIC RTV-11 SILICONE RUBBER, OR EQUIVALENT.
   - B. ENVIRONMENTAL REQUIREMENTS
     1. FLEXIBILITY: THE CIRCUIT SHALL BE CAPABLE OF BEING BENT 180° AROUND A 3/8 INCH MANDREL BOTH BEFORE AND AFTER ALL TESTS SPECIFIED ON THIS DRAWING. WITHOUT TAKING A PERMANENT SET
     2. HUMIDITY: THE CIRCUIT SHALL BE TESTED FOR HUMIDITY RESISTANCE IN ACCORDANCE WITH MIL-STD-810, METHOD 507 AND FOUND CAPABLE OF MEETING THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     3. HIGH TEMPERATURE RESISTANCE: THE CIRCUIT SHALL BE TESTED FOR HIGH TEMPERATURE RESISTANCE WITH HIGHEST OPERATING TEMPERATURE OF 180°F IN ACCORDANCE WITH MIL-STD-810, METHOD 501, AND FOUND TO MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     4. LOW TEMPERATURE RESISTANCE: THE CIRCUIT SHALL BE TESTED FOR LOW TEMPERATURE RESISTANCE WITH A LOWEST OPERATING TEMPERATURE OF -65°F IN ACCORDANCE WITH MIL-STD-810 (USAF) METHOD 502 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     5. TEMPERATURE SHOCK: THE CIRCUIT SHALL BE TESTED FOR TEMPERATURE SHOCK IN ACCORDANCE WITH MIL-STD-810 (USAF), METHOD 503 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     6. TEMPERATURE - ALTITUDE: THE CIRCUIT SHALL BE TESTED FOR TEMPERATURE-ALTITUDE RESISTANCE (CYCLING) IN ACCORDANCE WITH MIL-STD-810 (USAF), METHOD 504 FOR EQUIPMENT CLASS 2 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     7. LOW PRESSURE: THE CIRCUIT SHALL BE TESTED FOR LOW PRESSURE RESISTANCE IN ACCORDANCE WITH MIL-STD-810 (USAF), METHOD 500 WITH A LOW PRESSURE OF 10^{9} MM Hg AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     8. SUNSHINE RESISTANCE: THE CIRCUIT SHALL BE TESTED FOR SUNSHINE RESISTANCE IN ACCORDANCE WITH MIL-STD-810 (USAF), METHOD 505 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     9. LOW PRESSURE - SOLAR ENERGY RESISTANCE: THE CIRCUIT SHALL BE TESTED FOR LOW PRESSURE AND SOLAR ENERGY RESISTANCE IN ACCORDANCE WITH MIL-STD-810, METHOD 517 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

KIC. PN 85386900910

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ±1/32 DECIMALS ±.005 ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 3A
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT
DRAWN E. Pizzo DATE 7-22-63
CHECKED
APPROVAL Costa 8/23/63
APPROVAL 9/20/63
NASA APPROVAL
MIT APPROVAL 9/5/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FLEXPRINT & CONNECTOR ASSEMBLY OF (SXT)
SOURCE CONTROL DRAWING

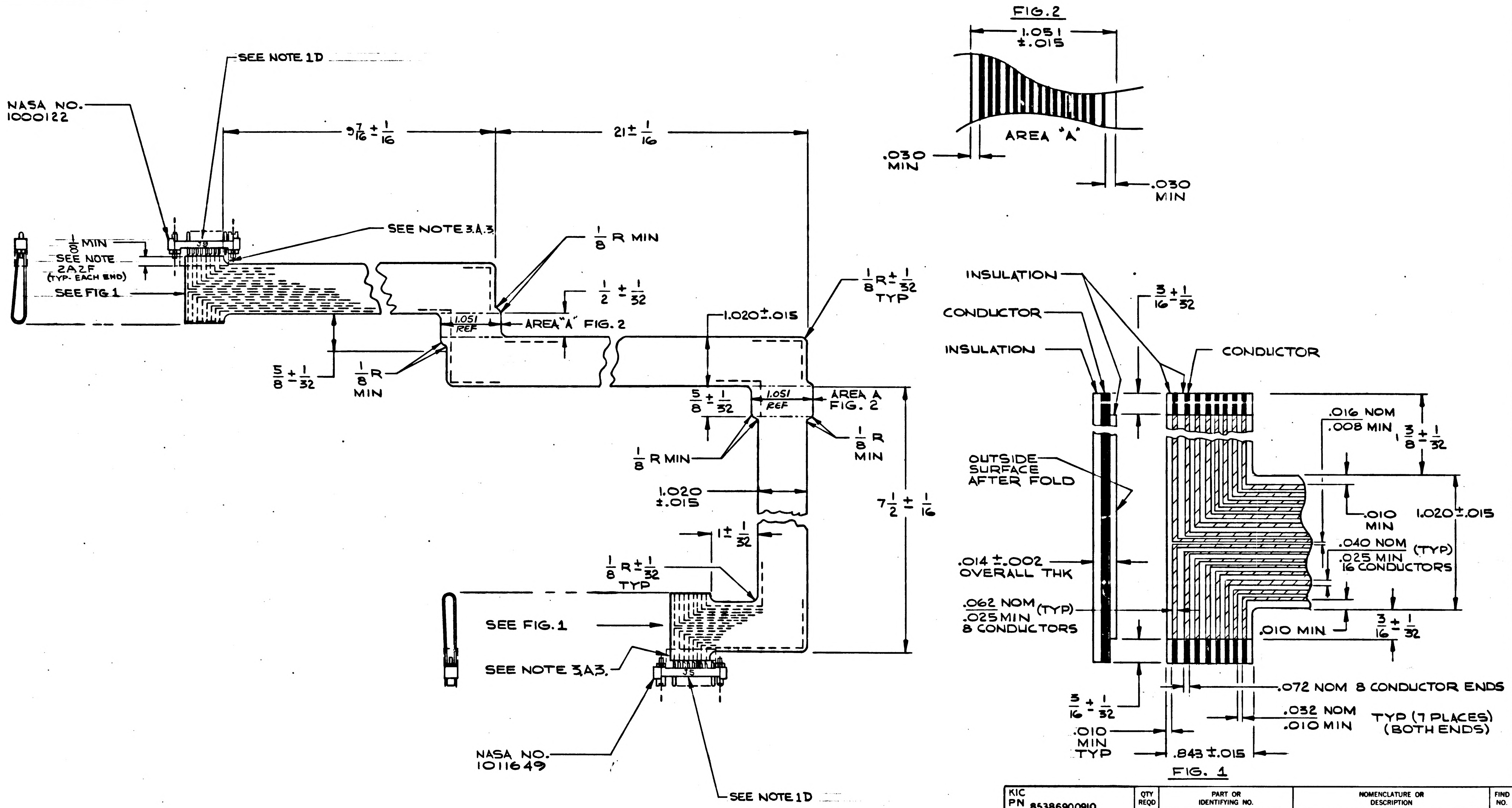
CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1011908
SCALE
WT
SHEET 2 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

8061101

REVISIONS 0 7/9/9			
SYM	DESCRIPTION	DATE	APPROVAL


SEE NOTE 1D
NASA NO. 1000122
$9\frac{7}{16} \pm \frac{1}{16}$
$21 \pm \frac{1}{16}$
J9
SEE NOTE 3.A.3
$\frac{1}{8}$ R MIN
$\frac{1}{8}$ MIN
SEE NOTE 2A2F (TYP. EACH END)
SEE FIG 1
$\frac{1}{2} \pm \frac{1}{32}$
1.051 REF
AREA "A" FIG. 2
1.020 ± .015
$\frac{1}{8}$ R ± $\frac{1}{32}$ TYP
$\frac{5}{8} \pm \frac{1}{32}$
$\frac{1}{8}$ R MIN
$\frac{5}{8} \pm \frac{1}{32}$
1.051 REF
AREA A FIG. 2
$\frac{1}{8}$ R MIN
$\frac{1}{8}$ R MIN
1.020 ±.015
$7\frac{1}{2} \pm \frac{1}{16}$
$1 \pm \frac{1}{32}$
$\frac{1}{8}$ R ± $\frac{1}{32}$ TYP
SEE FIG. 1
SEE NOTE 3.A.3.
J5
NASA NO. 1011649
SEE NOTE 1D
FIG. 2
1.051 ±.015
AREA "A"
.030 MIN
.030 MIN
INSULATION
CONDUCTOR
INSULATION
CONDUCTOR
$\frac{3}{16} \pm \frac{1}{32}$
.016 NOM
.008 MIN
$\frac{3}{8} \pm \frac{1}{32}$
OUTSIDE SURFACE AFTER FOLD
.010 MIN
1.020 ±.015
.040 NOM
.025 MIN
(TYP)
16 CONDUCTORS
.014 ±.002 OVERALL THK
.062 NOM
.025 MIN
(TYP)
8 CONDUCTORS
.010 MIN
$\frac{3}{16} \pm \frac{1}{32}$
.072 NOM 8 CONDUCTOR ENDS
$\frac{3}{16} \pm \frac{1}{32}$
.032 NOM
.010 MIN
TYP (7 PLACES) (BOTH ENDS)
.010 MIN TYP
.843 ±.015
FIG. 1

KIC PN 85386900910	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.	
	LIST OF MATERIALS				

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/32 DECIMALS ±.005 ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN F.Pizzo DATE 7-22-63
CHECKED
APPROVAL 8/23/63
APPROVAL
NASA APPROVAL 9/5/61
MIT APPROVAL 10/5/62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FLEXPRINT & CONNECTOR, ASSEMBLY OF (SXT)
SOURCE CONTROL DRAWING

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1011908
SCALE ~
WT
SHEET 1 OF 2

1011908

MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

REQUIREMENTS:

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III
   - D. CHARACTERS TO BE $\frac{1}{8}$ HIGH IN ACCORDANCE WITH ND 1002019
2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS
     1. EXTERNAL DIMENSIONS AS SHOWN.
     2. INTERNAL DIMENSIONS AS FOLLOWS:
        - a. IN ALL SECTIONS OF THE FLEXPRINT THE DISTANCE FROM THE EDGE OF THE END CONDUCTORS AND THE CLOSEST EDGE OF THE FLEXPRINT SHALL BE GREATER THAN .010 IN. AS SHOWN IN FIGURE 1.
        - b. IN THE 2 FLEXPRINT AREAS MARKED "A", THE CLOSEST APPROACH OF A CONDUCTOR TO THE CLOSEST FLEXPRINT EDGE IS TO BE A MINIMUM OF .030 IN. AS SHOWN IN FIGURE 2.
        - c. THE MIDDLE ROW OF PINS ON 3 ROW CONNECTORS SHALL NOT BE CONNECTED TO THE FLEXPRINT AND SHALL REMAIN UNUSED.
        - d. CONDUCTORS ARE SOLDERED TO CONNECTOR PINS PER MSFC-PROC-158.
        - e. THE POTTING OF THE FLEXPRINT-CONNECTOR AREAS SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
        - f. THE POTTING SHALL COVER THE OUTSIDE SURFACES OF BOTH THE CONNECTOR BASE AND FLEXPRINT INSULATION COATS. THE POTTING SHALL COVER THE FLEXPRINT INSULATION COATS FOR A MINIMUM DISTANCE OF 1/8 INCH
   - B. ELECTRICAL REQUIREMENTS
     1. DIELECTRIC WITHSTANDING VOLTAGE: THE CIRCUIT SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-202, METHOD 301 WITH 500 VOLTS DC APPLIED TO (1) ADJACENT CONDUCTORS AT THEIR ENDS, AND (2) BETWEEN EACH CONDUCTOR AND THE OUTER SURFACE OF THE INSULATION CLOSEST TO THE CONNECTED CONDUCTOR.
     2. INSULATION RESISTANCE: THE CIRCUIT SHALL BE TESTED IN ACCORDANCE WITH MIL-STD-202, METHOD 302, CONDITION B AT POINTS IDENTICAL TO THOSE STATED IN SECTION 2.B.1 ABOVE.
3. DESIGN REQUIREMENTS
   - A. MATERIAL
     1. CONDUCTOR: COPPER STRIP CONFORMING TO FEDERAL SPECIFICATION QQ-C-576. HALF HARD.
        - a. THICKNESS .0040±.0004 IN.
        - b. WIDTH: AS SHOWN IN FIGURE 1.
     2. INSULATION: E. I. DUPONT TEFLON FEP TYPE "A" OR EQUIVALENT IN CONFORMITY WITH ASTM SPECIFICATION D2116-62T
        - a. THICKNESS: .0050±.0005
        - b. PEEL STRENGTH: 5 POUND/INCH WIDTH OF CABLE, MIN.
     3. POT USING GENERAL ELECTRIC RTV-11 SILICONE RUBBER, OR EQUIVALENT.
   - B. ENVIRONMENTAL REQUIREMENTS
     1. FLEXIBILITY: THE CIRCUIT SHALL BE CAPABLE OF BEING BENT 180° AROUND A 3/8 INCH MANDREL BOTH BEFORE AND AFTER ALL TESTS SPECIFIED ON THIS DRAWING. WITHOUT TAKING A PERMANENT SET
     2. HUMIDITY: THE CIRCUIT SHALL BE TESTED FOR HUMIDITY RESISTANCE IN ACCORDANCE WITH MIL-STD-810, METHOD 507 AND FOUND CAPABLE OF MEETING THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     3. HIGH TEMPERATURE RESISTANCE: THE CIRCUIT SHALL BE TESTED FOR HIGH TEMPERATURE RESISTANCE WITH HIGHEST OPERATING TEMPERATURE OF 180°F IN ACCORDANCE WITH MIL-STD-810, METHOD 501, AND FOUND TO MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     4. LOW TEMPERATURE RESISTANCE: THE CIRCUIT SHALL BE TESTED FOR LOW TEMPERATURE RESISTANCE WITH A LOWEST OPERATING TEMPERATURE OF -65°F IN ACCORDANCE WITH MIL-STD-810 (USAF) METHOD 502 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     5. TEMPERATURE SHOCK: THE CIRCUIT SHALL BE TESTED FOR TEMPERATURE SHOCK IN ACCORDANCE WITH MIL-STD-810 (USAF), METHOD 503 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     6. TEMPERATURE - ALTITUDE: THE CIRCUIT SHALL BE TESTED FOR TEMPERATURE-ALTITUDE RESISTANCE (CYCLING) IN ACCORDANCE WITH MIL-STD-810 (USAF), METHOD 504 FOR EQUIPMENT CLASS 2 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     7. LOW PRESSURE: THE CIRCUIT SHALL BE TESTED FOR LOW PRESSURE RESISTANCE IN ACCORDANCE WITH MIL-STD-810 (USAF), METHOD 500 WITH A LOW PRESSURE OF 10^{-9} MM Hg AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     8. SUNSHINE RESISTANCE: THE CIRCUIT SHALL BE TESTED FOR SUNSHINE RESISTANCE IN ACCORDANCE WITH MIL-STD-810 (USAF), METHOD 505 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.
     9. LOW PRESSURE - SOLAR ENERGY RESISTANCE: THE CIRCUIT SHALL BE TESTED FOR LOW PRESSURE AND SOLAR ENERGY RESISTANCE IN ACCORDANCE WITH MIL-STD-810, METHOD 517 AND MEET THE FLEXIBILITY AND INSPECTION AND ACCEPTANCE REQUIREMENTS.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

SHEET 1	SHEET 2
REVISION STATUS OF SHEETS	

MASTER

KIC PN 85386900910

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/32 DECIMALS ±.005 ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 3A
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN E. Pizzo DATE 7-22-63
CHECKED
APPROVAL C. Costa 7-23-63
APPROVAL
NASA APPROVAL
MIT APPROVAL 9/5/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FLEXPRINT & CONNECTOR ASSEMBLY OF (SXT)
SOURCE CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	D	1011908
SCALE ~	WT	SHEET 2 OF 2

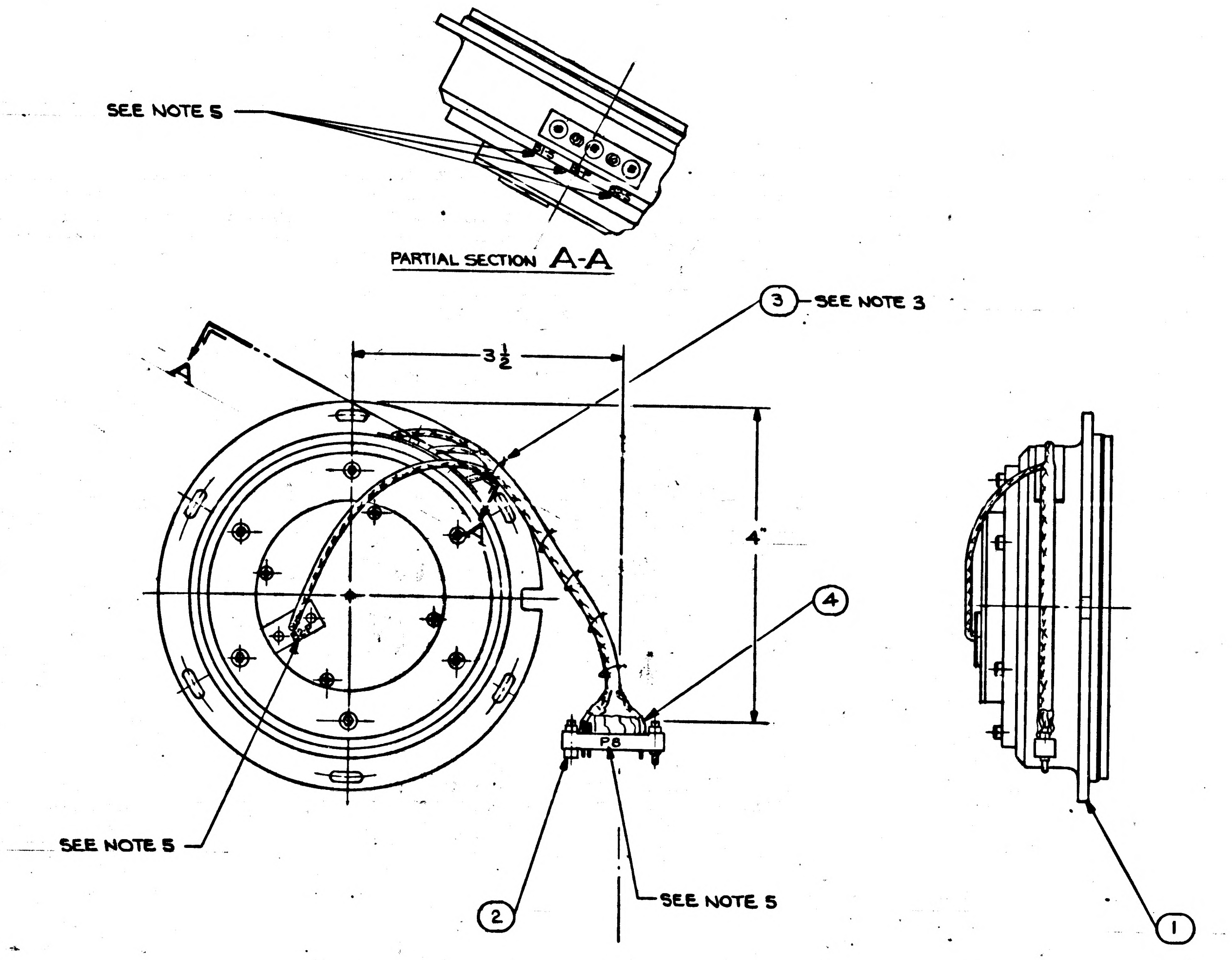
INCHES
0 2
PHOTOGRAPHIC SCALE ONLY

A 6061101

SYM	ZONE	DESCRIPTION	DATE	APPROV
A3		REVISED PER TDRR# 06001	1-27-64	W.I.

REVISIONS 02944

WIRING LEGEND						
COND. NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 6	
D1	YELLOW		B1-P2	P8-C	8	Ⓐ1
D2	BLUE		B1-P4	P8-D		
D3	BLACK		B1-P3	P8-H	8	
D4	RED		B1-P1	P8-L		
D5	BLUE		B1-S4	P8-P	8	
D6	YELLOW		B1-S2	P8-T		
D7	RED		B1-S1	P8-W	8	
D8	BLACK		B1-S3	P8-V		
D9	BLACK		B2-S3	P8-Y	8	
D10	RED		B2-S1	P8-b		
D11	BLUE		B2-P4	P8-S	8	Ⓐ2
D12	YELLOW		B2-P2	P8-Z		
D13	RED		B2-P1	P8-e	8	Ⓐ3
D14	BLACK		B2-P3	P8-F		
D15	YELLOW		B2-S2	P8-U	8	
D16	BLUE		B2-S4	P8-X		



NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING SCHEMATIC DWG 1015122.
3. LACE WIRES IN ACCORDANCE WITH ND 1002032.
4. SOLDER WIRES IN ACCORDANCE WITH MSFC-PROC-158, USING TYPE SN60 WAR P2 SOLDER PER QQ-S-571.
5. MARK CHARACTERS 3/32 HIGH PER ND 1002019 AT LOCATION SHOWN.
6. TWISTED CONDUCTORS TO CONSIST OF FOUR (4) FULL TURNS PER INCH MINIMUM.

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
4	AR	*	1010490-060			INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
3	AR	*	1011753	—		TAPE, LACING & TYING			
2	1	*	1011756	68502018401		CONNECTOR, ELECTRICAL, 22 PIN CONTACTS (P			
1	1	*	1011294	75386900020		RESOLVER ASSY (1 SPEED & 64 SPEED)			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/8; DECIMALS ± —; ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900920

DRAWN [illegible] DATE 8-20-63
CHECKED [illegible] 8-21-63
APPROVAL [illegible] 8/2/63
APPROVAL [illegible] 9/3/63
NASA APPROVAL [illegible] 9/5/63
MIT APPROVAL [illegible] 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RESOLVER & CONNECTOR,
ASSEMBLY OF
(SXT)

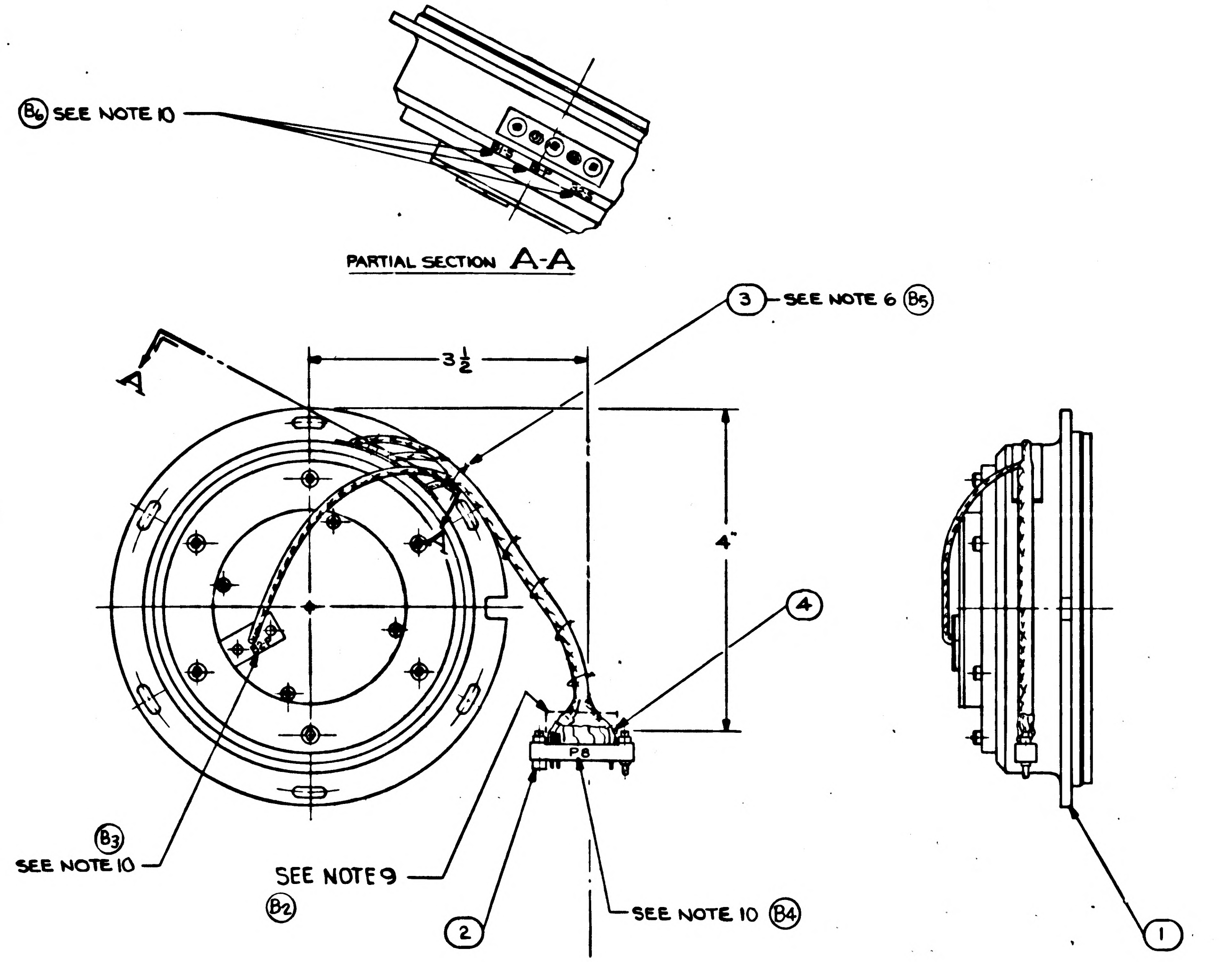
CODE IDENT NO.
SIZE D
NASA NUMBER 1011909
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

B 6061101

REVISIONS 02944				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR# 06001	1-27-64	WH
B9		REVISED PER TDRR NO. 07521	4-7-64	

WIRING LEGEND					
COND. NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 3
D1	WHITE/YELLOW		B1-P2	P8-C	8
D2	WHITE/BLUE		B1-P4	P8-D	
D3	WHITE/BLACK		B1-P3	P8-H	8
D4	WHITE/RED		B1-P1	P8-L	
D5	WHITE/BLUE		B1-S4	P8-P	8
D6	WHITE/YELLOW		B1-S2	P8-T	
D7	WHITE/RED		B1-S1	P8-W	8
D8	WHITE/BLACK		B1-S3	P8-V	
D9	BLACK		B2-S3	P8-Y	8
D10	RED		B2-S1	P8-b	
D11	BLUE		B2-P4	P8-S	8
D12	YELLOW		B2-P2	P8-Z	
D13	RED		B2-P1	P8-e	8
D14	BLACK		B2-P3	P8-F	
D15	YELLOW		B2-S2	P8-U	8
D16	BLUE		B2-S4	P8-X	

(B9) (A1) (B7) (A2) (A3)



NOTES:
1-INTERPRET DRAWING INACCORDANCE WITH MIL-D-70327.
2-REFER TO WIRING SCHEMATIC, NASA DWG NO. 1015122.
3-TWIST CONDUCTORS IN ACCORDANCE WITH ND1002032.
4-SLIDE ITEM 4 OVER WIRES BEYOND STRIPPED ENDS.
5-SOLDER CONDUCTORS, PER WIRING LEGEND, WITH SN60WRP2, PER QQ-S-571, PER MSFC-PROC-158.
6-LACE CONDUCTORS, USING ITEM 3, IN ACCORDANCE WITH ND1002032.
7-PERFORM CONTINUITY CHECK.
8-SLIDE ITEM 4 OVER SOLDERED JOINTS AND SHRINK.
9-POT IN ACCORDANCE WITH ND-1002009, METHOD C.
  A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
  B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
10-MARK REFERENCE DESIGNATIONS 3/32 INCH HIGH IN ACCORDANCE WITH ND-1002019.

(B1)

✱ PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

(B8)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
4	16	✱	1010490-060			INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
3	AR	✱	1011753	—		TAPE, LACING & TYING			
2	1	✱	1011756	68502018401		CONNECTOR, ELECTRICAL, 22 PIN CONTACTS (P8)			
1	1	✱	1011294	75386900020		RESOLVER ASSY (1 SPEED & 64 SPEED)			

LIST OF PARTS AND MATERIALS

1011891	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/8; DECIMALS ± —; ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900920
DRAWN DATE 8-20-63
CHECKED Costa 8-21-63
APPROVAL
APPROVAL
NASA APPROVAL 9/4/63
MIT APPROVAL 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RESOLVER & CONNECTOR,
ASSEMBLY OF
(SXT)

CODE IDENT NO.
SIZE D
NASA NUMBER 1011909
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011909 B

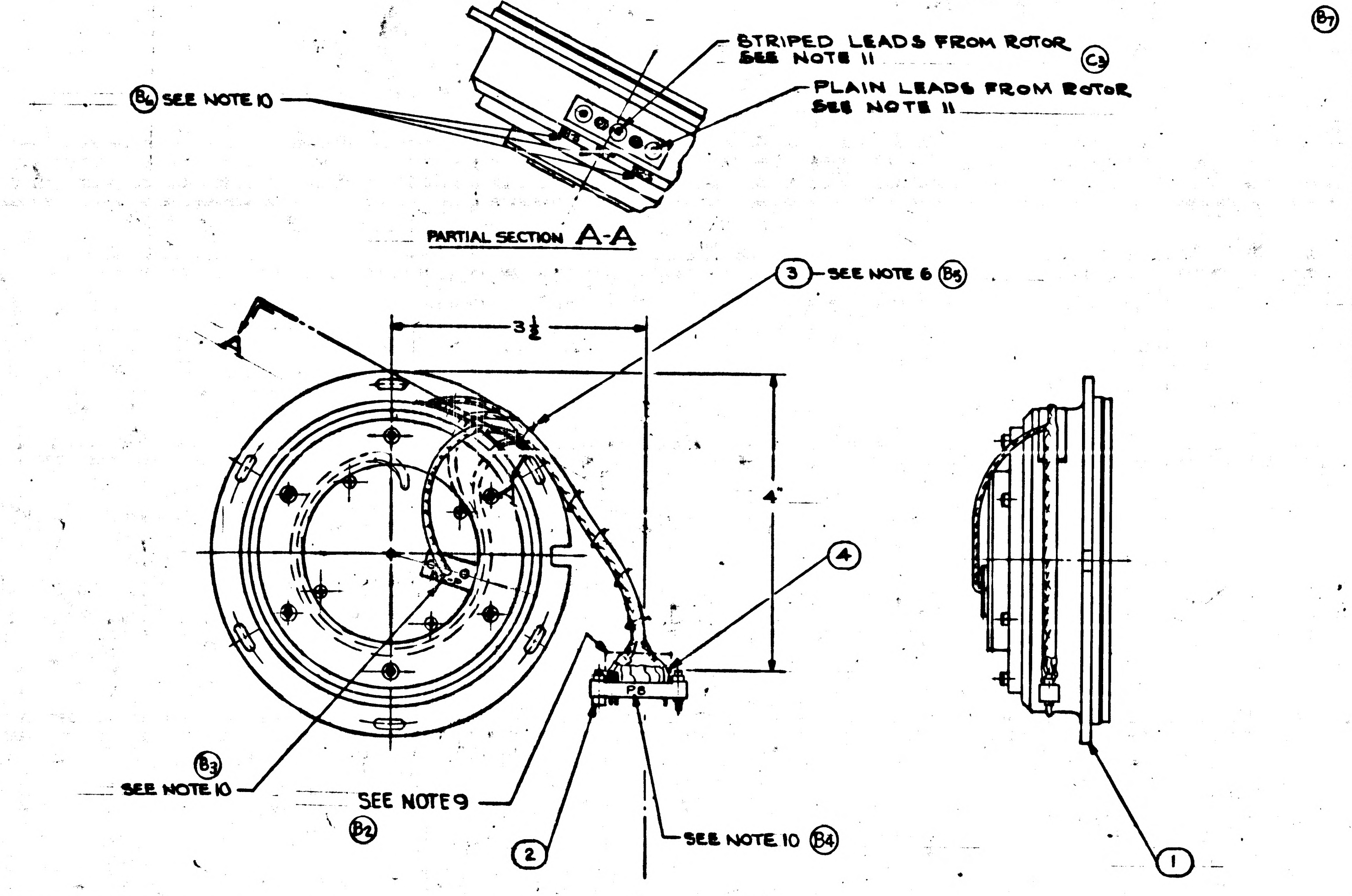
C	6061101

REVISIONS

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR # 06001	1-27-64	WK
B9		REVISED PER TDRR NO. 07521	4-9-64	
C3		REVISED PER TDRR NO. 08594		

WIRING LEGEND

COND. NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 3
D1	WHITE/YELLOW		B1-P2	P8-C	8
D2	WHITE/BLUE		B1-P4	P8-D	
D3	WHITE/BLACK		B1-P3	P8-H	8
D4	WHITE/RED		B1-P1	P8-L	
D5	WHITE/BLUE		B1-S4	P8-P	8
D6	WHITE/YELLOW		B1-S2	P8-T	
D7	WHITE/RED		B1-S1	P8-W	8
D8	WHITE/BLACK		B1-S3	P8-V	
D9	BLACK		B2-S3	P8-Y	8
D10	RED		B2-S1	P8-b	
D11	BLUE		B2-P4	P8-S	8
D12	YELLOW		B2-P2	P8-Z	
D13	RED		B2-P1	P8-e	8
D14	BLACK		B2-P3	P8-F	
D15	YELLOW		B2-S2	P8-U	8
D16	BLUE		B2-S4	P8-X	



NOTES:
1-INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2-REFER TO WIRING SCHEMATIC, NASA DWG NO. 1015122. (B1)
3-TWIST CONDUCTORS IN ACCORDANCE WITH ND1002032, (DO NOT TWIST INTERNAL CONDUCTORS)
4-SLIDE ITEM 4 OVER WIRES BEYOND STRIPPED ENDS.
5-SOLDER CONDUCTORS, PER WIRING LEGEND, WITH SN60WRP2, (C1)
PER QQ-S-571, PER MSFC-PROC-158.
6-LACE CONDUCTORS, USING ITEM 3, IN ACCORDANCE WITH ND1002032, (DO NOT LACE INTERNAL CONDUCTORS)
7-PERFORM CONTINUITY CHECK.
8-SLIDE ITEM 4 OVER SOLDERED JOINTS AND SHRINK.
9-POT IN ACCORDANCE WITH ND-1002009, METHOD C.
A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
10-MARK REFERENCE DESIGNATIONS 3/32 INCH HIGH IN ACCORDANCE WITH ND-1002019.
11. ROTOR LEAD LENGTH FROM HUB TO GROMMET TO BE APPROX. 10 INCHES LONG. LEADS TO BE WRAPPED AROUND HUB IN DIRECTION SHOWN IN LEFT HAND VIEW (ZONE D-7). (C2)

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

MASTER

LIST OF PARTS AND MATERIALS

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
4	16	*	1010490-060			INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
3	AR	*	1011753	—		TAPE, LACING & TYING			
2	1	*	1011756	68502018401		CONNECTOR, ELECTRICAL, 22 PIN CONTACTS (P8)			
1	1	*	1011294	75386900020		RESOLVER ASSY (1 SPEED & 64 SPEED)			

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/8; DECIMALS ± [illegible]; ANGLES ± [illegible]
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900920
DRAWN DATE 8-20-63
CHECKED 8-21-63
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RESOLVER & CONNECTOR, ASSEMBLY OF (SXT)

CODE IDENT NO.
SIZE D
NASA NUMBER 1011909
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

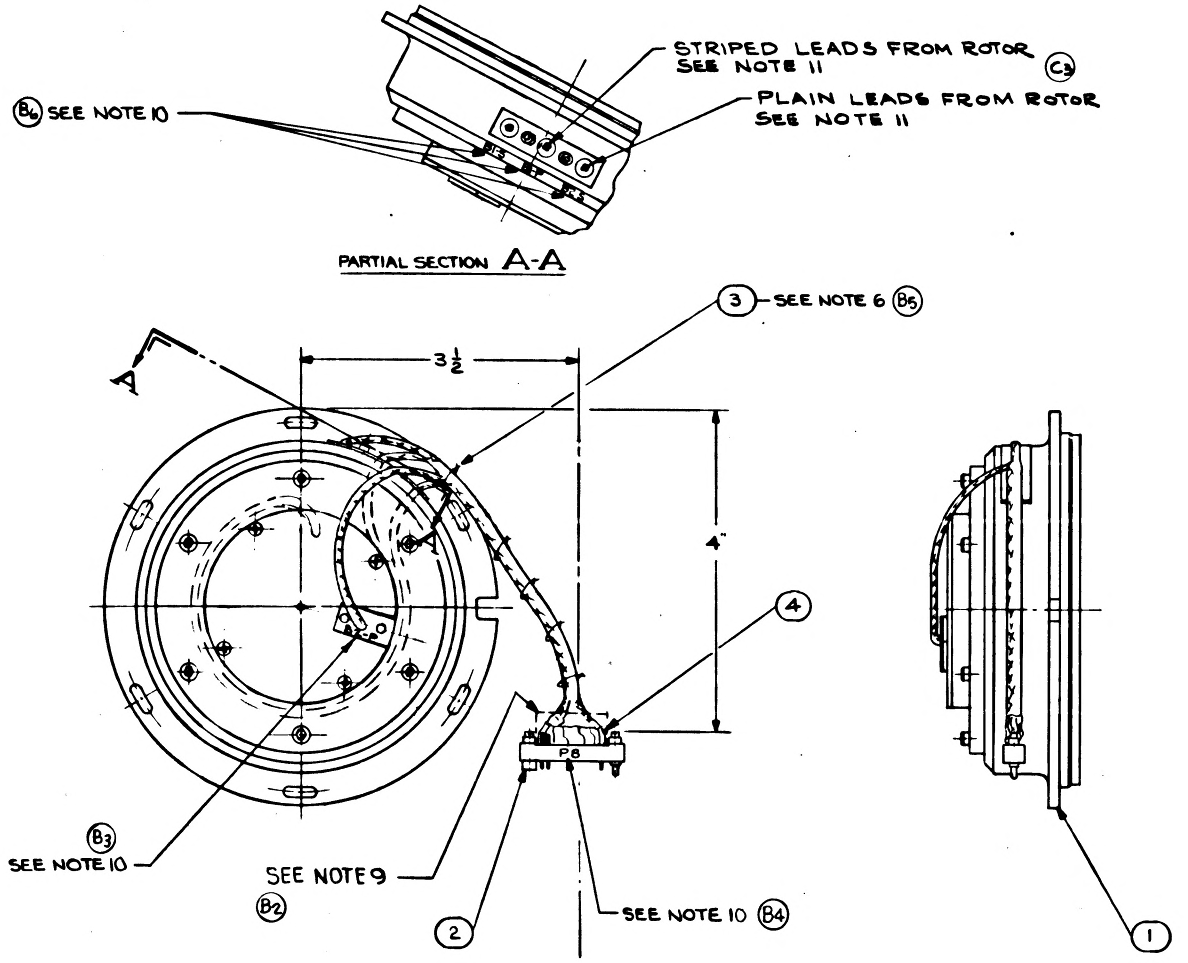
1011909 C

D 6061101

REVISIONS 02944				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR# U6001	1-27-64	WK
B9		REVISED PER TDRR NO. 07521	4-7-64	
C3		REVISED PER TDRR NO. 08594	5-14-64	
D		REVISED PER TDRR NO. 11113	7-21-64	

WIRING LEGEND					
COND. NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 3
D1	WHITE/YELLOW		B1-P2	P8-C	8
D2	WHITE/BLUE		B1-P4	P8-D	
D3	WHITE/BLACK		B1-P3	P8-H	8
D4	WHITE/RED		B1-P1	P8-L	
D5	WHITE/BLUE		B1-S4	P8-P	8
D6	WHITE/YELLOW		B1-S2	P8-T	
D7	WHITE/RED		B1-S1	P8-W	8
D8	WHITE/BLACK		B1-S3	P8-V	
D9	BLACK		B2-S3	P8-Y	8
D10	RED		B2-S1	P8-b	
D11	BLUE		B2-P4	P8-S	8
D12	YELLOW		B2-P2	P8-Z	
D13	RED		B2-P1	P8-e	8
D14	BLACK		B2-P3	P8-F	
D15	YELLOW		B2-S2	P8-U	8
D16	BLUE		B2-S4	P8-X	

B9 A1 B7 A2 A3



NOTES
1-INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2-REFER TO WIRING SCHEMATIC NASA DRAWING NO. 1015122.
3-LACE WIRES EXTENDING FROM GROMMET IN ACCORDANCE (B1) (D)
WITH ND 1002032 (INTERNAL WIRES ARE NOT TO BE TWISTED OR LACED.)
4-SLIDE ITEM 4 OVER WIRES BEYOND STRIPPED ENDS.
5-SOLDER CONDUCTORS, PER WIRING LEGEND, WITH SN60WRD2,
PER QQ-S-571, PER MSFC-PROC-158.
6-LACE CONDUCTORS, USING ITEM 3, IN ACCORDANCE WITH ND1002032, (DO NOT LACE INTERNAL CONDUCTORS)
7-PERFORM CONTINUITY CHECK.
8-SLIDE ITEM 4 OVER SOLDERED JOINTS AND SHRINK.
9-POT IN ACCORDANCE WITH ND-1002009, METHOD C.
A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
10-MARK REFERENCE DESIGNATIONS 3/32 INCH HIGH IN ACCORDANCE
WITH ND-1002019.
11. ROTOR LEAD LENGTH FROM HUB TO GROMMET TO BE APPROX. 10 INCHES
LONG. LEADS TO BE WRAPPED AROUND HUB IN DIRECTION SHOWN IN (C2)
LEFT HAND VIEW (ZONE D-7).

(C1)

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

B8

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
4	16	*	1010490-060			INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
3	AR	*	1011753	—		TAPE, LACING & TYING			
2	1	*	1011756	68502018401		CONNECTOR, ELECTRICAL, 22 PIN CONTACTS (P8)			
1	1	*	1011294	75386900020		RESOLVER ASSY (1 SPEED & 64 SPEED)			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/8	± —	± —

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900920
DRAWN DATE 8-20-63
CHECKED Costa 8-21-63
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RESOLVER & CONNECTOR,
ASSEMBLY OF
(SXT)

CODE IDENT NO.
SIZE D
NASA NUMBER 1011909
SCALE 1/1
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

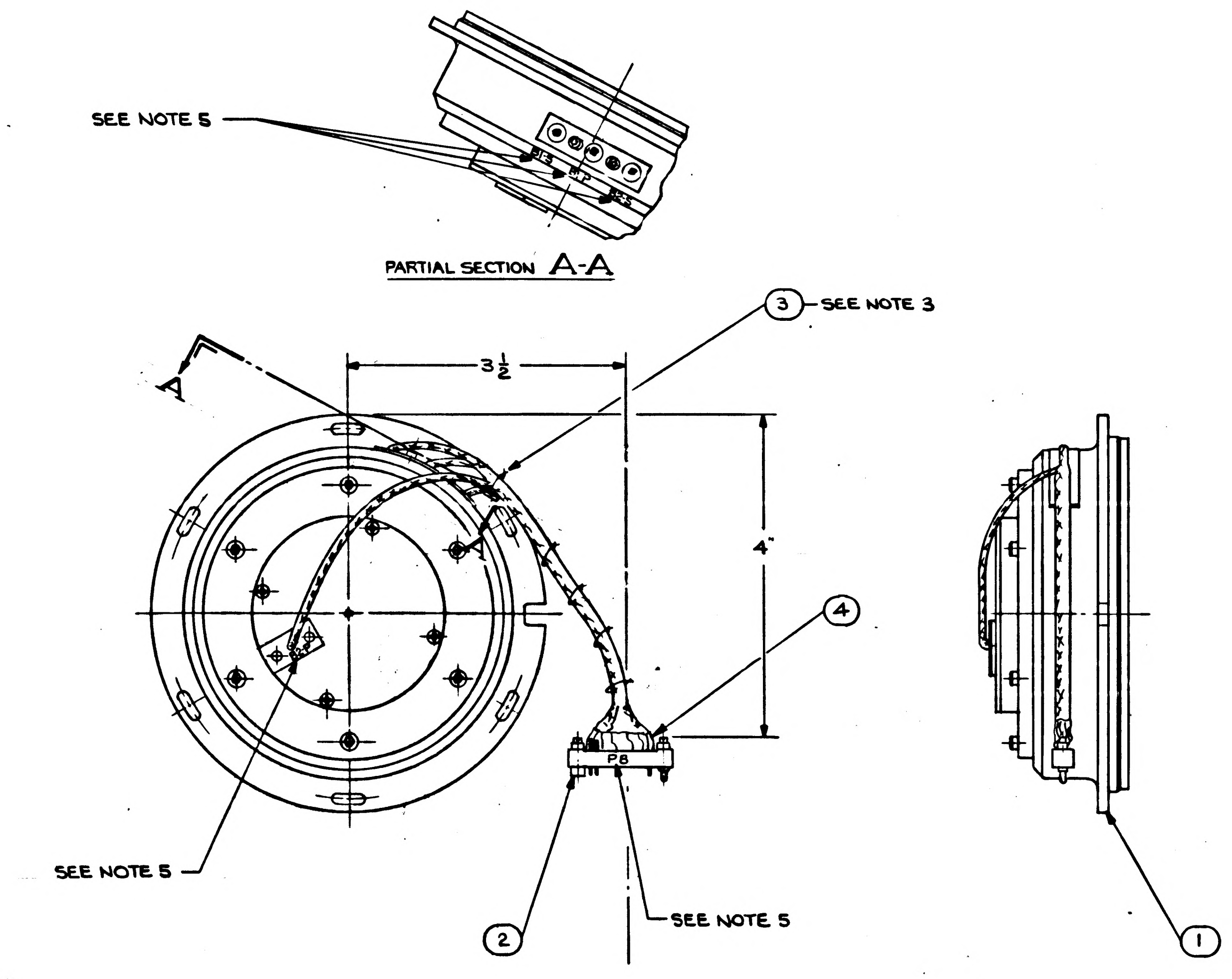
D 1011909

E-186

6061101

REVISIONS 0-944				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

WIRING LEGEND					
COND. NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 6
D1	YELLOW		B1-P2	P8-A	8
D2	BLUE		B1-P4	P8-D	
D3	BLACK		B1-P3	P8-H	8
D4	RED		B1-P1	P8-L	
D5	BLUE		B1-S4	P8-P	8
D6	YELLOW		B1-S2	P8-T	
D7	RED		B1-S1	P8-W	8
D8	BLACK		B1-S3	P8-V	
D9	BLACK		B2-S3	P8-Y	8
D10	RED		B2-S1	P8-b	
D11	BLUE		B2-P4	P8-d	8
D12	YELLOW		B2-P2	P8-Z	
D13	RED		B2-P1	P8-C	8
D14	BLACK		B2-P3	P8-F	
D15	YELLOW		B2-S2	P8-U	8
D16	BLUE		B2-S4	P8-X	



NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING SCHEMATIC DWG 1015122.
3. LACE WIRES IN ACCORDANCE WITH ND 1002032.
4. SOLDER WIRES IN ACCORDANCE WITH MSFC-PROC-158, USING TYPE SN60 WAR P2 SOLDER PER QQ-S-571.
5. MARK CHARACTERS 3/32 HIGH PER ND1002019 AT LOCATION SHOWN.
6. TWISTED CONDUCTORS TO CONSIST OF FOUR (4) FULL TURNS PER INCH MINIMUM.

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
4	AR	*	1010490-060			INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
3	AR	*	1011753	—		TAPE, LACING & TYING			
2	1	*	1011756	68502018401		CONNECTOR, ELECTRICAL, 22 PIN CONTACTS (P8)			
1	1	*	1011294	75386900020		RESOLVER ASSY (1 SPEED & 64 SPEED)			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011891	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/8; DECIMALS ± ~; ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900920
DRAWN DATE 8-20-63
CHECKED C. F. Costa 8-21-63
APPROVAL C. F. Costa 8/21/63
APPROVAL 8/23/63
NASA APPROVAL 9/5/63
MIT APPROVAL D. Hazel 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RESOLVER & CONNECTOR,
ASSEMBLY OF
(SXT)

CODE IDENT NO.
SIZE D
NASA NUMBER 1011909
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

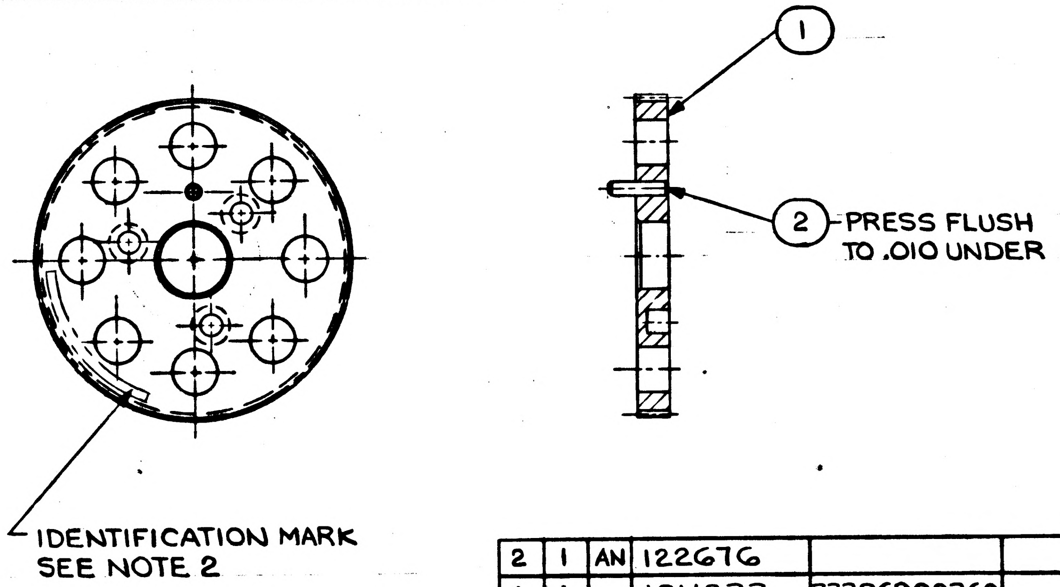
MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

0161101

REVISIONS 02623			
SYM	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORD WITH MIL-D-70327.
2. IDENTIFY USING NASA DWG NO. REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORD WITH ND1002019.



2	1	AN	122676			PIN-DOWEL, STEEL			
1	1		1011233	33386900360		GEAR, SPUR (126T-96P)			
ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011701	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON: FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900930

DRAWN F. Schiller DATE 7-9-63
CHECKED Paul Pappachristou
APPROVAL G. Kuhlmann
APPROVAL J. J. Sirico 8-15-63
NASA APPROVAL W J Rhine 8-16-63
MIT APPROVAL W Kupfer 16 Aug 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
GEAR AND PIN,
ASSY OF

CODE IDENT NO. | SIZE B | NASA NUMBER 1011910
SCALE 2/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

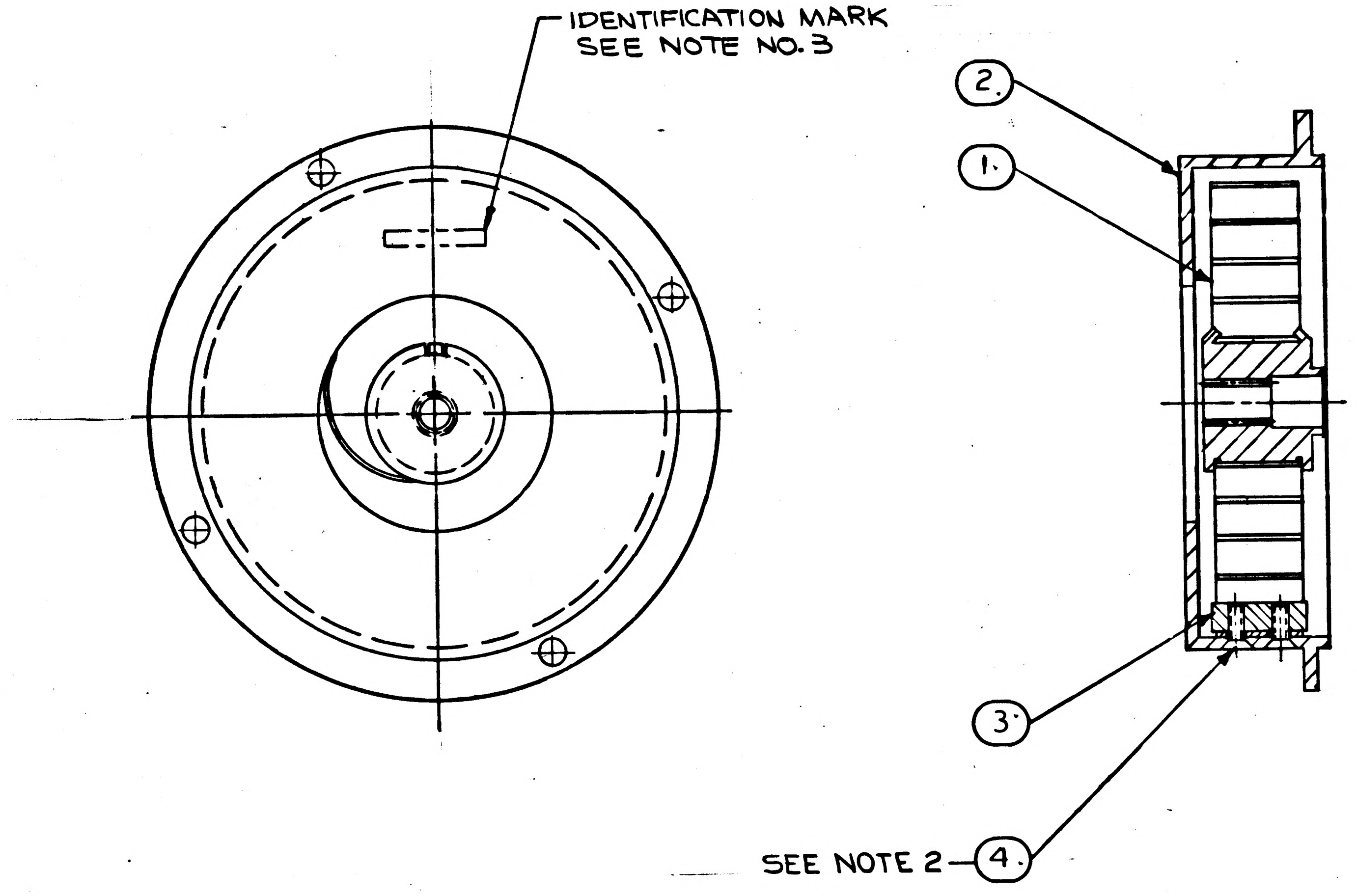
E-153

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1161101

REVISIONS 02623				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTE:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. SECURE *SCREWS* WITH LOCKING COMPOUND CONFORMING TO MIL-S-22473.
3. IDENTIFY USING NASA DWG. NO., REVISION LETTER & MANUFACTURER'S SYMBOL PER ND1002019



MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
4	2		AN510C1-3			SCREW MACHINE FLAT HEAD.			
3	1.		1011315 .	56386900200		PLATE, SPRING RETAINING			
2	1.		1011312 .	57386900740		COVER, SPRING			
1	1		1011326 .	85386900290		SPRING AND COLLET ASSEMBLY OF			

LIST OF PARTS AND MATERIALS

1011705	1011000
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	+ — -	+ — -	+ — -

DO NOT SCALE THIS DRAWING

MATERIAL —

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386900980.

DRAWN E.DRAPALA DATE 7-22-63
CHECKED 7/22/63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL W J 8-16-63
MIT APPROVAL 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING AND SPRING,
ASSEMBLY OF.

CODE IDENT NO.
SIZE C
NASA NUMBER 1011911.
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011911

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTES: (A1)
1-INTERPRET DWG IN ACCORDAN WITH MIL-D-70327
2-REFER TO WIRING SCHEMATIC, NASA DRAWING NO. 1015129
3-TWIST CONDUCTORS IN ACCORDANCE WITH ND-1002032
4-SLIDE ITEM 9 OVER WIRES BEYOND STRIPPED ENDS
5-SOLDER CONDUCTORS, PER WIRING LENGEND, WITH Sn60WRP2 PER QQ-S-571, PER MSFC-PROC-158
6-LACE CONDUCTORS, USING ITEM 4, IN ACCORDANCE WITH ND1002032

A	1011913

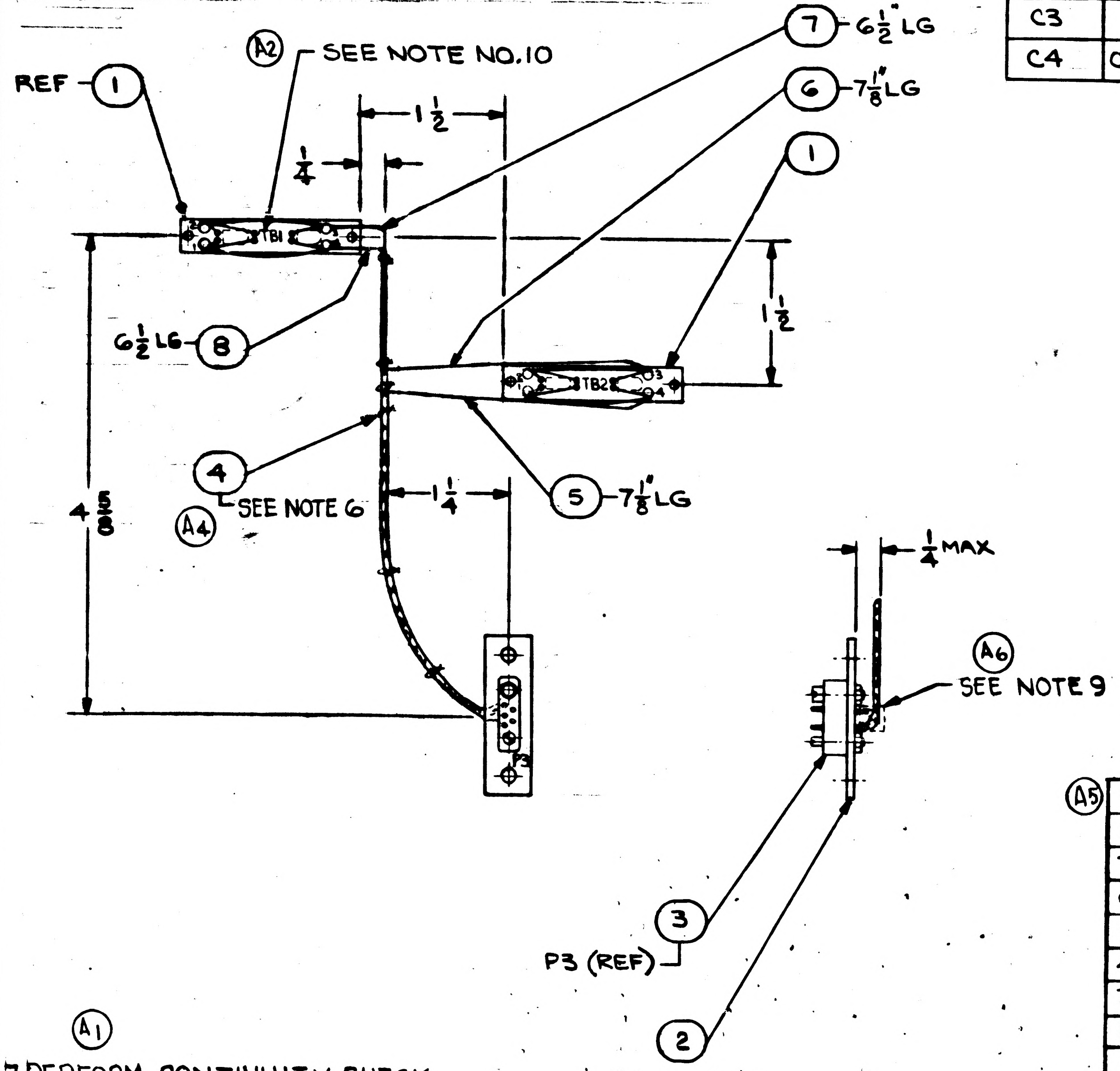
(A3)

WIRING LEGEND

COND NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 3
C1	BROWN	7	P3-C	TB1-3	8
C2	BLACK	8	P3-D	TB1-4	
C3	RED	6	P3-C	TB2-3	8
C4	ORANGE	5	P3-D	TB2-4	

REVISIONS TDRR 02624

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A6		REVISED DER TDRR NO. 07522	4-7-64	Jeb



(A1)
7-PERFORM CONTINUITY CHECK
8-SLIDE ITEM 9 OVER SOLDERED JOINTS AND SHRINK
9-POT IN ACCORDANCE WITH ND1002009 METHOD C.
A-POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION
B-POTTING SHALL COVER WIRE INSULATION FOR A MIN. OF 1/8 IN.
10-MARK REFERENCE DESIGNATION 1/8 INCH HIGH IN ACCORDANCE WITH ND1002019

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

(A5)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
9	2	*	1010490-054	—//—		INSULATION-SLEEVING, ELECTRICAL, HEATSHRINKABLE			
8	1	*	1010416-11	—//—		WIRE, ELECTRICAL, STRANDED, INSULATED			
7	1	*	1010416-12	—//—		WIRE, ELECTRICAL, STRANDED, INSULATED			
6	1	*	1010416-13	—//—		WIRE, ELECTRICAL, STRANDED, INSULATED			
5	1	*	1010416-14	—//—		WIRE, ELECTRICAL, STRANDED, INSULATED			
4	AR	*	1011753	—//—		TAPE, LACING & TYING			
3	1	*	1011647	68502017501		CONNECTOR, ELECTRICAL (5 PINS)			
2	1		1011331	52386900670		PLATE, CONNECTOR MTG			
1	2		1011900	85386900970		LAMP & TERMINAL BOARD, ASSY OF			

LIST OF PARTS AND MATERIALS

1011784	1011000
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/8	± —	± —

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386901000

DRAWN J Sellen DATE 8-14-63
CHECKED 8-15-63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LAMP & HARNESS, ASSY OF

CODE IDENT NO.
SIZE C
NASA NUMBER 1011913
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011913 A

E-154
K+E ALBANENE TRACING CLOTH

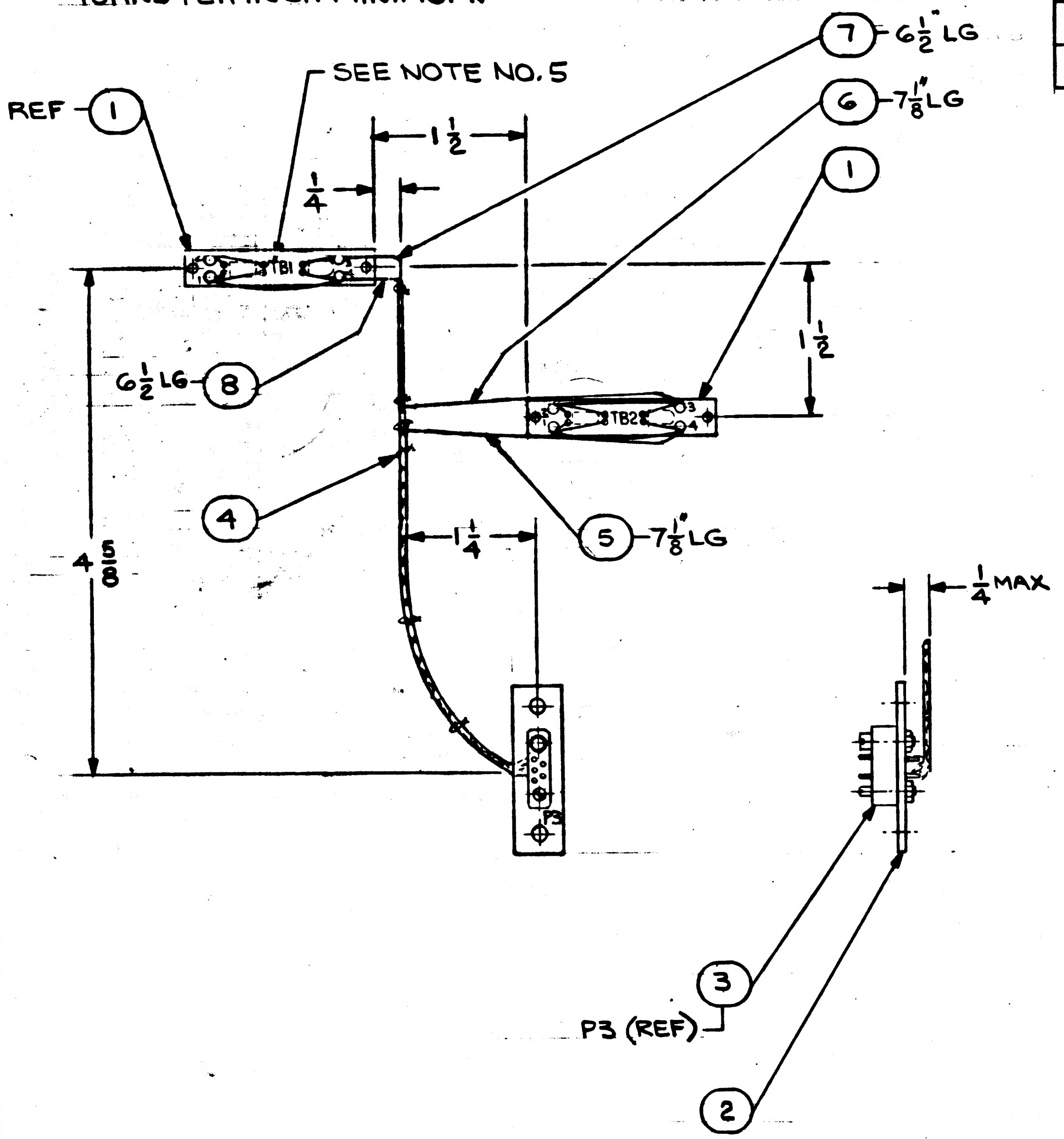
1011913

REVISIONS TDRR 02624				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING SCHEMATIC, NASA DWG NO. 1015129.
3. SOLDER PER MSFC-PROC-158.
4. LACE WIRE PER ND 1002032.
5. MARK CHARACTERS IN APPROX LOCATION SHOWN PER ND 1002019. (1/8 HIGH) 3 PLACES
6. TWISTED CONDUCTORS TO CONSIST OF FOUR (4) FULL TURNS PER INCH MINIMUM.

WIRING LEGEND					
COND NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 6
C1	BROWN	7	P3-C	TB1-3	8
C2	BLACK	8	P3-D	TB1-4	
C3	RED	6	P3-C	TB2-3	8
C4	ORANGE	5	P3-D	TB2-4	



MASTER

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
8	1	*	1010416-11	—‖—		WIRE, ELECTRICAL, STRANDED, INSULATED			
7	1	*	1010416-12	—‖—		WIRE, ELECTRICAL, STRANDED, INSULATED			
6	1	*	1010416-13	—‖—		WIRE, ELECTRICAL, STRANDED, INSULATED			
5	1	*	1010416-14	—‖—		WIRE, ELECTRICAL, STRANDED, INSULATED			
4	AR	*	1011753	—‖—		TAPE, LACING & TYING			
3	1	*	1011647	68502017501		CONNECTOR, ELECTRICAL (5 PINS)			
2	1		1011331	52386900670		PLATE, CONNECTOR MTG			
1	2		1011900	85386900970		LAMP & TERMINAL BOARD, ASSY OF			

LIST OF PARTS AND MATERIALS

APPLICATION	
NEXT ASSY	USED ON
1011784	1011000

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/8	± x	± x

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386901000

DRAWN J. Sellers DATE 8-14-63
CHECKED 8-15-63
APPROVAL 8-15-63
APPROVAL 8-15-63
NASA APPROVAL W. J. 8-16-63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LAMP & HARNESS,
ASSY OF

CODE IDENT NO. | SIZE C | NASA NUMBER 1011913
SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

E-184

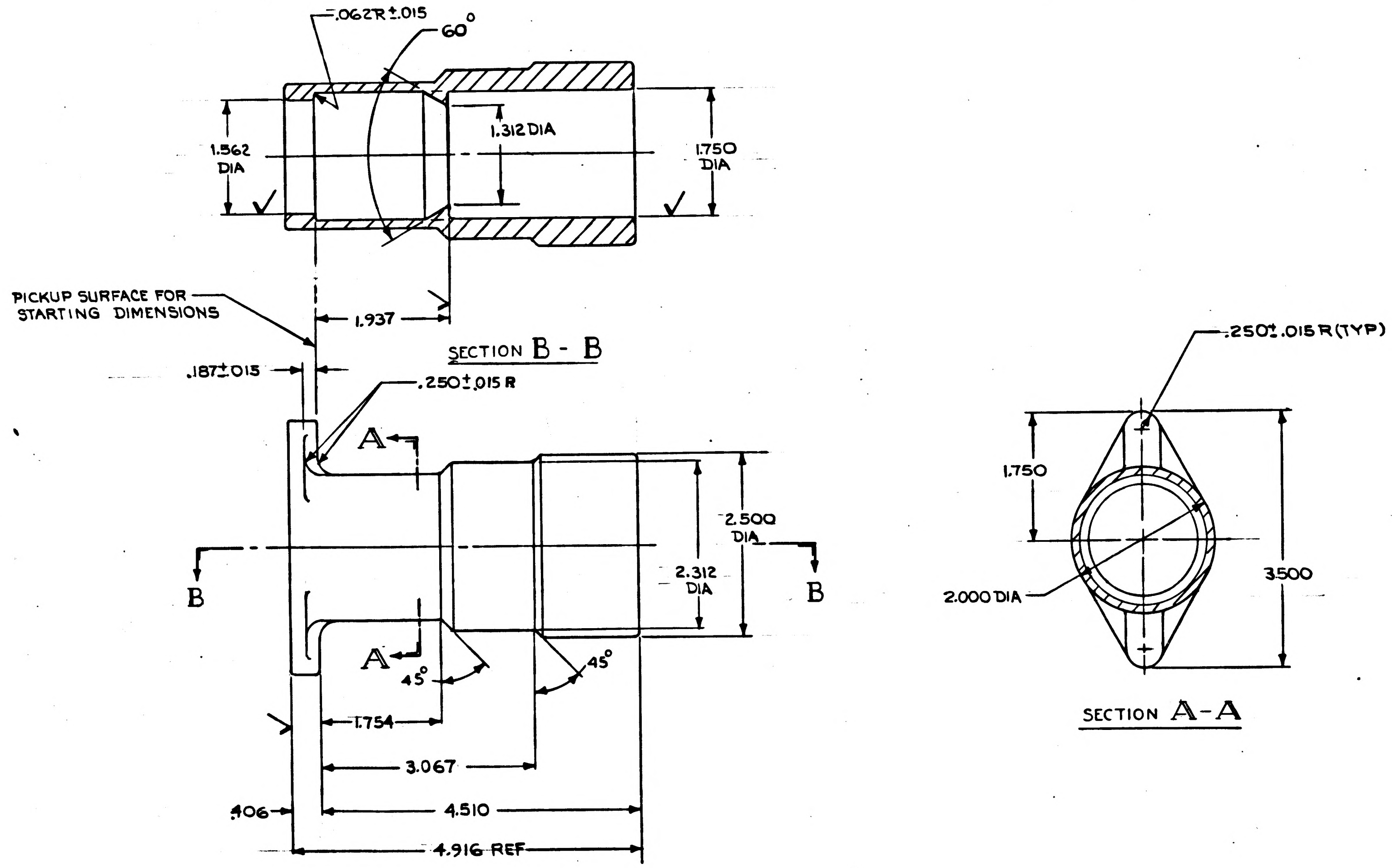
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011913

1011914

SYM	ZONE	REVISIONS DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. MATERIAL: INVESTMENT CASTING ALUMINUM ALLOY.
   FED. SPEC MIL-C-11866(Ord) ALLOY COMPOSITION NO.2 (356 COMM. DESIGNATION) TEMPER T6.
3. CORNER RADII AND FILLETS .031R UNLESS OTHERWISE SPECIFIED.
4. SURFACES MARKED ✓ WILL BE MACHINED. DIMENSIONS INCLUDE ALLOWANCE FOR MACHINING.
5. CASTING TOLERANCE ±.005 INCH/INCH. FOR DIMENSIONS LESS THAN ONE INCH – ±.005.
6. SURFACES NOT MACHINED, TO HAVE A CAST FINISH OF 125 RMS (MAX.).



.062R±.015
60°
1.562 DIA
1.312 DIA
1.750 DIA
PICKUP SURFACE FOR STARTING DIMENSIONS
1.937
SECTION B - B
.187±.015
.250±.015 R
A
A
2.500 DIA
2.312 DIA
B
B
45°
45°
1.754
3.067
4.510
.406
4.916 REF
.250±.015 R (TYP)
1.750
2.000 DIA
3.500
SECTION A-A

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011961	1011000
1011915	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ± — ANGLES ± 5°
DO NOT SCALE THIS DRAWING
MATERIAL: SEE NOTE 2
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 21386900090

DRAWN E. DRAPALA DATE 12-4-63
CHECKED T. SULLIVAN 12-12-63
APPROVAL 12/16/63
APPROVAL E. Thorup 12/17/63
NASA APPROVAL
MIT APPROVAL C. Wafel 12/17/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, EYEPIECE, SCT
(CASTING)

CODE IDENT NO.
SIZE D
NASA NUMBER 1011914
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

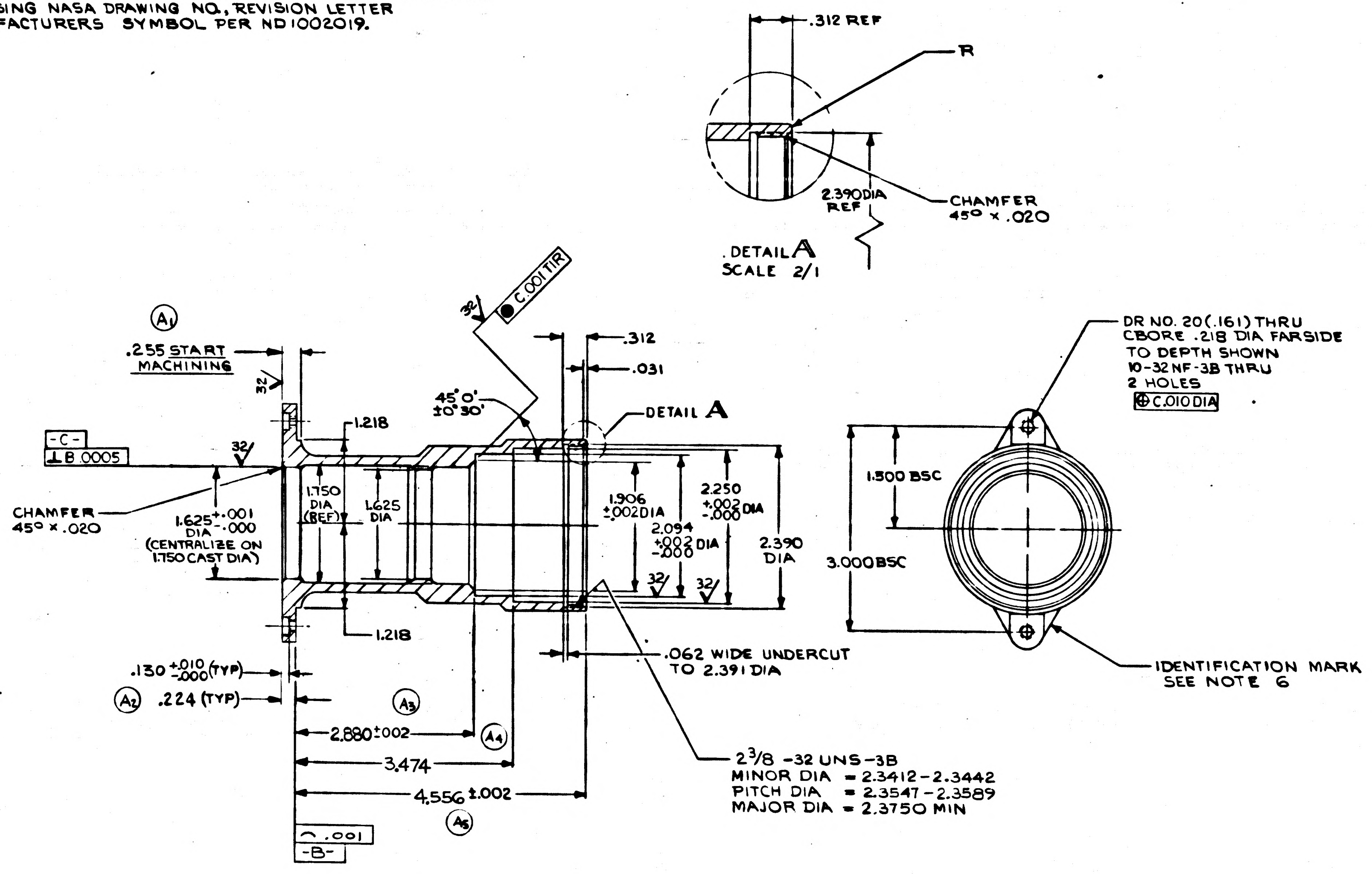
1011914

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ON ALL MACHINED SURFACES
   b. BREAK CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. BLACK ANODIZE PER MIL-A-8625 TYPE II BLACK (KPS-1005A.201)
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019.

A	1011915

REVISIONS TCC 05232

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A 5		REVISED PER TDRR NO. 13443	10-14-64	JHB



.312 REF
R
2.390 DIA REF
CHAMFER 45° × .020
DETAIL A
SCALE 2/1
A1
.255 START MACHINING
32
C.001 TIR
45° 0' ±0° 30'
.312
.031
DETAIL A
-C-
⊥ B .0005
1.218
CHAMFER 45° × .020
1.625 +.001 -.000 DIA (CENTRALIZE ON 1.750 CAST DIA)
1.750 DIA (REF)
1.625 DIA
1.906 ±.002 DIA
2.094 +.002 -.000 DIA
2.250 +.002 -.000 DIA
2.390 DIA
1.218
.062 WIDE UNDERCUT TO 2.391 DIA
.130 +.010 -.000 (TYP)
A2
.224 (TYP)
A3
2.880 ±.002
A4
3.474
4.556 ±.002
A5
⌒ .001
-B-
2 3/8 -32 UNS-3B
MINOR DIA = 2.3412-2.3442
PITCH DIA = 2.3547-2.3589
MAJOR DIA = 2.3750 MIN
DR NO. 20(.161) THRU
CBORE .218 DIA FARSIDE
TO DEPTH SHOWN
10-32 NF-3B THRU
2 HOLES
⊕ C.010 DIA
1.500 BSC
3.000 BSC
IDENTIFICATION MARK
SEE NOTE 6

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011788	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL 1011914

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900970

DRAWN E. DRAPALA DATE 7-8-63
CHECKED 9-3-63
APPROVAL 10/4/63
APPROVAL E. Thomp 12/12/63
NASA APPROVAL K Michel 1/4
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, LONG EYE RELIEF
EYEPIECE, SCT

CODE IDENT NO.
SIZE D
NASA NUMBER 1011915
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011915 A

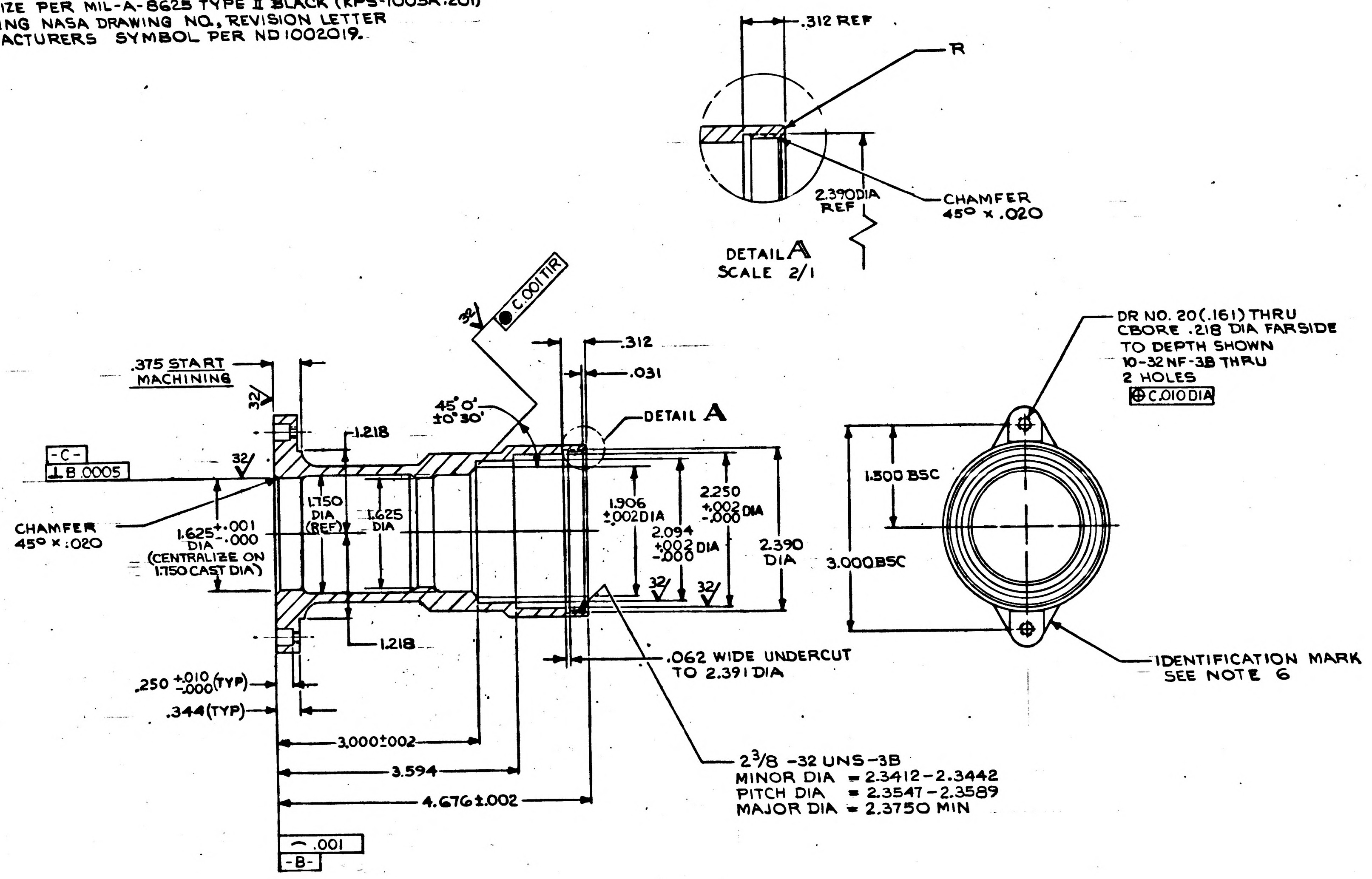
1011915

REVISIONS TORG 05239

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63/√ FINISH ON ALL MACHINED SURFACES
   b. BREAK CORNERS IN ACCORDANCE WITH ND1002078.
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079.
5. BLACK ANODIZE PER MIL-A-8625 TYPE II BLACK (KPS-1005A.201)
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019.


.312 REF
R
2.390 DIA REF
CHAMFER 45° x .020
DETAIL A SCALE 2/1
C.001 TIR
32
.312
.031
.375 START MACHINING
45° 0' ±0° 30'
DETAIL A
1.218
-C-
⊥ B .0005
CHAMFER 45° x .020
1.625 +.001 -.000 DIA (CENTRALIZE ON 1.750 CAST DIA)
1.750 DIA (REF)
1.625 DIA
1.906 ±.002 DIA
2.094 +.002 -.000 DIA
2.250 +.002 -.000 DIA
2.390 DIA
1.218
.062 WIDE UNDERCUT TO 2.391 DIA
.250 +.010 -.000 (TYP)
.344 (TYP)
3.000±.002
3.594
4.676±.002
2 3/8 -32 UNS-3B
MINOR DIA = 2.3412-2.3442
PITCH DIA = 2.3547-2.3589
MAJOR DIA = 2.3750 MIN
⌒ .001
-B-
DR NO. 20 (.161) THRU
CBORE .218 DIA FARSIDE
TO DEPTH SHOWN
10-32 NF-3B THRU
2 HOLES
⊕ C.010 DIA
1.500 BSC
3.000 BSC
IDENTIFICATION MARK SEE NOTE 6

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011788	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL 1011914

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386900970

DRAWN E. DRAPALA DATE 7-8-63
CHECKED 9-3-63
APPROVED 10/
APPROVAL 12/ /63
NASA APPROVAL
MIT APPROVAL 12/17/

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
HOUSING, LONG EYE RELIEF
EYEPIECE, SCT

CODE IDENT NO.	SIZE	NASA NUMBER
	D	1011915

SCALE 1/1 WEIGHT CALC ACTUAL SHEET OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011915

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

8161101

REVISIONS 02919			
SYM	DESCRIPTION	DATE	APPROVAL

REQUIREMENTS

I GENERAL:

A. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.

C. PACKING & SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD IA

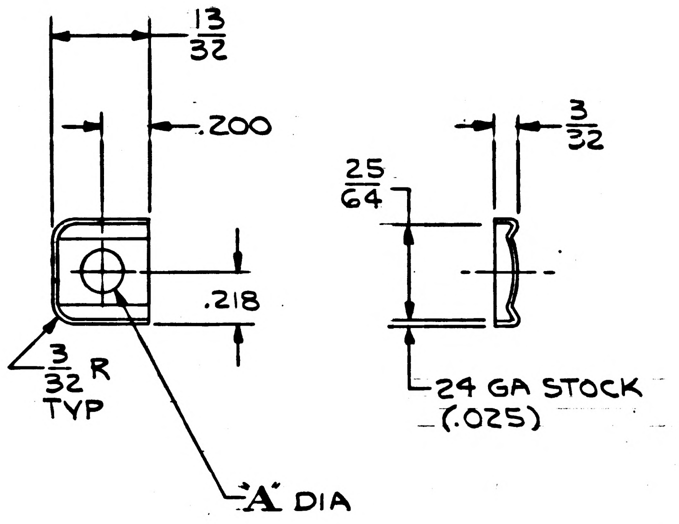
2. INSPECTION AND ACCEPTANCE

A. MECHANICAL REQUIREMENTS

1. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED WITH NASA NUMBER, REVISION LETTER & MANUFACTURERS IDENTIFICATION PER MIL-STD-129

2. IDENTIFY USING NASA DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL PER ND 1002019

3. NICKEL PLATE CLASS I MATTE, IN ACCORD WITH FED. SPEC QQ-N-290, TYPE II (FS)



NASA DWG NO	DIM A
1011918-1	.128
1011918-2	.140
1011918-3	.167

MASTER

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
± 1/64	± .005	± —

DO NOT SCALE THIS DRAWING

MATERIAL CARBON STEEL COND CD ANL, COMP I FED SPEC QQ-S-640

HEAT TREATMENT

FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT

DRAWN R. BRUNELLE DATE 8-8-63
CHECKED W. Cabin 8-9-63
APPROVAL 8/9/63
APPROVAL 8/28/63
NASA APPROVAL 9/5/63
MIT APPROVAL 9/5/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WASHER,
CABLE CLAMP
(SPECIFICATION CONTROL DRAWING)

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1011918
SCALE 2/1
WT
SHEET 1 OF 1

8161101

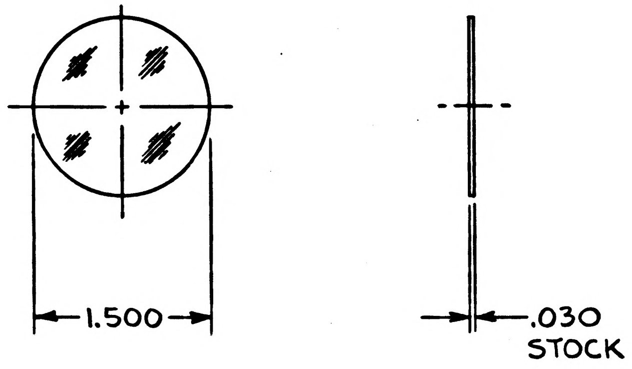
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

		REVISIONS TORR 05006		
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

1011923

REQUIREMENTS:-

1. GENERAL:
   - A. INTERPRET DWG IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404 CLASS 3.
   - C. PACKING & SHIPPING PER MIL-P-116 SUB METHOD IA 8, IN INDIVIDUAL BAGS.
2. INSPECTION & ACCEPTANCE:
   - A. MARK EACH BAG WITH NASA DRAWING, LATEST REVISION LETTER AND MANUFACTURER'S IDENTIFICATION PER ND 1002019.
   - B. PART SHALL CONFORM TO REQUIREMENTS OF MIL-O-13830.
     1. SURFACE QUALITY: 60-40 ALL OVER.
     2. RESOLUTION: 1 MINUTE OF ARC OR BETTER.
     3. DEVIATION: 5 MINUTES OF ARC MAX.
3. DESIGN REQUIREMENTS:
   - A. MECHANICAL REQUIREMENTS:
     1. MATERIAL - POLAROID FILM HN32 LAMINATED IN CELLULOSE ACETATE BUTYRATE.
   - B. OPTICAL REQUIREMENTS:
     1. SINGLE PART TRANSMISSION FOR NORMAL INCIDENT LIGHT SHALL BE 32% ± 5% OVER VISIBLE SPECTRUM.
     2. TRANSMISSION SHALL NOT EXCEED 0.5% AT THE MINIMUM POINT.



PROCURE ONLY FROM APPROVED SOURCES
ON ND 1002034 FOR THIS DRAWING

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011931	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	±.005	± ~

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 25386900080

DRAWN V.AMATO DATE 8-9-63
CHECKED 9-10-63
APPROVAL 10/14/61
APPROVAL E. Thorup 12/6/63
NASA APPROVAL 12/4/63
MIT APPROVAL 12/10/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
POLARIZATION FILTER
(SOURCE CONTROL DRAWING)

CODE IDENT NO.
SIZE C
NASA NUMBER 1011923
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

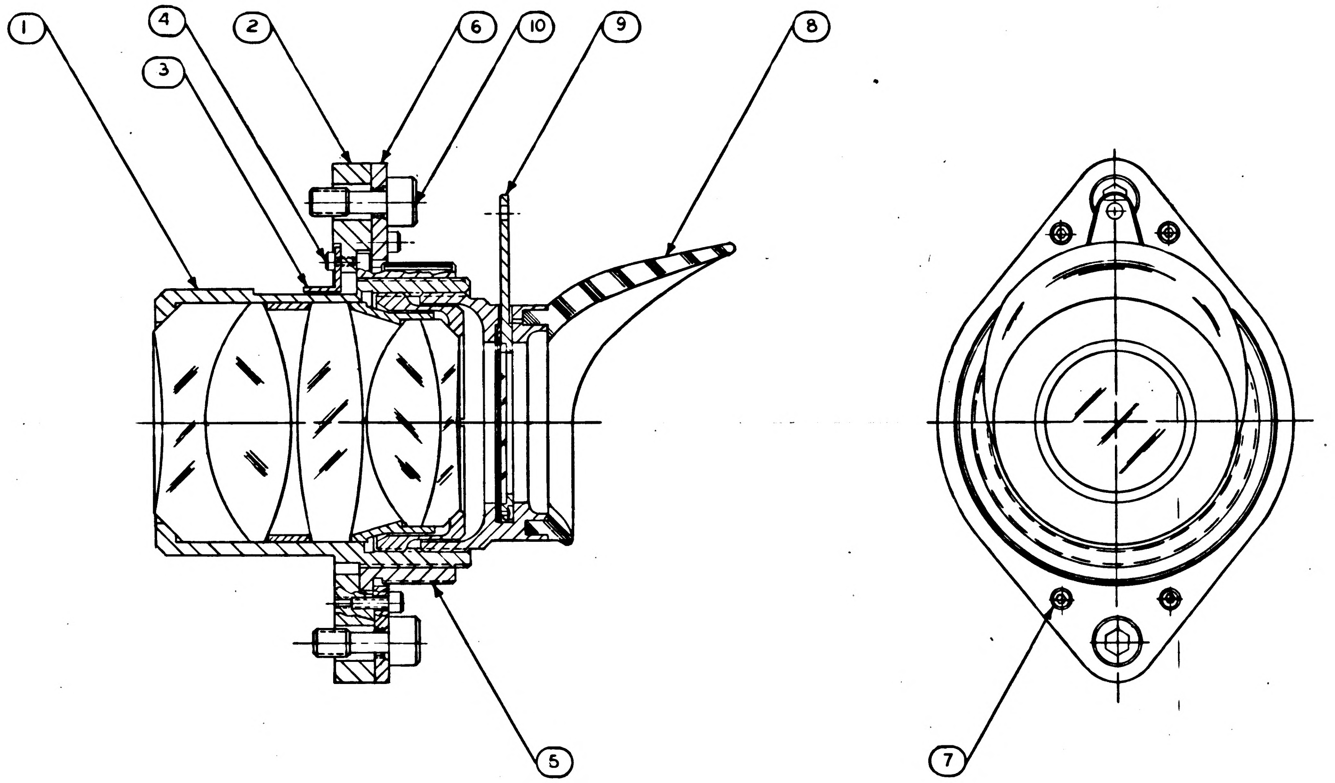
E-154

1011923

1011932

REVISIONS 02744				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. ASSEMBLE PER A.T.P. 1011932



10	2		1011282	45386900140		SCREW, CAPTIVE HEX SOCKET HEAD			
9	1		1011790	85386900550		POLAROID FILTER AND SPRING, ASSY OF			
8	1		1011789	85386900560		SXT EYEGUARD ASSEMBLY			
7	4	NAS	1352C02LL4	74455157006		SCREW, CAP, SOCKET HEAD-SELF LOCKING			
6	1		1011874	52386900940		RETAINER, ADJUSTMENT NUT			
5	1		1011881	57386901510		RING, ADJUSTING			
4	2	NAS	1352C01LL2	74455157001		SCREW, CAP, SOCKET HEAD-SELF LOCKING			
3	1		1011882	52386900960		KEY			
2	1		1011880	52386900950		PLATE, MOUNTING			
1	1		1011793	85386900810		HOUSING AND LENS, ASSY OF			
ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011000	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386901040
DRAWN E.DRAPALA DATE 8-21-63
CHECKED 8-27-63
APPROVAL 8-27-63
APPROVAL 8-29-63
NASA APPROVAL
MIT APPROVAL 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
EYEPIECE, (SXT)
ASSY OF

CODE IDENT NO. SIZE D NASA NUMBER 1011932
SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

E-100

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011932

NOTES: (A1)

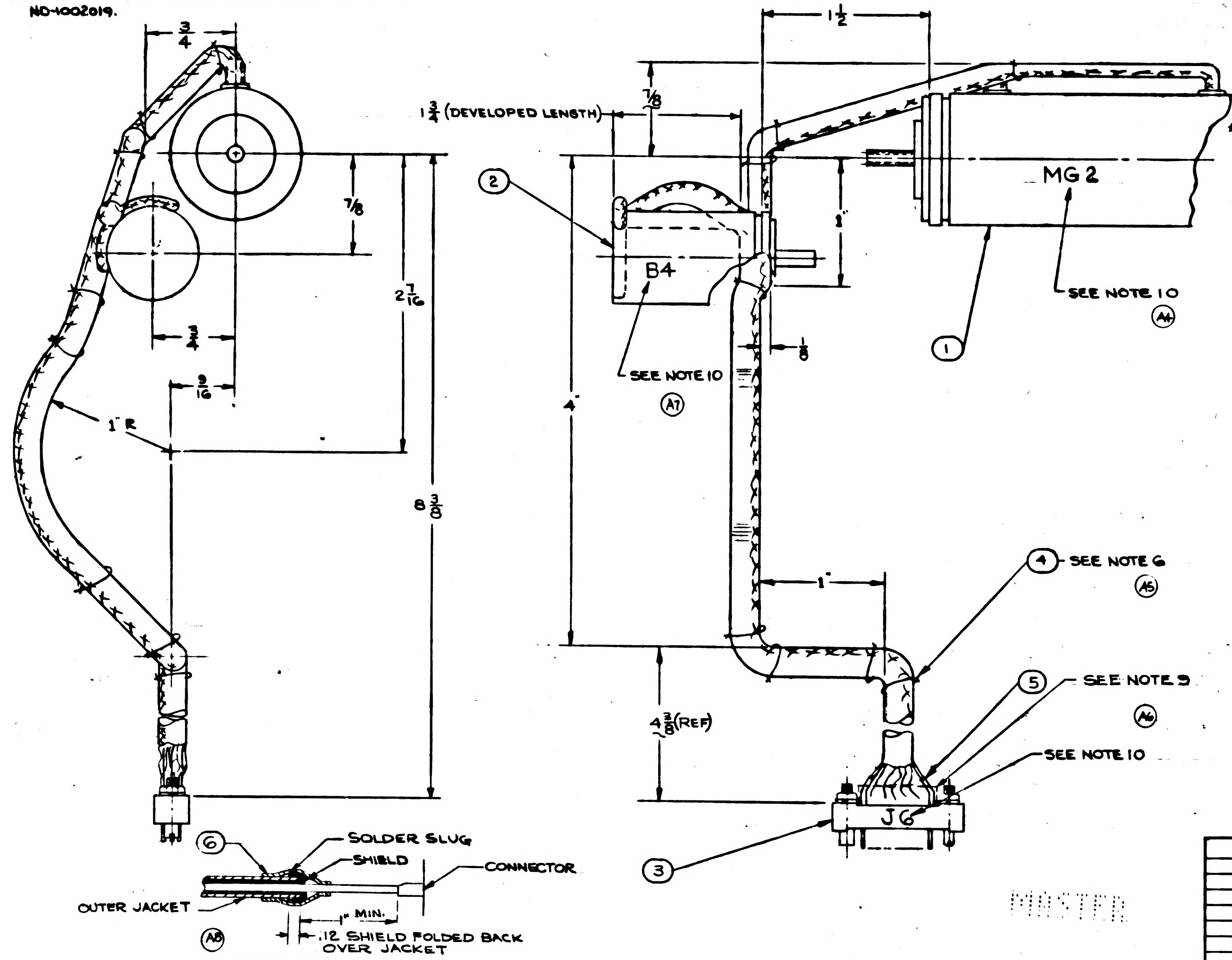
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING SCHEMATIC, NASA DWG NO. 1015122.
3. TWIST CONDUCTORS IN ACCORDANCE WITH ND-1002032.
4. SLIDE ITEM 5 OVER WIRES BEYOND STRIPPED ENDS.
5. SOLDER CONDUCTORS PER WIRING LEGEND, WITH Sn GOWRP2, PER QQ-S-571 PER MSFC-PROC-158.
6. LACE CONDUCTORS, USING ITEM 4, IN ACCORDANCE WITH ND-1002032.
7. PERFORM CONTINUITY CHECK.
8. SLIDE ITEM 5 OVER SOLDERED JOINTS AND SHRINK.
9. POT IN ACCORDANCE WITH ND-1002009, METHOD C.
   - A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
   - B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
10. MARK REF. DESIGNATIONS 1/8 IN. HIGH IN ACCORDANCE WITH ND-1002019.

REVISIONS 02944				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A8		REVISED PER TDRR NO. 07672	4-4-64	

(A2)

WIRING LEGEND					
COND. NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 3
B1	YELLOW		MG2-YELLOW	J6-C	8
B2	WHITE		MG2-WHITE	J6-B	
B3	RED		MG2-RED	J6-D	8
B4	RED-BLACK	—	MG2-RED-BLK	J6-A	
B5	BLACK	—	MG2-BLACK	J6-E	
B6	ORANGE		MG2-ORANGE	J6-F	8
B7	GRAY		MG2-GRAY	J6-H	
B8	BLUE		MG2-BLUE	J6-J	8
B9	BROWN		MG2-BROWN	J6-K	
B10*	BLUE		B4-P4	J6-M	8
B11*	YELLOW	—	B4-P2	J6-N	
B12*	RED		B4-P1	J6-P	8
B13*	BLACK		B4-P3	J6-R	
B14**	YELLOW		B4-S2	J6-S	8
B15**	BLACK		B4-S4, S3	J6-T	
B16**	RED		B4-S1	J6-U	

**- THESE THREE (3) LEADS EXIT FROM B4 TOGETHER
*- THESE FOUR (4) LEADS EXIT FROM B4 TOGETHER



DETAIL "A" NO SCALE
APPLIES TO MG2 - BLUE LEAD

MASTER

*- PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

(A3)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
6	1	*	1010402-2	—		SLEEVE, SOLDER, ELECT. COND, INSUL HEAT SHRINKABLE			
5	16	*	1010490-060	—		INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
4	AR	*	1011753	—		TAPE, LACING & TYING			
3	1	*	1011740	68502016801		CONNECTOR, ELECTRICAL			
2	1	*	1010341	—		RESOLVER, RECEIVER, ONE SPEED			
1	1	*	1010610	—		SERVO MOTOR-TACHOMETER, GENERATOR			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011705	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± 1/8 DECIMALS ± — ANGLES ± 5°
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80386900040
DRAWN J. Schiller DATE 8-23-63
CHECKED 8-28-63
APPROVAL 8-30-63
APPROVAL 9-4-63
NASA APPROVAL 7/5/63
MIT APPROVAL 10/15/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SXT SHAFT DRIVE HARNESS,
ASSY OF

CODE IDENT NO. SIZE D NASA NUMBER 1011933
SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

NOTES: Ⓐ1

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING SCHEMATIC, NASA DWG NO. 1015122.
3. TWIST CONDUCTORS IN ACCORDANCE WITH ND-1002032.
4. SLIDE ITEM 5 OVER WIRES BEYOND STRIPPED ENDS.
5. SOLDER CONDUCTORS PER WIRING LEGEND, WITH Sn 60 WRP2, PER QQ-S-571 PER MSFC-PROC-158.
6. LACE CONDUCTORS, USING ITEM 4, IN ACCORDANCE WITH ND-1002032.
7. PERFORM CONTINUITY CHECK.
8. SLIDE ITEM 5 OVER SOLDERED JOINTS AND SHRINK.
9. POT IN ACCORDANCE WITH ND-1002009, METHOD C.
   - A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
   - B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
10. MARK REF. DESIGNATIONS 1/8 IN. HIGH IN ACCORDANCE WITH ND-1002019.

B 1011933

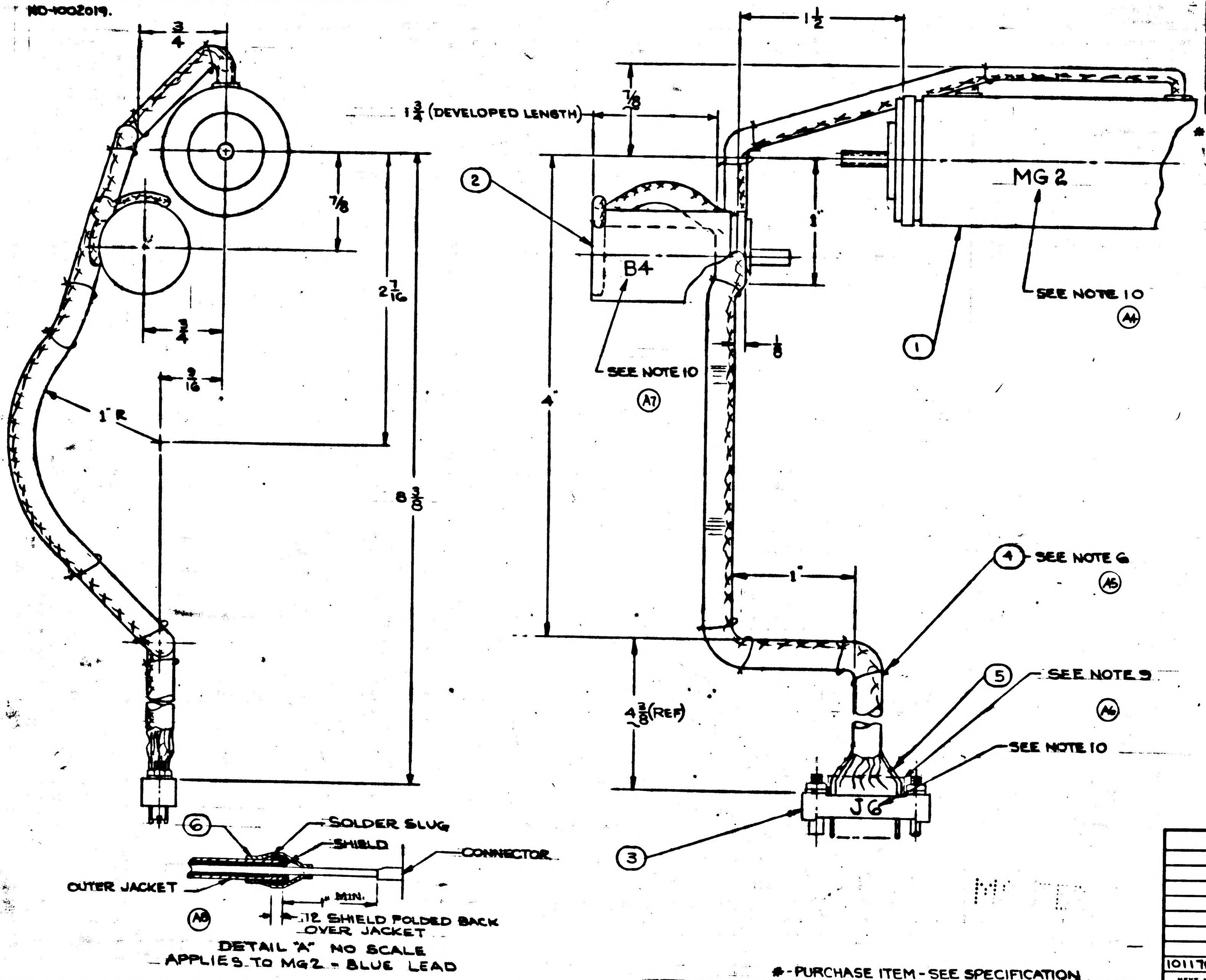
REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A8		REVISED PER TDRR NO. 07672	4-4-64	
B		REVISED PER TDRR NO. 08595	5-14-64	

Ⓐ2

WIRING LEGEND

COND. NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 3
B1	YELLOW		MG2-YELLOW	J6-C	8
B2	WHITE		MG2-WHITE	J6-B	
B3	RED		MG2-RED	J6-D	8
B4	RED-BLACK		MG2-RED-BLK	J6-A	
B5	BLACK		MG2-BLACK	J6-E	
B6	ORANGE		MG2-ORANGE	J6-F	8
B7	GRAY		MG2-GRAY	J6-H	
B8	BLUE		MG2-BLUE	J6-J	8
B9	BROWN		MG2-BROWN	J6-K	
B10#	BLUE		B4-P4	J6-M	8
B11#	YELLOW		B4-P2	J6-N	
B12#	RED		B4-P1	J6-P	8
B13#	BLACK		B4-P3	J6-R	
B14##	YELLOW		B4-S2	J6-S	8
B15##	BLACK		B4-S4, S3	J6-T	
B16##	RED		B4-S1	J6-U	

##- THESE THREE (3) LEADS EXIT FROM B4 TOGETHER
#- THESE FOUR (4) LEADS EXIT FROM B4 TOGETHER



DETAIL "A" NO SCALE
APPLIES TO MG2 - BLUE LEAD

#- PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

Ⓐ3 Ⓑ

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
6	1	#	1010402-2	—		SLEEVE, SOLDER, ELECT. COND, INSUL HEAT SHRINKABLE			
5	16	#	1010490-060	—		INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
4	AR	#	1011753	—		TAPE, LACING & TYING			
3	1	#	1011740	68502016801		CONNECTOR, ELECTRICAL			
2	1	#	1010341	—		RESOLVER, RECEIVER, ONE SPEED			
1	1	#	1010610-1 OR 1010610-2	—		SERVO MOTOR-TACHOMETER, GENERATOR			

LIST OF PARTS AND MATERIALS

1011705	1011000
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/8; DECIMALS ± —; ANGLES ± 5°
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80386900040
DRAWN J. DeDillo DATE 8-28-63
CHECKED 8-28-63
APPROVAL 8-30-63
APPROVAL 9-4-63
NASA APPROVAL 7/5/63
MIT APPROVAL 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SXT SHAFT DRIVE HARNESS, ASSY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011933
SCALE 2/1
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

1011933 B

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING SCHEMATIC, NASA DWG NO. 1015122.
3. TWIST CONDUCTORS IN ACCORDANCE WITH ND-1002032.
4. SLIDE ITEM 5 OVER WIRES BEYOND STRIPPED ENDS.
5. SOLDER CONDUCTORS PER WIRING LEGEND, WITH Sn 60 WRP2, PER QQ-S-571 PER MSFC-PROC-158.
6. LACE CONDUCTORS, USING ITEM 4, IN ACCORDANCE WITH ND-1002032.
7. PERFORM CONTINUITY CHECK.
8. SLIDE ITEM 5 OVER SOLDERED JOINTS AND SHRINK.
9. POT IN ACCORDANCE WITH ND-1002009, METHOD C.
   A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
   B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
10 MARK REF. DESIGNATIONS 1/8 IN. HIGH IN ACCORDANCE WITH ND-1002019.

(A1)

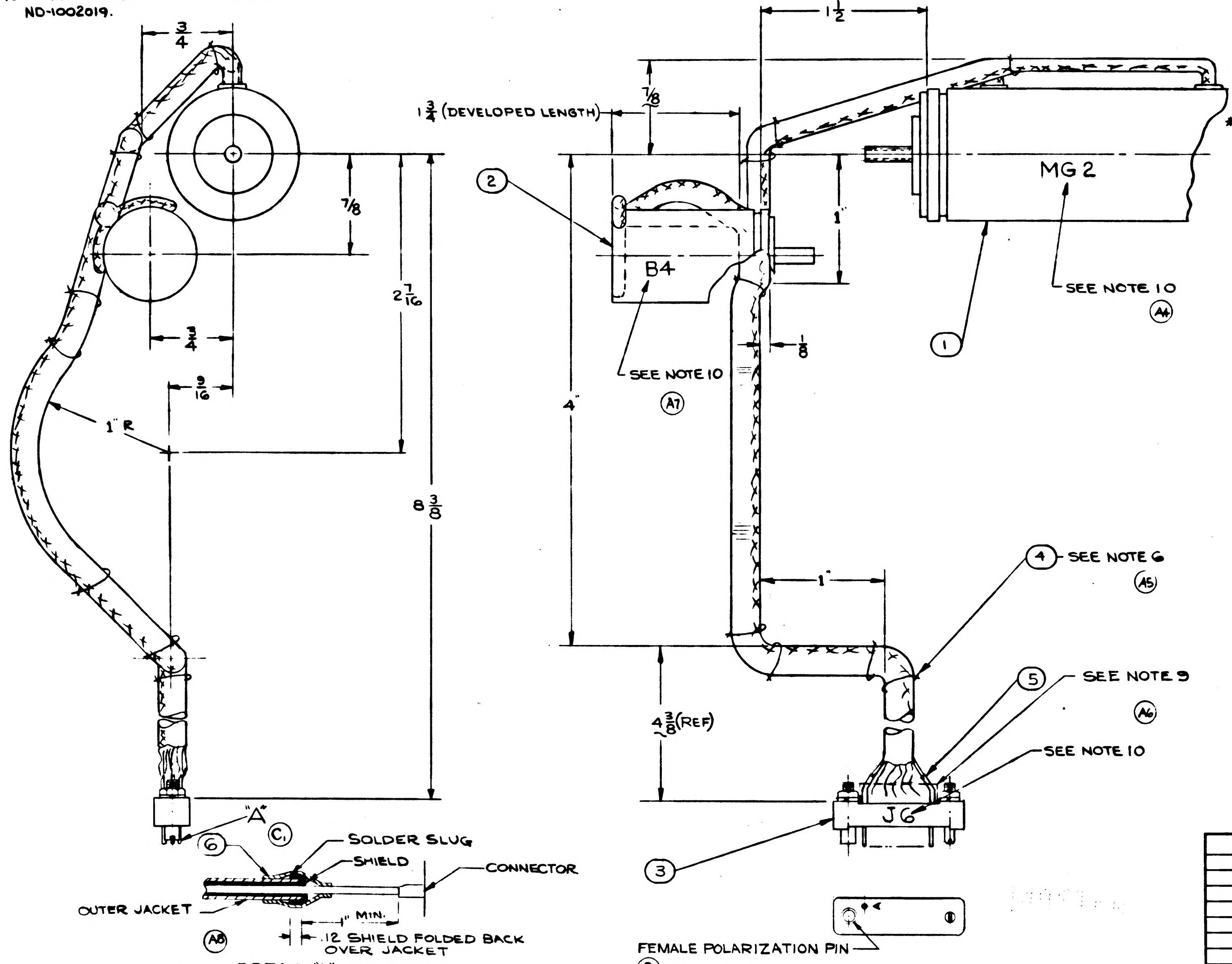
C	1011933

(A2)

WIRING LEGEND					
COND. NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 3
B1	YELLOW		MG2-YELLOW	J6-C	8
B2	WHITE		MG2-WHITE	J6-B	
B3	RED		MG2-RED	J6-D	8
B4	RED-BLACK		MG2-RED-BLK	J6-A	
B5	BLACK		MG2-BLACK	J6-E	
B6	ORANGE		MG2-ORANGE	J6-F	8
B7	GRAY		MG2-GRAY	J6-H	
B8	BLUE		MG2-BLUE	J6-J	8
B9	BROWN		MG2-BROWN	J6-K	
B10*	BLUE		B4-P4	J6-M	8
B11*	YELLOW		B4-P2	J6 N	
B12*	RED		B4-P1	J6-P	8
B13 *	BLACK		B4-P3	J6-R	
B14**	YELLOW		B4-S2	J6-S	8
B15**	BLACK		B4-S4, S3	J6-T	
B16**	RED		B4-S1	J6-U	

**- THESE THREE (3) LEADS EXIT FROM B4 TOGETHER
*- THESE FOUR (4) LEADS EXIT FROM B4 TOGETHER

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A8		REVISED PER TDRR NO. 07672	4-4-64	
B		REVISED PER TDRR NO 08595	5-9-64	
C2		REVISED PER TDRR NO. 12849	9/23/64	


SEE DETAIL "A"
3/4
1 3/4 (DEVELOPED LENGTH)
7/8
1 1/2
7/8
1"
2 7/16
3/4
9/16
1" R
8 3/8
4"
1/8
2
B4
SEE NOTE 10
(A7)
MG 2
SEE NOTE 10
(A4)
1
1"
4 - SEE NOTE 6
(A5)
5
SEE NOTE 9
(A6)
SEE NOTE 10
4 3/8 (REF)
J6
3
FEMALE POLARIZATION PIN
(C2)
"A"
(C1)
6
SOLDER SLUG
SHIELD
CONNECTOR
OUTER JACKET
1" MIN.
.12 SHIELD FOLDED BACK OVER JACKET
(A8)

DETAIL "A" NO SCALE
APPLIES TO MG2 - BLUE LEAD

*- PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

(A3)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
6	1	*	1010402-2	—		SLEEVE, SOLDER ELECT. COND, INSUL HEAT SHRINKABLE			
5	16	*	1010490-060	—		INSULATION-SLEEVING. ELECTRICAL, HEAT SHRINKABLE			
4	AR	*	1011753	—		TAPE, LACING & TYING			
3	1	*	1011740	68502016801		CONNECTOR, ELECTRICAL			
2	1	*	1010341	—		RESOLVER, RECEIVER, ONE SPEED			
1	1	*	1010610-1 OR 1010610-2	—		SERVO MOTOR-TACHOMETER, GENERATOR			

(B)

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011705	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/8; DECIMALS ± —; ANGLES ± 5°
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80386900040
DRAWN J. Schiller DATE 8-23-63
CHECKED 8-28-63
APPROVAL 8-30
APPROVAL 9-4-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SXT SHAFT DRIVE HARNESS,
ASSY OF

CODE IDENT NO. | SIZE D | NASA NUMBER 1011933
SCALE 2/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

1011933 C

NOTES:

1. NTERPRET DWG IN ACCORDANCE WITH MIL-D-70327. (A1)
2. REFER TO WIRING SCHEMATIC, NASA DWG NO. 1015122.
3. TWIST CONDUCTORS IN ACCORDANCE WITH ND-1002032.
4. SLIDE ITEM 5 OVER WIRES BEYOND STRIPPED ENDS.
5. SOLDER CONDUCTORS PER WIRING LEGEND, WITH Sn 60WRP2, PER QQ-S-571 PER MSFC-PROC-158.
6. LACE CONDUCTORS, USING ITEM 4, IN ACCORDANCE WITH ND-1002032.
7. PERFORM CONTINUITY CHECK.
8. SLIDE ITEM 5 OVER SOLDERED JOINTS AND SHRINK.
9. POT 1011933-000 CONNECTOR PER ND 1002009, METHOD C. (D1)
   POT 1011933-001 CONNECTOR PER ND1002240.
   A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
   B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
10. MARK REF. DESIGNATIONS 1/8 IN. HIGH IN ACCORDANCE WITH ND-1002019.

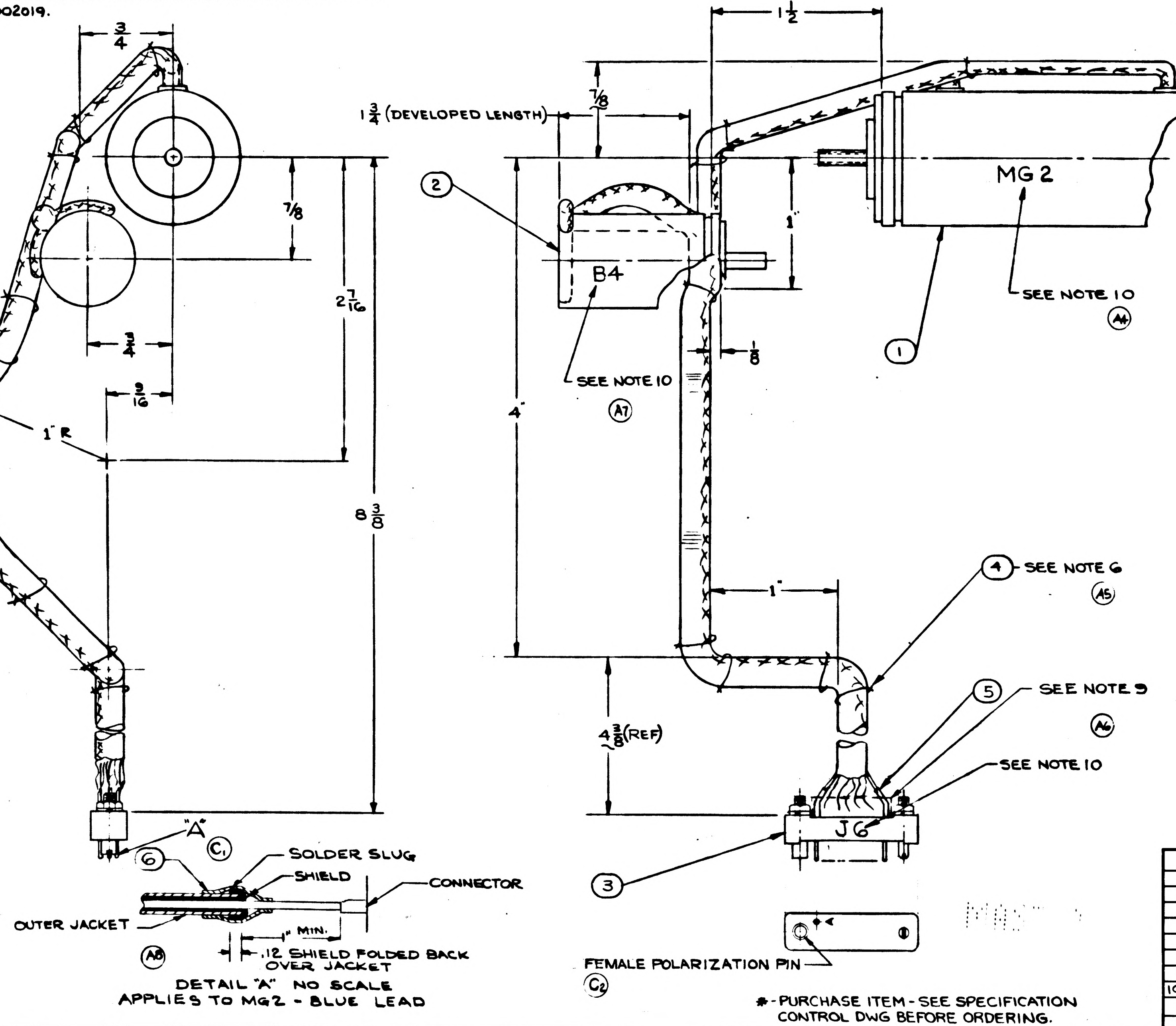
D 1011933

(A2)

WIRING LEGEND					
COND. NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 3
B1	YELLOW		MG2-YELLOW	J6-C	8
B2	WHITE		MG2-WHITE	J6-B	
B3	RED		MG2-RED	J6-D	8
B4	RED-BLACK		MG2-RED-BLK	J6-A	
B5	BLACK		MG2-BLACK	J6-E	
B6	ORANGE		MG2-ORANGE	J6-F	8
B7	GRAY		MG2-GRAY	J6-H	
B8	BLUE		MG2-BLUE	J6-J	8
B9	BROWN		MG2-BROWN	J6-K	
B10*	BLUE		B4-P4	J6-M	8
B11*	YELLOW		B4-P2	J6-N	
B12*	RED		B4-P1	J6-P	8
B13*	BLACK		B4-P3	J6-R	
B14**	YELLOW		B4-S2	J6-S	8
B15**	BLACK		B4-S4, S3	J6-T	
B16**	RED		B4-S1	J6-U	

**-THESE THREE (3) LEADS EXIT FROM B4 TOGETHER
*-THESE FOUR (4) LEADS EXIT FROM B4 TOGETHER

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A8		REVISED PER TDRR NO. 07672	4-4-64	
B		REVISED PER TDRR NO 08595	5-19-64	
C2		REVISED PER TDRR NO. 12849	9/29/64	
D2		REVISED PER TDRR NO. 16889	4/20/65	



DETAIL "A" NO SCALE
APPLIES TO MG2 - BLUE LEAD

*-PURCHASE ITEM-SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

(D2) (A3) (B)

001 QTY REQD	000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
1	1	6		*	1010402-2	—		SLEEVE, SOLDER, ELECT. COND, INSUL HEAT SHRINKABLE			
16	16	5		*	1010490-060	—		INSULATION-SLEEVING. ELECTRICAL, HEAT SHRINKABLE			
AR	AR	4		*	1011753	—		TAPE, LACING & TYING			
1	1	3		*	1011740	68502016801		CONNECTOR, ELECTRICAL			
1	1	2		*	1010341	—		RESOLVER, RECEIVER, ONE SPEED			
1	1	1		*	1010610-1 OR 1010610-2	—		SERVO MOTOR-TACHOMETER, GENERATOR			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011705	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± 1/8 DECIMALS ± — ANGLES ± 5°
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80386900040
DRAWN J. Schiller DATE 8-23-63
CHECKED 8-28-63
APPROVAL
APPROVAL 9-4-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SXT SHAFT DRIVE HARNESS,
ASSY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011933
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011933

1011933

SYM	ZONE	REVISIONS DESCRIPTION	DATE	APPROVAL

NOTES:

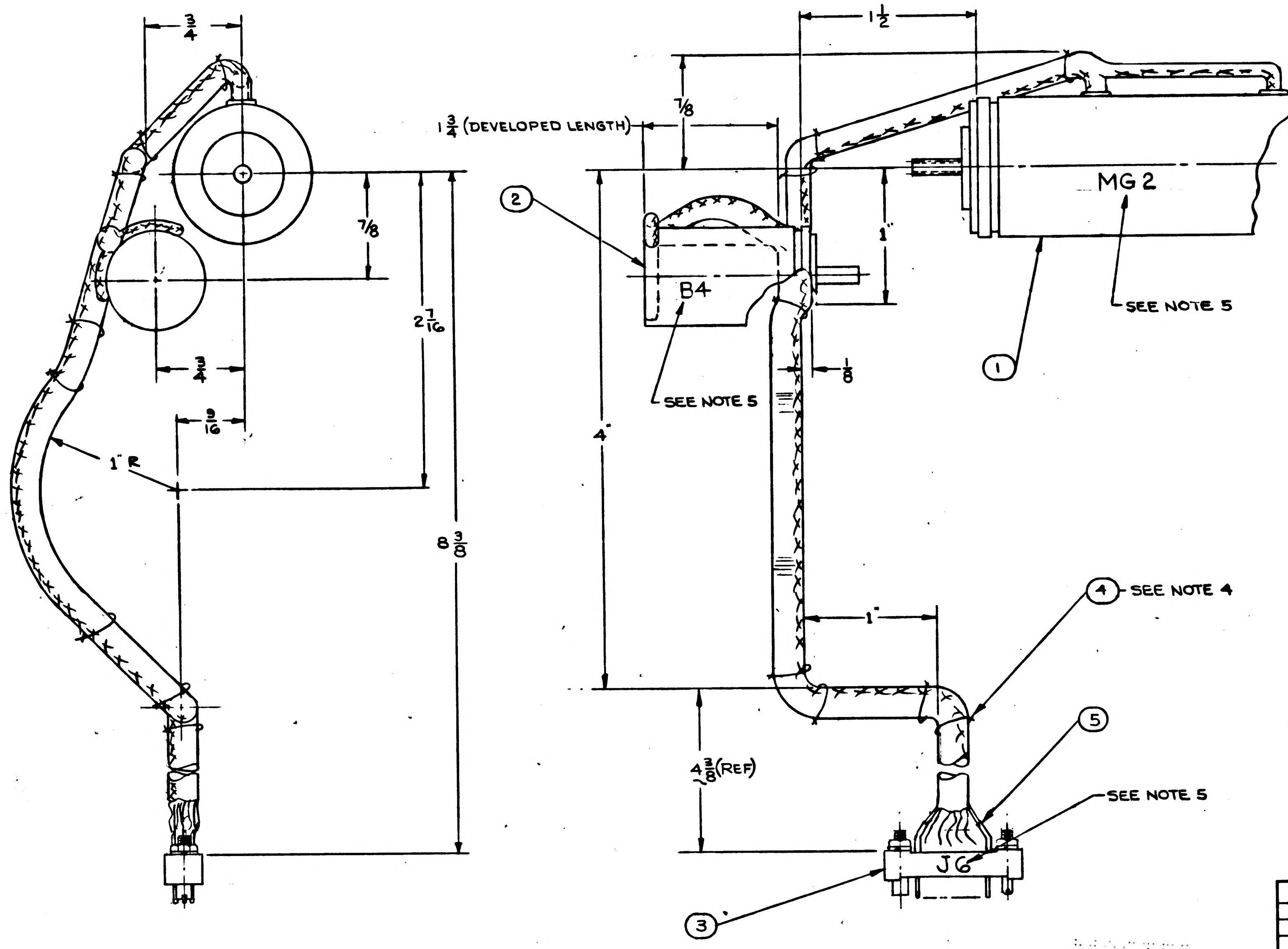
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING SCHEMATIC DWG.1015122.
3. SOLDER WIRES TO CONNECTOR IN ACCORDANCE WITH MSFC-PROC-158, USING TYPE SN60 WAR P2 SOLDER PER QQ-S-571
4. LACE WIRES IN ACCORD WITH ND1002032.
5. MARK CHARACTERS 1/8 HIGH PER ND1002019 AT LOCATIONS SHOWN.
6. TWISTED CONDUCTORS TO CONSIST OF FOUR (4) FULL TURNS PER INCH MINIMUM.
7. ASSEMBLY AND TEST PROCEDURE IN ACCORDANCE WITH ATP1011933

WIRING LEGEND

COND. NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 6
B1	YELLOW		MG2-YELLOW	J6-B	8
B2	WHITE		MG2-WHITE	J6-C	
B3	RED		MG2-RED	J6-D	8
B4	RED/BLACK		MG2-RED/BLK	J6-A	
B5	BLACK		MG2-BLACK	J6-E	
B6	ORANGE		MG2-ORANGE	J6-F	8
B7	GRAY		MG2-GRAY	J6-H	
B8	BLUE		MG2-BLUE	J6-J	8
B9	BROWN		MG2-BROWN	J6-K	
B10*	BLUE		B4-P4	J6-M	8
B11*	YELLOW		B4-P2	J6-N	
B12*	RED		B4-P1	J6-P	8
B13 *	BLACK		B4-P3	J6-R	
B14**	YELLOW		B4-S2	J6-S	8
B15**	BLACK		B4-S4,S3	J6-T	
B16**	RED		B4-S1	J6-U	

**- THESE THREE (3) LEADS EXIT FROM B4 TOGETHER

*- THESE FOUR (4) LEADS EXIT FROM B4 TOGETHER



*- PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
5	AR	*	1010490-060			INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
4	R	*	1011753	—		TAPE, LACING & TYING			
3	1	*	1011740	68502016801		CONNECTOR, ELECTRICAL			
2	1	*	1010341	—		RESOLVER, RECEIVER, ONE SPEED			
1	1	*	1010610	—		SERVO MOTOR-TACHOMETER, GENERATOR			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011705	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/8; DECIMALS ± —; ANGLES ± 5°
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80386900040
DRAWN J. Schiller DATE 8-23-63
CHECKED Borenstein 8-28-63
APPROVAL Rosenbaum 8-30-63
APPROVAL J. Siriaco 9-4-63
NASA APPROVAL 7/5/6
MIT APPROVAL 9/5/6

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SXT SHAFT DRIVE HARNESS, ASSY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011933
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011933

MASTER

INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

1011934 A

NOTES: Ⓐ1
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING SCHEMATIC, NASA DRAWING NO. 1015129.
3. TWIST CONDUCTORS IN ACCORDANCE WITH ND-1002032.
4. SLIDE ITEM 5 OVER WIRES BEYOND STRIPPED ENDS.
5. SOLDER CONDUCTORS, PER WIRING LEGEND, WITH Sn 60WRP2, PER QQ-S-571, PER MFC-PROC-158.
6. LACE CONDUCTORS, USING ITEM 4 IN ACCORDANCE WITH ND-1002032.
7. PERFORM CONTINUITY CHECK.
8. SLIDE ITEM 5 OVER SOLDERED JOINTS AND SHRINK.
9. POT IN ACCORDANCE WITH ND-1002009, METHOD C.
   A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
   B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
10. MARK REFERENCE DESIGNATIONS 1/8 INCH HIGH IN ACCORDANCE WITH ND-1002019.

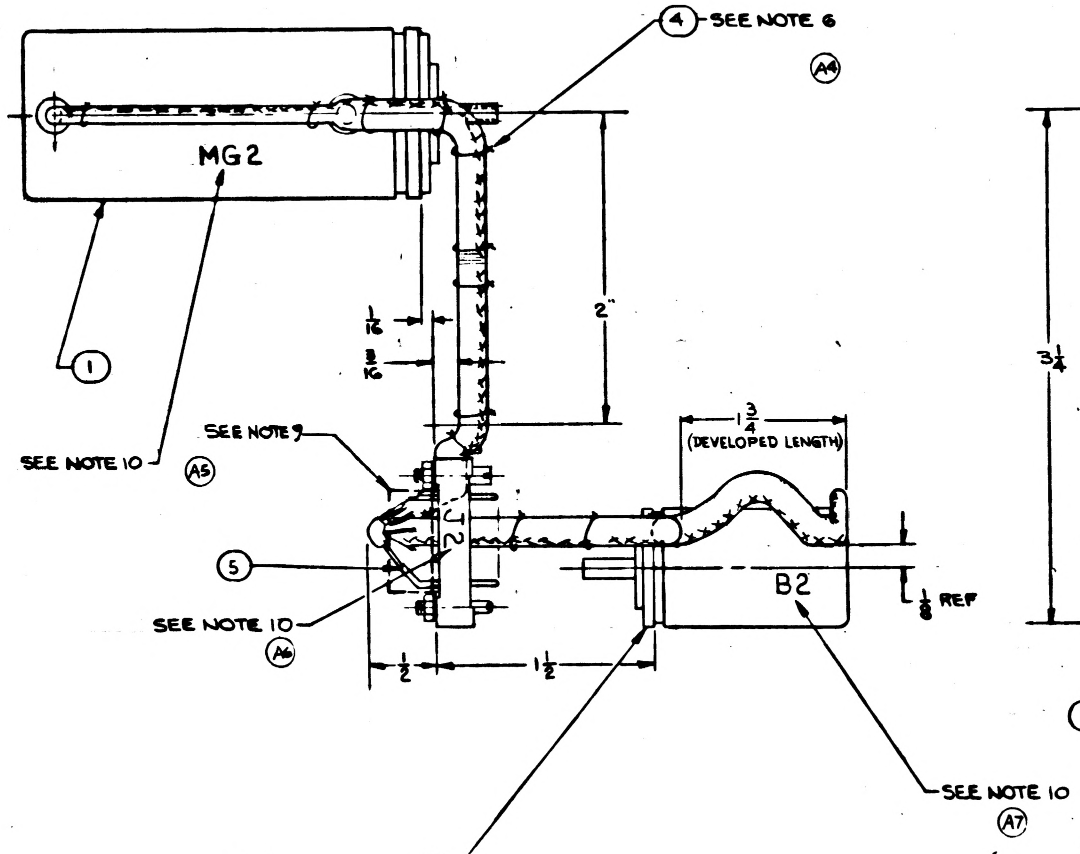
REVISIONS 02945				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR NO. 07673	4-14-64	JUB

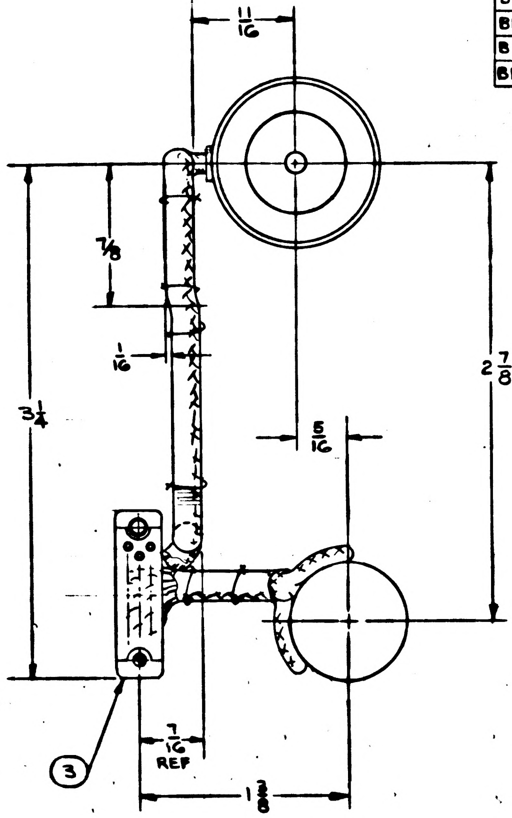
Ⓐ2

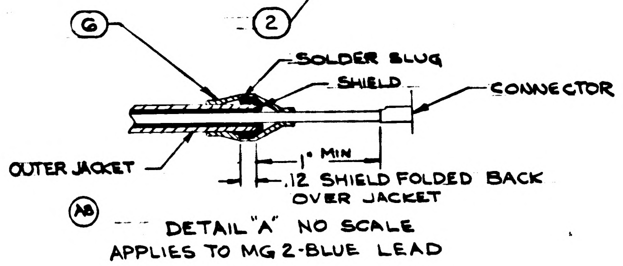
WIRING LEGEND					
COND. NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE
B1	YELLOW		M62-YELLOW	J2-B	8
B2	WHITE		M62-WHITE	J2-A	
B3	RED		M62-RED	J2-C	8
B4	RED-BLACK		M62-RED-BLK	J2-D	
B5	BLACK		M62-BLACK	J2-E	
B6	ORANGE		M62-ORANGE	J2-F	8
B7	GRAY		M62-GRAY	J2-H	
B8	BLUE		M62-BLUE	J2-J	8
B9	BROWN		M62-BROWN	J2-K	
B10*	RED		B2-S1	J2-P	8
B11*	BLACK		B2-S3	J2-M	
B12*	YELLOW		B2-S2	J2-N	
B13**	BLACK		B2-P3	J2-R	8
B14**	RED		B2-P1	J2-S	
B15**	YELLOW		B2-P2	J2-T	8
B16**	BLUE		B2-P4	J2-U	

SEE DETAIL "A"

*- THESE THREE (3) LEADS EXIT FROM B2 TOGETHER
**- THESE FOUR (4) LEADS EXIT FROM B2 TOGETHER







DETAIL "A" NO SCALE
APPLIES TO MG 2-BLUE LEAD

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

Ⓐ3

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
6	1	*	1010402-2	—		SLEEVE, SOLDER, ELECT. COND. INSUL, HEAT SHRINKABLE			
5	16	*	1010490-060	—		INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
4	AR	*	1011753	—		TAPE, LACING & TYING			
3	1	*	1011740	68502016801		CONNECTOR, ELECTRICAL			
2	1	*	1010341	—		RESOLVER, RECEIVER, ONE SPEED			
1	1	*	1010610	—		SERVO MOTOR-TACHOMETER, GENERATOR			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011703	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/8; DECIMALS ± —; ANGLES ± 5°
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80386900050

DRAWN DATE 8-22-63
CHECKED 8-28-63
APPROVAL 8-31-63
APPROVAL 9-4-63
NASA APPROVAL 9/5/63
MIT APPROVAL 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCT SHAFT DRIVE HARNESS,
ASSY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011934
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011934 A

1011934 B

NOTES: (A1)

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING SCHEMATIC, NASA DRAWING NO. 1015129.
3. TWIST CONDUCTORS IN ACCORDANCE WITH ND-1002032.
4. SLIDE ITEM 5 OVER WIRES BEYOND STRIPPED ENDS.
5. SOLDER CONDUCTORS, PER WIRING LEGEND, WITH Sn 60WRP2, PER QQ-S-571, PER MFC-PROC-158.
6. LACE CONDUCTORS, USING ITEM 4 IN ACCORDANCE WITH ND-1002032.
7. PERFORM CONTINUITY CHECK.
8. SLIDE ITEM 5 OVER SOLDERED JOINTS AND SHRINK.
9. POT IN ACCORDANCE WITH ND-1002009, METHOD C.
   - A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
   - B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
10. MARK REFERENCE DESIGNATIONS 1/8 INCH HIGH IN ACCORDANCE WITH ND-1002019.

REVISIONS 02945

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR NO. 07673	4-14-64	JWB
B		REVISED PER TDRR NO. 08593	8-19-64	JWB

(A2)

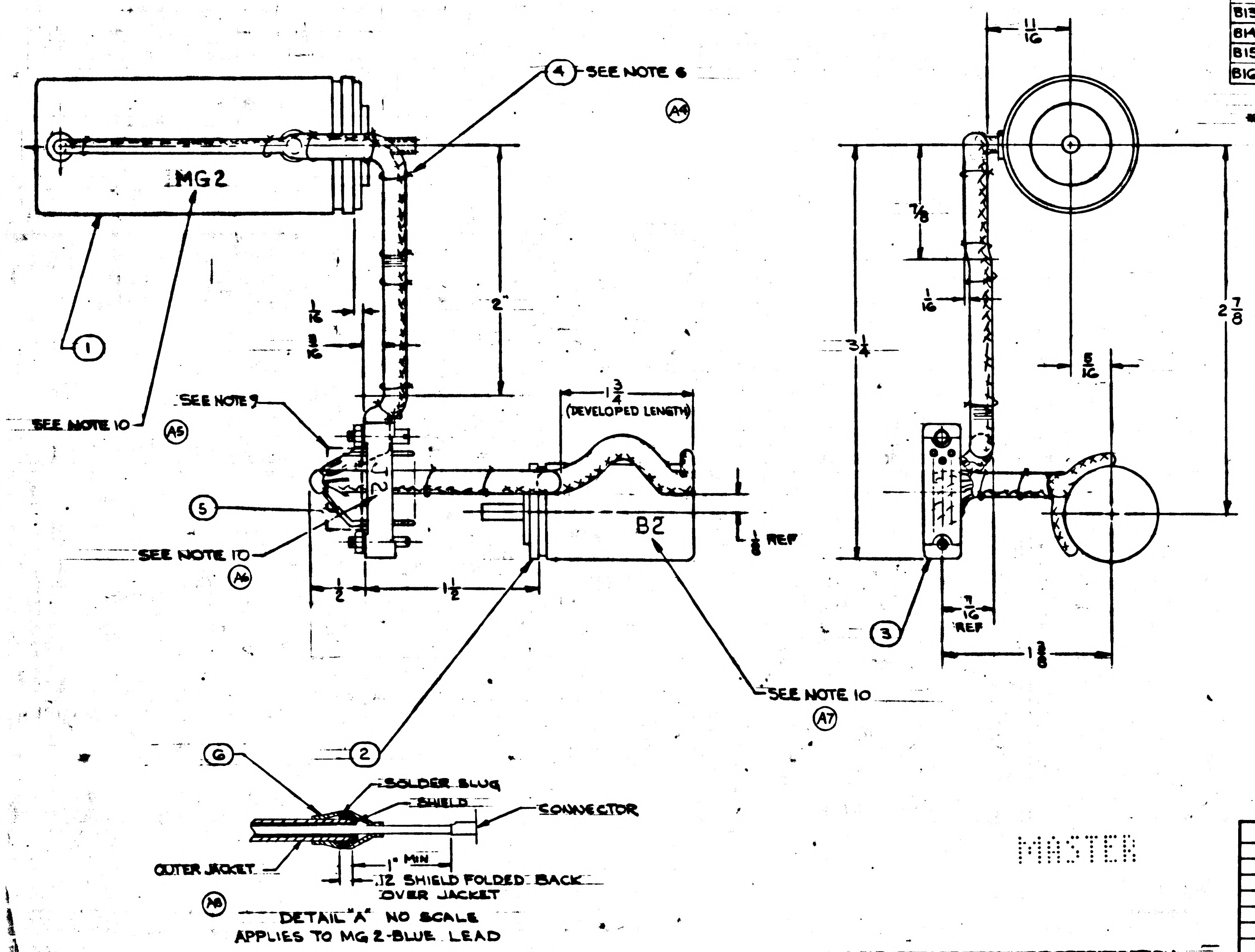
WIRING LEGEND

SEE DETAIL "A" (B8)

COND. NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTES
B1	YELLOW		M62-YELLOW	J2-B	8
B2	WHITE		M62-WHITE	J2-A	
B3	RED		M62-RED	J2-C	8
B4	RED-BLACK		M62-RED-BLK	J2-D	
B5	BLACK		M62-BLACK	J2-E	
B6	ORANGE		M62-ORANGE	J2-F	8
B7	GRAY		M62-GRAY	J2-H	
B8	BLUE		M62-BLUE	J2-J	8
B9	BROWN		M62-BROWN	J2-K	
B10*	RED		B2-S1	J2-P	8
B11*	BLACK		B2-S3	J2-M	
B12*	YELLOW		B2-S2	J2-N	
B13**	BLACK		B2-P3	J2-R	8
B14**	RED		B2-P1	J2-S	
B15**	YELLOW		B2-P2	J2-T	8
B16**	BLUE		B2-P4	J2-U	

*- THESE THREE (3) LEADS EXIT FROM B2 TOGETHER

**- THESE FOUR (4) LEADS EXIT FROM B2 TOGETHER



4 SEE NOTE 6
(A4)
MG2
1
SEE NOTE 10
(A5)
SEE NOTE 9
5
SEE NOTE 10
(A6)
J2
2"
1/16
3/16
1 3/4 (DEVELOPED LENGTH)
B2
1/8 REF
1/2
1 1/2
SEE NOTE 10
(A7)
2
11/16
7/8
1/16
3 1/4
2 7/8
5/16
7/16 REF
1 3/8
3
G
SOLDER SLUG
SHIELD
CONNECTOR
OUTER JACKET
1" MIN
.12 SHIELD FOLDED BACK OVER JACKET
(A8)
DETAIL "A" NO SCALE
APPLIES TO MG 2-BLUE LEAD

MASTER

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

(A3) (B)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
6	1	*	1010402-2	—		SLEEVE, SOLDER, ELECT. COND. INSUL, HEAT SHRINKABLE			
5	16	*	1010490-060	—		INSULATION - SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
4	AR	*	1011753	—		TAPE, LACING & TYING			
3	1	*	1011740	68502016801		CONNECTOR, ELECTRICAL			
2	1	*	1010341	—		RESOLVER, RECEIVER, ONE SPEED			
1	1	*	1010610-1 OR 1010610-2	—		SERVO MOTOR-TACHOMETER, GENERATOR			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011703	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/8; DECIMALS ± —; ANGLES ± 5°
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80386900050

DRAWN DATE 8-28-63
CHECKED 8-28-63
APPROVAL 8-29-63
APPROVAL 9-4-63
NASA APPROVAL 9/4/63
MIT APPROVAL 9/5/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCT SHAFT DRIVE HARNESS, ASSY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011934
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011934 B

1011934	C

NOTES: (A1)

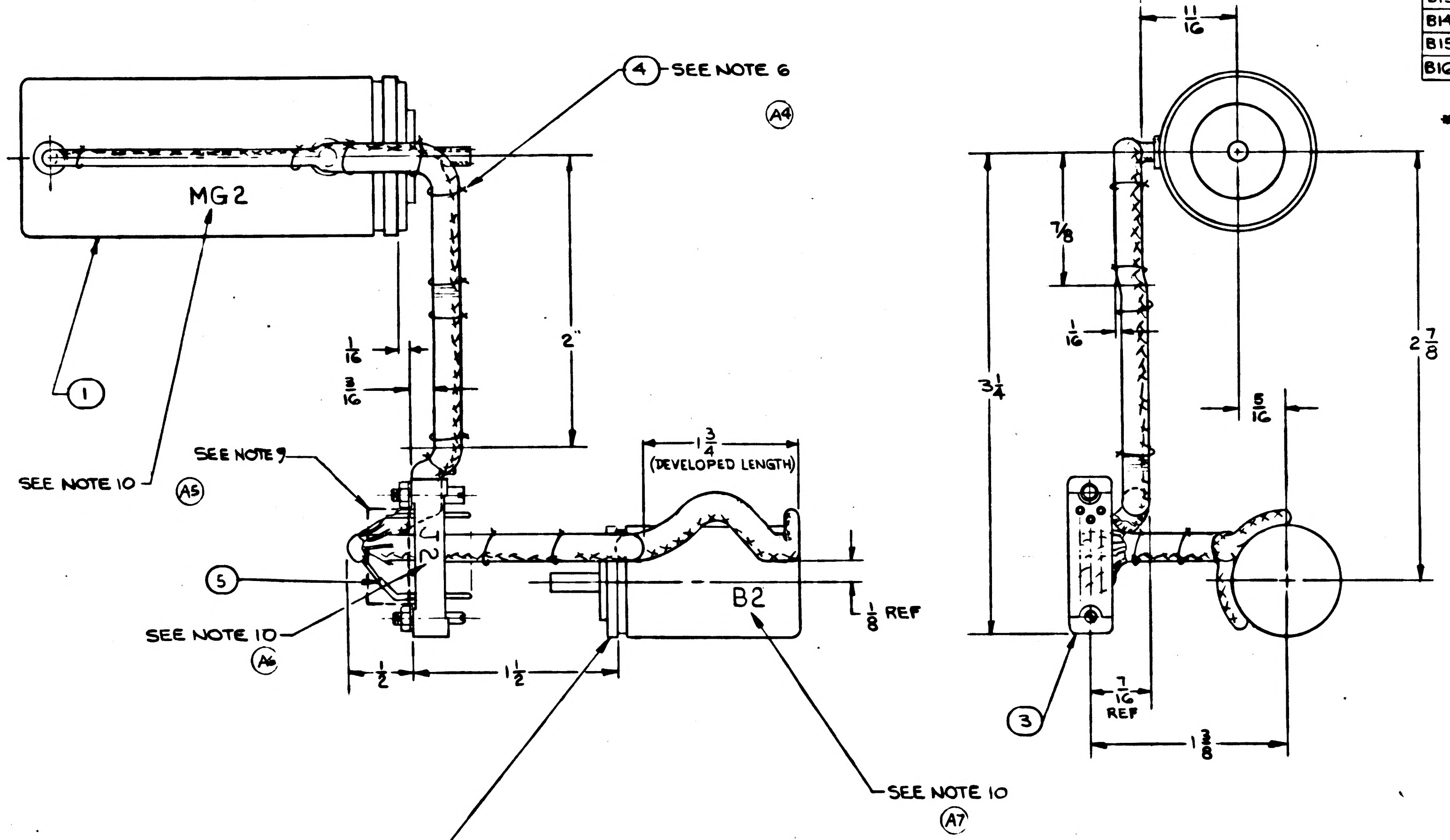
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING SCHEMATIC, NASA DRAWING NO. 1015129.
3. TWIST CONDUCTORS IN ACCORDANCE WITH ND-1002032
4. SLIDE ITEM 5 OVER WIRES BEYOND STRIPPED ENDS.
5. SOLDER CONDUCTORS, PER WIRING LEGEND, WITH Sn 60WRP2, PER QQ-S-571, PER MFC-PROC-158.
6. LACE CONDUCTORS, USING ITEM 4 IN ACCORDANCE WITH ND-1002032.
7. PERFORM CONTINUITY CHECK.
8. SLIDE ITEM 5 OVER SOLDERED JOINTS AND SHRINK.
9. POT 1011934-000 CONNECTOR PER ND1002009 METHOD C. (C1)
   POT 1011934-001 CONNECTOR PER ND1002240.
   A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
   B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
10. MARK REFERENCE DESIGNATIONS 1/8 INCH HIGH IN ACCORDANCE WITH ND-1002019.

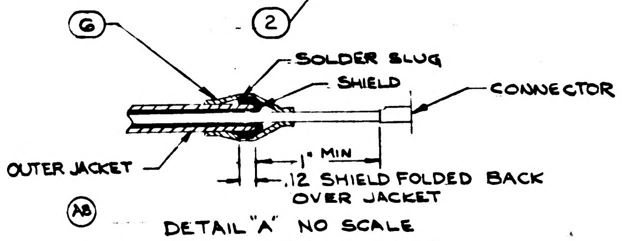
REVISIONS 02745				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR NO. 07673	4-14-64	JWB
B		REVISED PER TDRR NO. 08593	5-19-64	JWB
C2		REVISED PER TDRR NO. 16887	2-26-65	JWB

(A2)

WIRING LEGEND					
COND. NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 3
B1	YELLOW		MG2-YELLOW	J2-B	8
B2	WHITE		MG2-WHITE	J2-A	
B3	RED		MG2-RED	J2-C	8
B4	RED-BLACK		MG2-RED-BLK	J2-D	
B5	BLACK		MG2-BLACK	J2-E	
B6	ORANGE		MG2-ORANGE	J2-F	8
B7	GRAY		MG2-GRAY	J2-H	
B8	BLUE		MG2-BLUE	J2-J	8
B9	BROWN		MG2-BROWN	J2-K	
B10*	RED		B2-S1	J2-P	8
B11*	BLACK		B2-S3	J2-M	
B12*	YELLOW		B2-S2	J2-N	
B13**	BLACK		B2-P3	J2-R	8
B14**	RED		B2-P1	J2-S	
B15**	YELLOW		B2-P2	J2-T	8
B16**	BLUE		B2-P4	J2-U	

*- THESE THREE (3) LEADS EXIT FROM B2 TOGETHER
**- THESE FOUR (4) LEADS EXIT FROM B2 TOGETHER





DETAIL "A" NO SCALE
APPLIES TO MG 2-BLUE LEAD

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

(C2) (A3) (B)

QTY REQD 001	QTY REQD 000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
1	1	6		*	1010402-2	—		SLEEVE, SOLDER, ELECT COND. INSUL, HEAT SHRINKABLE			
16	16	5		*	1010490-060	—		INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
AR	AR	4		*	1011753	—		TAPE, LACING & TYING			
1	1	3		*	1011740	6850206801		CONNECTOR, ELECTRICAL			
1	1	2		*	1010341	—		RESOLVER, RECEIVER, ONE SPEED			
1	1	1		*	1010610-1 OR 1010610-2	—		SERVO MOTOR-TACHOMETER, GENERATOR			

LIST OF PARTS AND MATERIALS

1011703	1011000
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± 1/8 DECIMALS ± — ANGLES ± 5°
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80386900050
DRAWN [illegible] DATE 8-22-63
CHECKED [illegible] 8-28-63
APPROVAL [illegible] 8-29-63
APPROVAL [illegible] 9-4-63
NASA APPROVAL [illegible] 9/5/63
MIT APPROVAL [illegible] 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCT SHAFT DRIVE HARNESS,
ASSY OF

CODE IDENT NO. SIZE D NASA NUMBER 1011934
SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

1011934 C

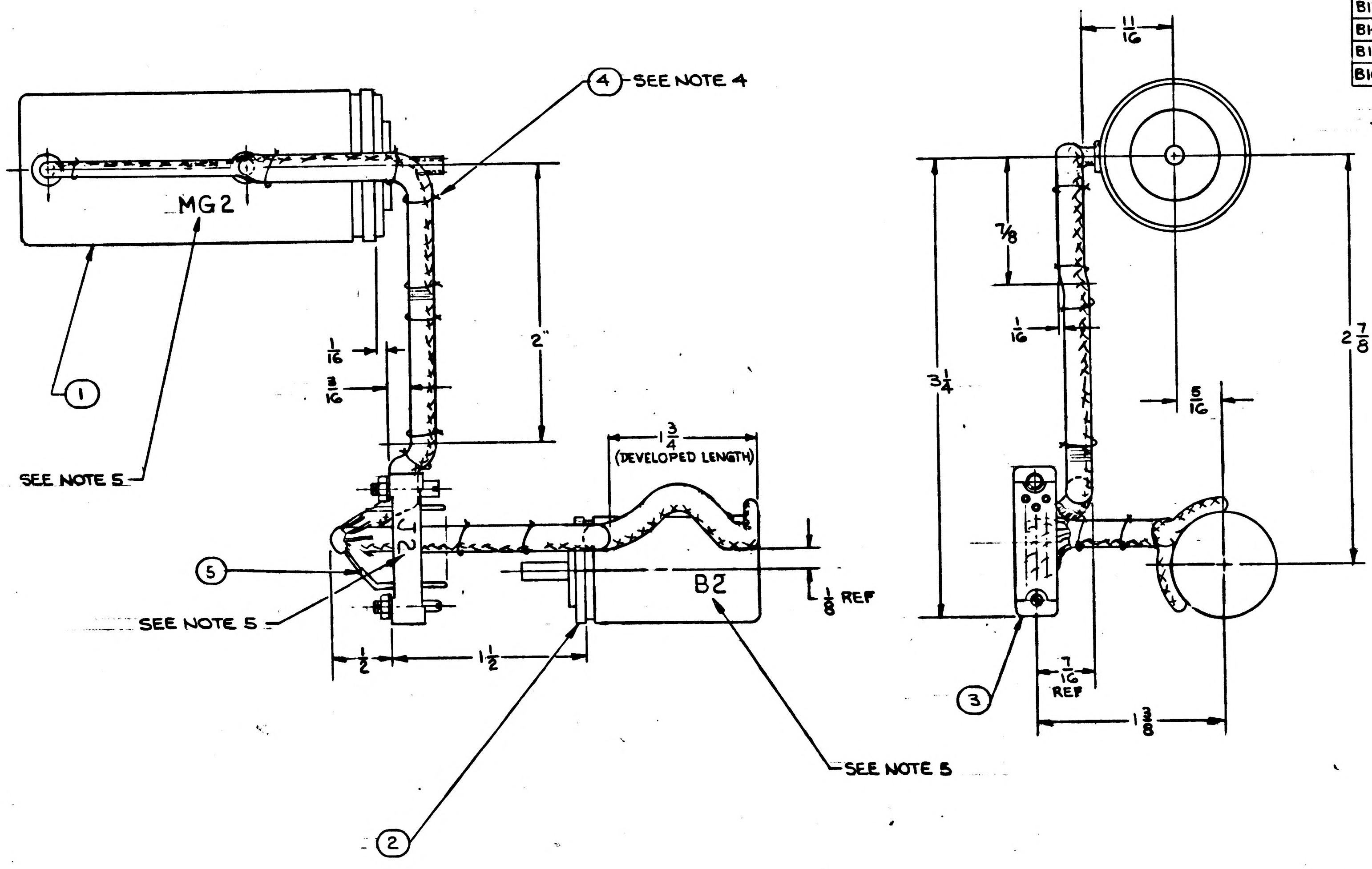
NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING SCHEMATIC DWG. 1015129.
3. SOLDER WIRES TO CONNECTOR IN ACCORDANCE WITH MSFC-PROC-158, USING TYPE SN60WAR P2 SOLDER PER QQ-S-571.
4. LACE WIRES IN ACCORD WITH ND1002032.
5. MARK CHARACTERS 1/8 HIGH PER ND1002019 AT LOCATIONS SHOWN.
6. TWISTED CONDUCTORS TO CONSIST OF FOUR (4) FULL TURNS PER INCH MINIMUM.
7. ASSEMBLY AND TEST PROCEDURE IN ACCORDANCE WITH ATP 1011934.

REVISIONS 02975				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

WIRING LEGEND

COND. NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 6
B1	YELLOW		MG2-YELLOW	J2-A	8
B2	WHITE		MG2-WHITE	J2-B	
B3	RED		MG2-RED	J2-C	8
B4	RED/BLACK		MG2-RED/BLK	J2-D	
B5	BLACK		MG2-BLACK	J2-E	
B6	ORANGE		MG2-ORANGE	J2-F	8
B7	GRAY		MG2-GRAY	J2-H	
B8	BLUE		MG2-BLUE	J2-J	8
B9	BROWN		MG2-BROWN	J2-K	
B10*	RED		B2-S1	J2-P	8
B11*	BLACK		B2-S3	J2-M	
B12*	YELLOW		B2-S2	J2-N	
B13**	BLACK		B2-P3	J2-R	8
B14**	RED		B2-P1	J2-S	
B15**	YELLOW		B2-P2	J2-T	8
B16**	BLUE		B2-P4	J2-U	

*- THESE THREE (3) LEADS EXIT FROM B2 TOGETHER
**- THESE FOUR (4) LEADS EXIT FROM B2 TOGETHER



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
5	AR	*	1010490-060			INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
4	AR	*	1011753	—		TAPE, LACING & TYING			
3	1	*	1011740	68502016801		CONNECTOR, ELECTRICAL			
2	1	*	1010341	—		RESOLVER, RECEIVER, ONE SPEED			
1	1	*	1010610	—		SERVO MOTOR-TACHOMETER, GENERATOR			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

MASTER

NEXT ASSY	USED ON
1011703	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± 1/8 DECIMALS ± — ANGLES ± 5°
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80386900050
DRAWN DATE 8-28-63
CHECKED 8-28-63
APPROVAL 8-28-63
APPROVAL 9-4-63
NASA APPROVAL 9/5/63
MIT APPROVAL 9/5/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCT SHAFT DRIVE HARNESS,
ASSY OF

CODE IDENT NO. SIZE D NASA NUMBER 1011934
SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011935	A

REVISIONS 02943

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A9		REVISED PER TDRR NO. 07674	4-14-64	

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327. (A1)
2. REFER TO WIRING SCHEMATIC, NASA DWG NO. 1015129.
3. TWIST CONDUCTORS IN ACCORDANCE WITH ND-1002032.
4. SLIDE ITEMS OVER WIRES BEYOND STRIPPED ENDS.
5. SOLDER CONDUCTORS, PER WIRING LEGEND, WITH Sn60WRP2, PER QQ-S-571, PER MSFC-PROC-158.
6. LACE CONDUCTORS, USING ITEM 4, IN ACCORDANCE WITH ND-1002032.
7. PERFORM CONTINUITY CHECK.
8. SLIDE ITEM 5 OVER SOLDER JOINTS AND SHRINK.
9. POT IN ACCORDANCE WITH ND-1002009, METHOD C.
   - A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
   - B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
10. MARK REFERENCE DESIGNATIONS 1/8 INCH HIGH IN ACCORDANCE WITH ND-1002019.

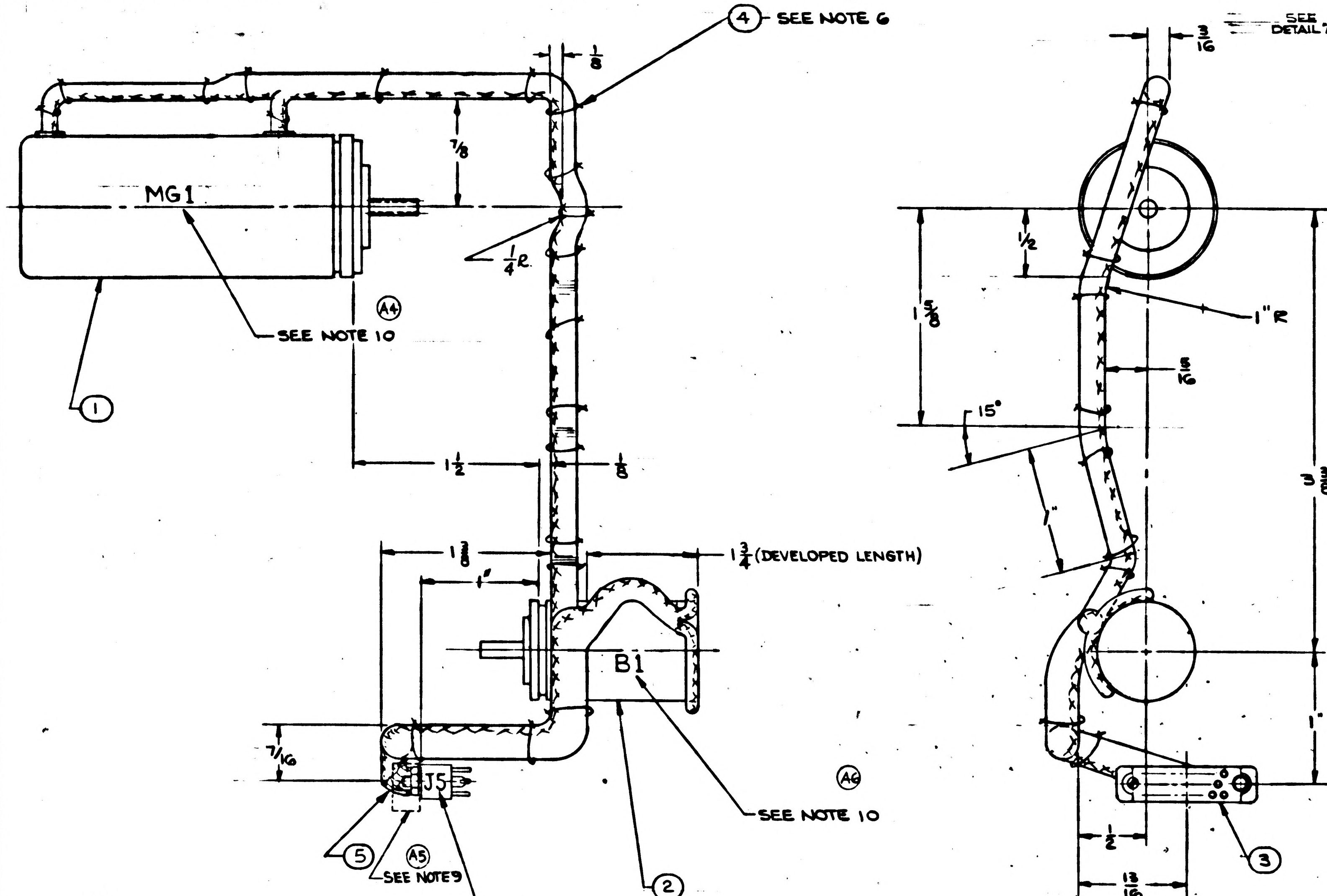
(A2)

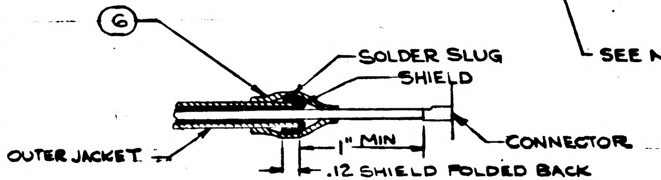
WIRING LEGEND

COND. NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 3
E1	YELLOW		MG1-YELLOW	J5-B	8
E2	WHITE		MG1-WHITE	J5-A	
E3	RED		MG1-RED	J5-C	8
E4	RED-BLACK		MG1-RED-BLK	J5-D	
E5	BLACK		MG1-BLACK	J5-E	
E6	ORANGE		MG1-ORANGE	J5-F	8
E7	GRAY		MG1-GRAY	J5-H	
E8	BLUE		MG1-BLUE	J5-J	8
E9	BROWN		MG1-BROWN	J5-K	
E10*	BLACK		B1-BLACK (S3)	J5-M	8
E11*	YELLOW		B1-YELLOW (S2)	J5-N	
E12*	RED		B1-RED (S1)	J5-P	
E13**	BLACK		B1-BLACK (P3)	J5-R	8
E14**	RED		B1-RED (P1)	J5-S	
E15**	YELLOW		B1-YELLOW (P2)	J5-T	8
E16**	BLUE		B1-BLUE (P4)	J5-U	

*-THESE THREE (3) LEADS EXIT FROM B1 TOGETHER

**-THESE FOUR (4) LEADS EXIT FROM B1 TOGETHER





DETAIL "A" NO SCALE
APPLIES TO MG1-BLU LEAD.

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

(A9)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
6	1	*	1010402-2	—		SLEEVE, SOLDER ELECT. COND. INSUL., HEAT SHRINKABLE			
5	6	*	1010490-060	—		INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
4	AR	*	1011753	—		TAPE, LACING & TYING			
3	1	*	1011740	68502016801		CONNECTOR, ELECTRICAL			
2	1	*	1010341	—		RESOLVER, RECEIVER, ONE SPEED			
1	1	*	1010610	—		SERVO MOTOR-TACHOMETER, GENERATOR			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011702	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/8; DECIMALS ± ~; ANGLES ± 5°
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80386900060
DRAWN DATE 8-21-63
CHECKED 8-28-63
APPROVAL 8-21-63
APPROVAL 9-4-63
NASA APPROVAL 9/1/63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCT TRUNNION DRIVE HARNESS,
ASSY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011935
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011935 A

E-198

1011935 B

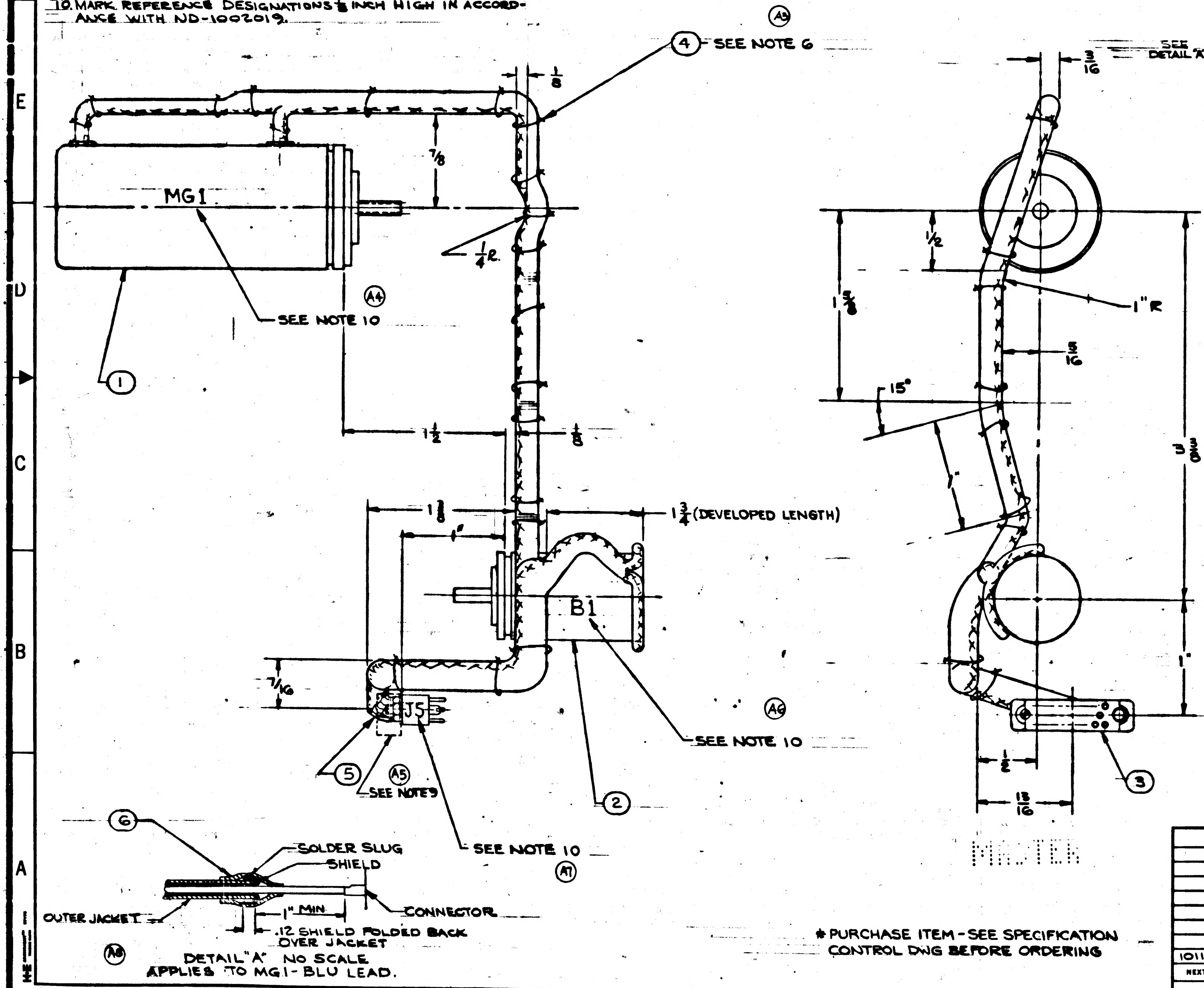
NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327. (A1)
2. REFER TO WIRING SCHEMATIC, NASA DWG NO. 1015129.
3. TWIST CONDUCTORS IN ACCORDANCE WITH ND-1002032.
4. SLIDE ITEMS OVER WIRES BEYOND STRIPPED ENDS.
5. SOLDER CONDUCTORS, PER WIRING LEGEND, WITH Sn60WRP2, PER QQ-S-571, PER MSFC-PROC-158.
6. LACE CONDUCTORS, USING ITEM 4, IN ACCORDANCE WITH ND-1002032.
7. PERFORM CONTINUITY CHECK.
8. SLIDE ITEM 5 OVER SOLDER JOINTS AND SHRINK.
9. POT IN ACCORDANCE WITH ND-1002009, METHOD C.
   A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
   B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
10. MARK REFERENCE DESIGNATIONS 1/8 INCH HIGH IN ACCORDANCE WITH ND-1002019.

REVISIONS 02993				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A9		REVISED PER TDRR NO. 07674	4-14-64	
B		REVISED PER TDRR No 08392	5-14-64	

WIRING LEGEND (A2)

COND. NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 3
E1	YELLOW		MG1-YELLOW	J5-B	8
E2	WHITE		MG1-WHITE	J5-A	
E3	RED		MG1-RED	J5-C	8
E4	RED-BLACK		MG1-RED-BLK	J5-D	
E5	BLACK		MG1-BLACK	J5-E	
E6	ORANGE		MG1-ORANGE	J5-F	8
E7	GRAY		MG1-GRAY	J5-H	
E8	BLUE		MG1-BLUE	J5-J	8
E9	BROWN		MG1-BROWN	J5-K	
E10*	BLACK		B1-BLACK(S3)	J5-M	8
E11*	YELLOW		B1-YELLOW(S2)	J5-N	
E12*	RED		B1-RED(S1)	J5-P	
E13**	BLACK		B1-BLACK(P3)	J5-R	8
E14**	RED		B1-RED(P1)	J5-S	
E15**	YELLOW		B1-YELLOW(P2)	J5-T	8
E16**	BLUE		B1-BLUE(P4)	J5-U	

*-THESE THREE (3) LEADS EXIT FROM B1 TOGETHER
**-THESE FOUR (4) LEADS EXIT FROM B1 TOGETHER



DETAIL "A" NO SCALE
APPLIES TO MG1-BLU LEAD

*PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
6	1	*	1010402-2	——•——		SLEEVE, SOLDER ELECT. COND. INSUL, HEAT SHRINKABLE			
5	6	*	1010490-060	——•——		INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
4	AR	*	1011753	——•——		TAPE, LACING & TYING			
3	1	*	1011740	68502016801		CONNECTOR, ELECTRICAL			
2	1	*	1010341	——•——		RESOLVER, RECEIVER, ONE SPEED			
1	1	*	1010610-1 OR 1010610-2	——•——		SERVO MOTOR-TACHOMETER, GENERATOR			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011702	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± 1/8; DECIMALS ± ~; ANGLES ± 5°
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80386900060
DRAWN DATE 8-2-63
CHECKED 8-22-63
APPROVAL 8-21-63
APPROVAL 9-4-63
NASA APPROVAL 9/6/63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCT TRUNNION DRIVE HARNESS,
ASSY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011935
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011935 C

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS 02745				
A9		REVISED PER TDRR NO. 07674	4-14-64	
B		REVISED PER TDRR No 08392	5-19-64	
C		REVISED PER TDRR No. 11110	7-21-64	

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327. (A1)
2. REFER TO WIRING SCHEMATIC, NASA DWG NO. 1015129.
3. TWIST CONDUCTORS IN ACCORDANCE WITH ND-1002032.
4. SLIDE ITEM 5 OVER WIRES BEYOND STRIPPED ENDS.
5. SOLDER CONDUCTORS, PER WIRING LEGEND, WITH Sn60WRP2, PER QQ-S-571, PER MSFC-PROC-158.
6. LACE CONDUCTORS, USING ITEM 4, IN ACCORDANCE WITH ND-1002032.
7. PERFORM CONTINUITY CHECK.
8. SLIDE ITEM 5 OVER SOLDER JOINTS AND SHRINK.
9. POT IN ACCORDANCE WITH ND-1002009, METHOD C.
   - A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
   - B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
10. MARK REFERENCE DESIGNATIONS 1/8 INCH HIGH IN ACCORDANCE WITH ND-1002019.

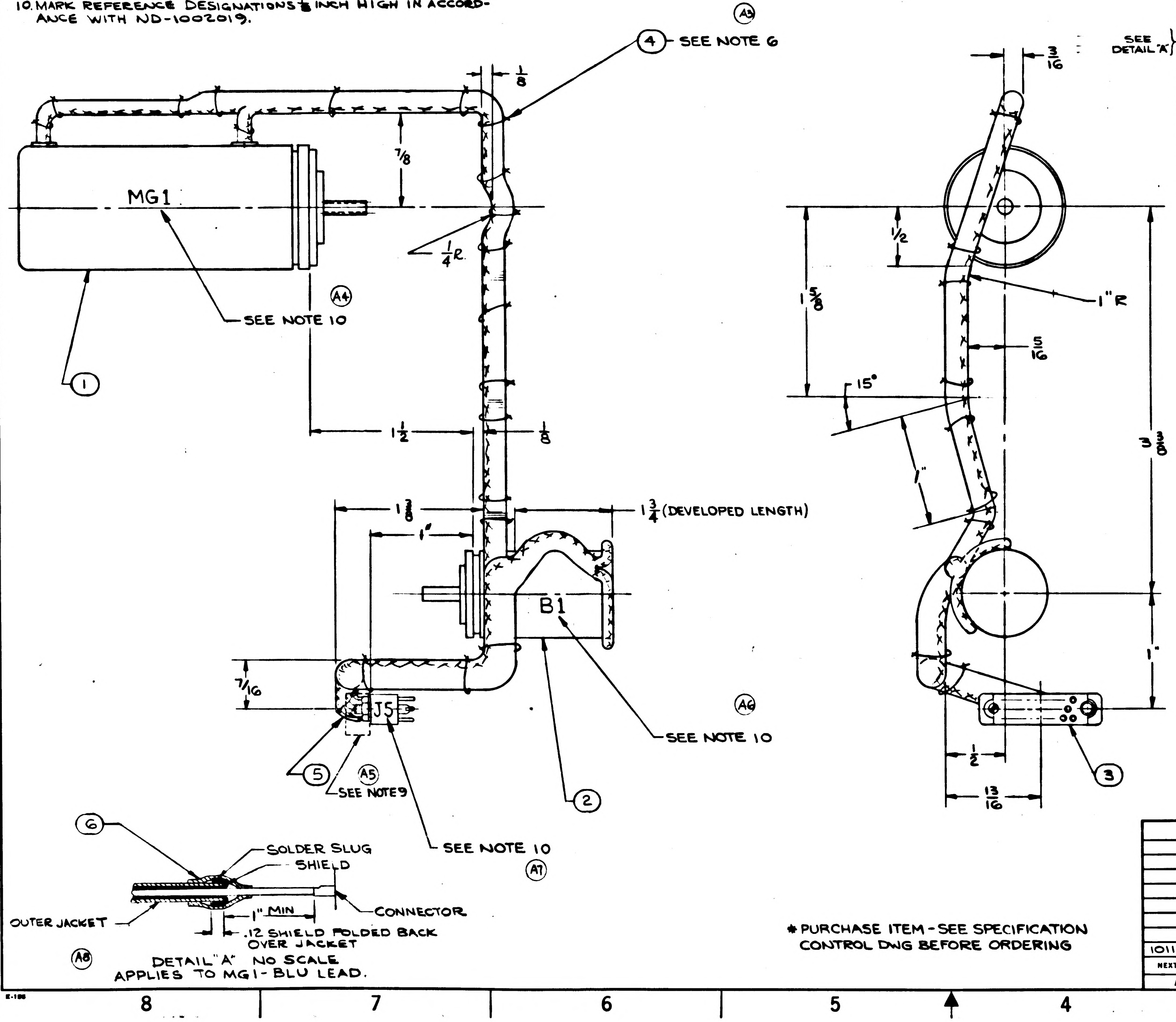
WIRING LEGEND (A2)

COND. NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 3
E1	YELLOW		MG1-YELLOW	J5-B	8
E2	WHITE		MG1-WHITE	J5-A	
E3	RED		MG1-RED	J5-C	8 8
E4	RED-BLACK		MG1-RED-BLK	J5-D	
E5	BLACK		MG1-BLACK	J5-E	
E6	ORANGE		MG1-ORANGE	J5-F	8
E7	GRAY		MG1-GRAY	J5-H	
E8	BLUE		MG1-BLUE	J5-J	8
E9	BROWN		MG1-BROWN	J5-K	
E10*	BLACK		B1-BLACK (S3)	J5-M	8 8
E11*	YELLOW		B1-YELLOW (S2)	J5-N	
E12*	RED		B1-RED (S1)	J5-P	
E13**	BLACK		B1-BLACK (P3)	J5-R	8
E14**	RED		B1-RED (P1)	J5-S	
E15**	YELLOW		B1-YELLOW (P2)	J5-T	8
E16**	BLUE		B1-BLUE (P4)	J5-U	

SEE DETAIL "A" (E8, E9)

*-THESE THREE (3) LEADS EXIT FROM B1 TOGETHER

**-THESE FOUR (4) LEADS EXIT FROM B1 TOGETHER



DETAIL "A" NO SCALE
APPLIES TO MG1-BLU LEAD.

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
6	1	*	1010402-2	—		SLEEVE, SOLDER ELECT. COND. INSUL., HEAT SHRINKABLE			
5	16	*	1010490-060	—		INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
4	AR	*	1011753	—		TAPE, LACING & TYING			
3	1	*	1011740	68502016801		CONNECTOR, ELECTRICAL			
2	1	*	1010341	—		RESOLVER, RECEIVER, ONE SPEED			
1	1	*	1010610-1 OR 1010610-2	—		SERVO MOTOR-TACHOMETER, GENERATOR			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011702	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± 1/8 DECIMALS ± ~ ANGLES ± 5°
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80386900060
DRAWN DATE 8-21-63
CHECKED 8-28-63
APPROVAL 8-31-63
APPROVAL 9-4-63
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCT TRUNNION DRIVE HARNESS, ASSY OF

CODE IDENT NO. SIZE D NASA NUMBER 1011935
SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

1011935 C

1011935 D

NOTES:

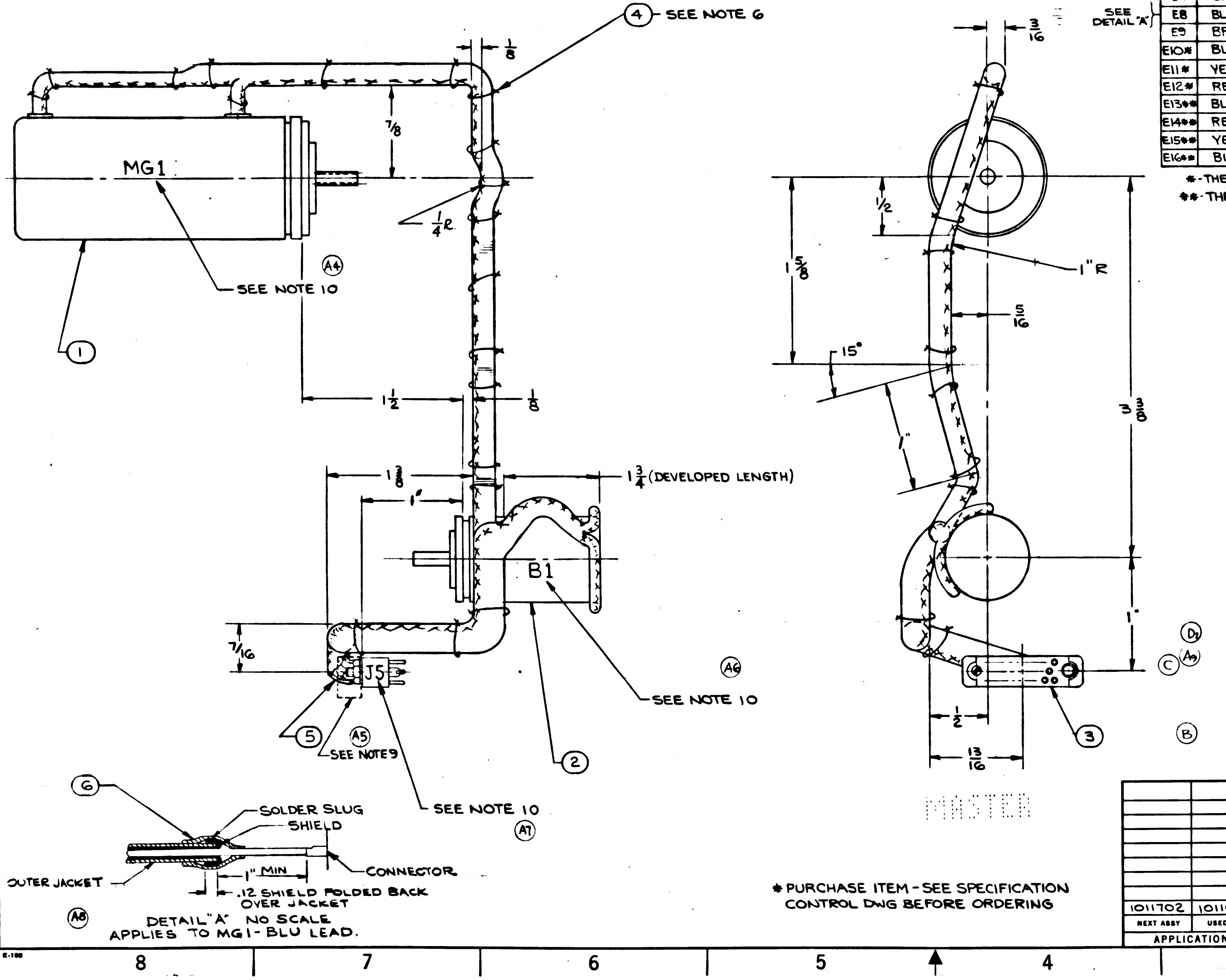
INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327. (A1)
2. REFER TO WIRING SCHEMATIC, NASA DWG NO. 1015129.
3. TWIST CONDUCTORS IN ACCORDANCE WITH ND-1002032.
4. SLIDE ITEMS OVER WIRES BEYOND STRIPPED ENDS.
5. SOLDER CONDUCTORS, PER WIRING LEGEND, WITH Sn60WRP2, PER QQ-S-571, PER MSFC-PROC-158.
6. LACE CONDUCTORS, USING ITEM 4, IN ACCORDANCE WITH ND-1002032.
7. PERFORM CONTINUITY CHECK.
8. SLIDE ITEM 5 OVER SOLDER JOINTS AND SHRINK.
9. POT 1011935-000 CONNECTOR PER ND1002009, METHOD C. (D1)
POT 1011935-001 CONNECTOR PER ND 1002240.
A. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
B. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
10. MARK REFERENCE DESIGNATIONS 1/8 INCH HIGH IN ACCORDANCE WITH ND-1002019.

REVISIONS 02745				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A9		REVISED PER TDRR NO. 07674	4-14-64	JwB
B		REVISED PER TDRR No. 08392	5-19-64	JwB
C		REVISED PER TDRR No. 11110	7-21-64	JwB
D2		REVISED PER TDRR No. 16885	2-2-65	JwB

WIRING LEGEND (A2)

COND. NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 3
E1	YELLOW		MG1-YELLOW	J5-B	8
E2	WHITE		MG1-WHITE	J5-A	
E3	RED		MG1-RED	J5-C	8
E4	RED-BLACK		MG1-RED-BLK	J5-D	
E5	BLACK		MG1-BLACK	J5-E	
E6	ORANGE		MG1-ORANGE	J5-F	8
E7	GRAY		MG1-GRAY	J5-H	
E8	BLUE		MG1-BLUE	J5-J	8
E9	BROWN		MG1-BROWN	J5-K	
E10*	BLACK		B1-BLACK(S3)	J5-M	8
E11*	YELLOW		B1-YELLOW(S2)	J5-N	
E12*	RED		B1-RED(S1)	J5-P	
E13**	BLACK		B1-BLACK(P3)	J5-R	8
E14**	RED		B1-RED(P1)	J5-S	
E15**	YELLOW		B1-YELLOW(P2)	J5-T	8
E16**	BLUE		B1-BLUE(P4)	J5-U	

*-THESE THREE (3) LEADS EXIT FROM B1 TOGETHER
**-THESE FOUR (4) LEADS EXIT FROM B1 TOGETHER



DETAIL "A" NO SCALE
APPLIES TO MG1-BLU LEAD.

MASTER

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

001 QTY REQD	000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
1	1	6		*	1010402-2	—		SLEEVE, SOLDER ELECT. COND INSUL, HEAT SHRINKABLE			
16	16	5		*	1010490-060	—		INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
AR	AR	4		*	1011753	—		TAPE, LACING & TYING			
1	1	3		*	1011740	68502016801		CONNECTOR, ELECTRICAL			
1	1	2		*	1010341	—		RESOLVER, RECEIVER, ONE SPEED			
1	1	1		*	1010610-1 OR 1010610-2	—		SERVO MOTOR-TACHOMETER, GENERATOR			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011702	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/8	± ~	± 5°

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80386900060
DRAWN J. Schilling DATE 8-21-63
CHECKED 8-28-63
APPROVAL 8-28-63
APPROVAL Sinaco 9-4-63
NASA APPROVAL 7/1/63
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCT TRUNNION DRIVE HARNESS, ASSY OF

CODE IDENT NO.	SIZE	NASA NUMBER
	D	1011935

SCALE 2/1 WEIGHT CALC ACTUAL SHEET 1 OF 1

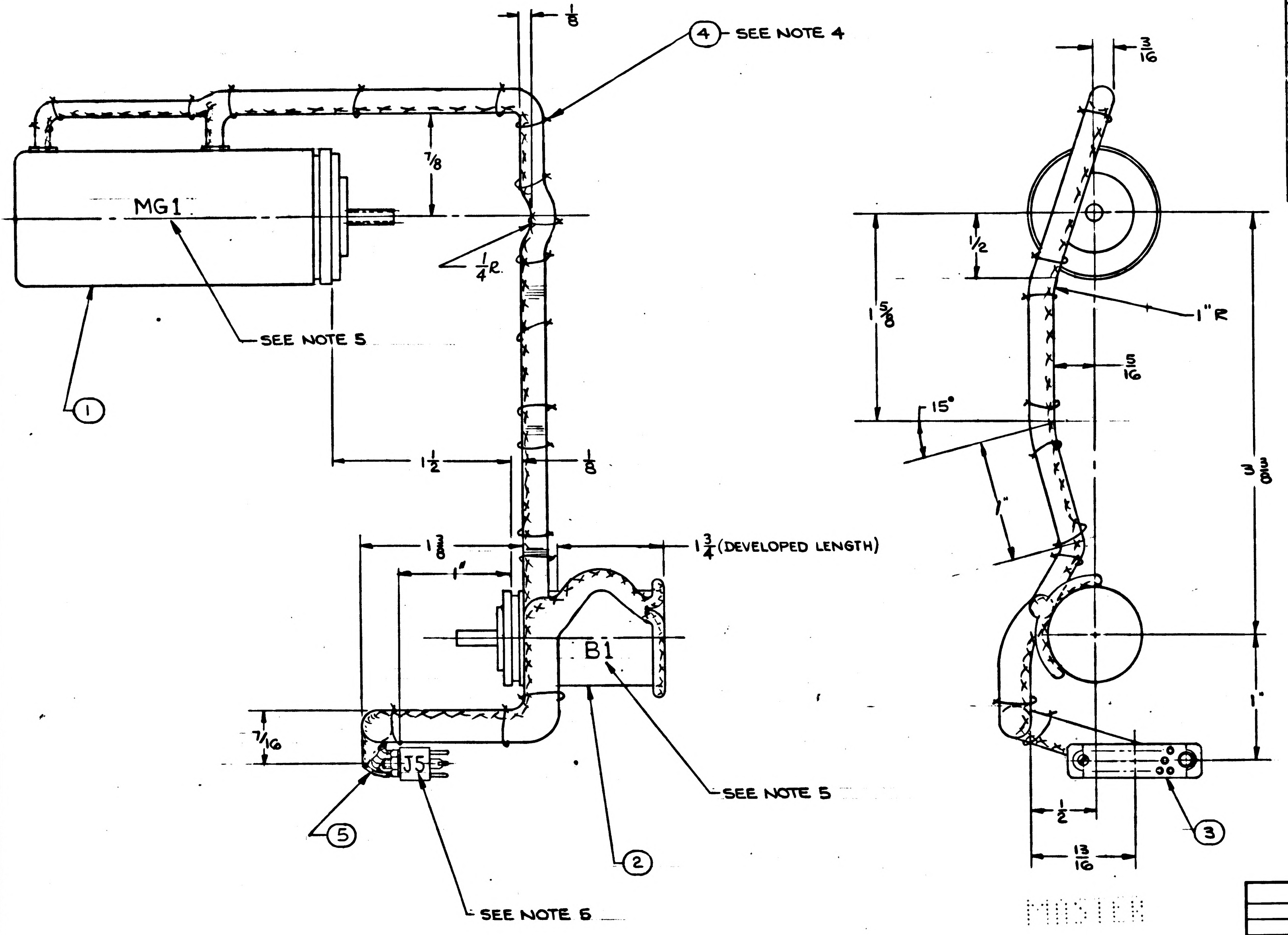
1011935 B

1011935

REVISIONS 02945				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING SCHEMATIC DWG 1015129.
3. SOLDER WIRES TO CONNECTOR IN ACCORDANCE WITH MSFC-PROC-158, USING TYPE SN60 WAR P2 SOLDER PER QQ-S-571.
4. LACE WIRES IN ACCORD WITH ND1002032.
5. MARK CHARACTERS 1/8 HIGH PER ND 1002019 AT LOCATIONS SHOWN.
6. TWISTED CONDUCTORS TO CONSIST OF FOUR (4) FULL TURNS PER INCH MINIMUM.
7. ASSEMBLY AND TEST PROCEDURE IN ACCORDANCE WITH ATP 1011935.



WIRING LEGEND

COND. NO.	COLOR	ITEM NO.	FROM	TO	SEE NOTE 6
E1	YELLOW		MG1-YELLOW	J5-A	8
E2	WHITE		MG1-WHITE	J5-B	
E3	RED		MG1-RED	J5-C	8
E4	RED/BLACK		MG1-RED/BLK	J5-D	
E5	BLACK		MG1-BLACK	J5-E	
E6	ORANGE		MG1-ORANGE	J5-F	8
E7	GRAY		MG1-GRAY	J5-H	
E8	BLUE		MG1-BLUE	J5-J	8
E9	BROWN		MG1-BROWN	J5-K	
E10*	BLACK		B1-BLACK (S3)	J5-M	8
E11*	YELLOW		B1-YELLOW (S2)	J5-N	
E12*	RED		B1-RED (S1)	J5-P	
E13**	BLACK		B1-BLACK (P3)	J5-R	8
E14**	RED		B1-RED (P1)	J5-S	
E15**	YELLOW		B1-YELLOW (P2)	J5-T	8
E16**	BLUE		B1-BLUE (P4)	J5-U	

*-THESE THREE (3) LEADS EXIT FROM B1 TOGETHER

**-THESE FOUR (4) LEADS EXIT FROM B1 TOGETHER

LIST OF PARTS AND MATERIALS

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
5	AR	*	1010490-060	—+—		INSULATION-SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
4	AR	*	1011753	—+—		TAPE, LACING & TYING			
3	1	*	1011740	68502016801		CONNECTOR, ELECTRICAL			
2	1	*	1010341	—+—		RESOLVER, RECEIVER, ONE SPEED			
1	1	*	1010610	—+—		SERVO MOTOR-TACHOMETER, GENERATOR			

*PURCHASE ITEM - SEE SPECIFICATION CONTROL DWG BEFORE ORDERING

NEXT ASSY	USED ON
1011702	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/8	± ~	± 5°

DO NOT SCALE THIS DRAWING

MATERIAL

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 80386300060

DRAWN F. Schiller DATE 8-21-63
CHECKED 8-28-63
APPROVAL 8-21-63
APPROVAL J. J. Sirico 9-4-63
NASA APPROVAL 9/5/63
MIT APPROVAL 9/5/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCT TRUNNION DRIVE HARNESS,
ASSY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011935
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011935

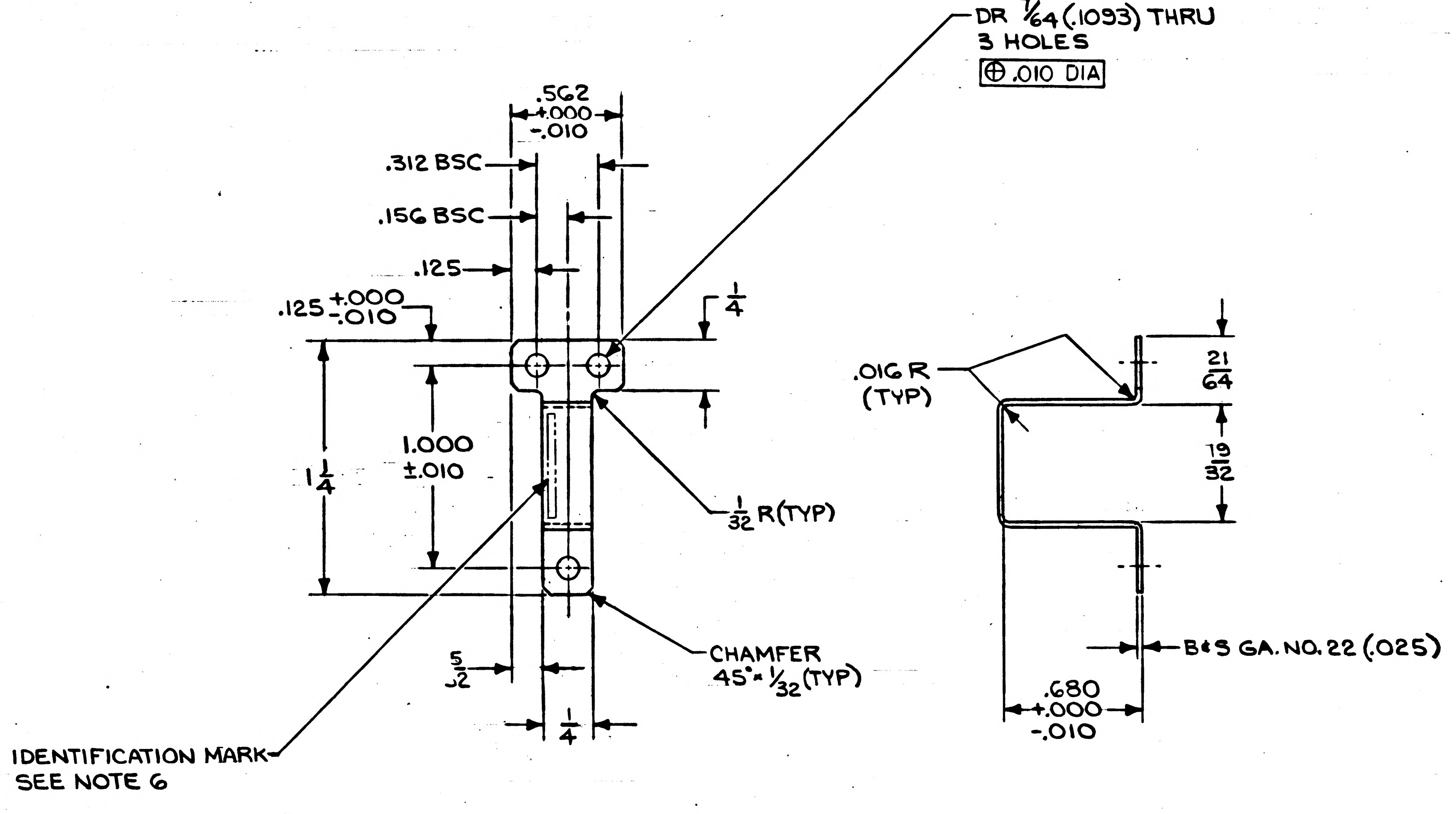
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

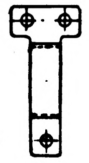
1011939

REVISIONS TDRR 04378				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ALL OVER.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079.
5. FINISH: BLACK ANODIZE IN ACCORDANCE WITH MIL-A-8625, TYPE II BLACK (KPS-1005A.201)
6. IDENTIFY USING NASA DRAWING NO., REVISION LETTER, AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND1002019.


DR 7/64 (.1093) THRU
3 HOLES
⊕ .010 DIA
.562 +.000 -.010
.312 BSC
.156 BSC
.125
.125 +.000 -.010
1/4
1 1/4
1.000 ±.010
1/32 R(TYP)
CHAMFER 45° × 1/32 (TYP)
5/32
1/4
IDENTIFICATION MARK SEE NOTE 6
.016 R (TYP)
21/64
19/32
B&S GA. NO. 22 (.025)
.680 +.000 -.010



ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011945	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± 1/64	±.005	± ~

DO NOT SCALE THIS DRAWING

MATERIAL ALUMINUM ALLOY 6061-T4 FED. SPEC QQ-A-327 TEMPER T4

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 59386900030

DRAWN F. Schiller DATE 9-6-63
CHECKED E. Drapala 9-19-63
APPROVAL [illegible] 10-19-63
APPROVAL E. Morup 10-31-63
NASA APPROVAL W. J. Rhine 11-5-63
MIT APPROVAL [illegible] 5 Nov 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BRACKET,
TRANSFORMER RETAINING

CODE IDENT NO.
SIZE C
NASA NUMBER 1011939
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-184

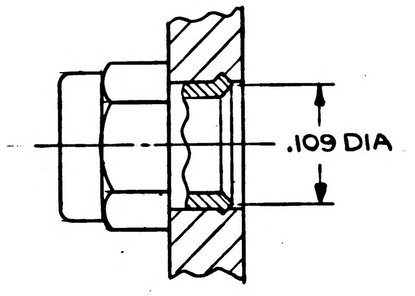
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011942

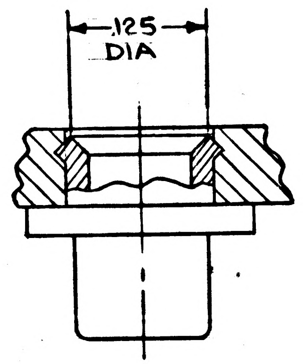
REVISIONS TDRR 04378				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

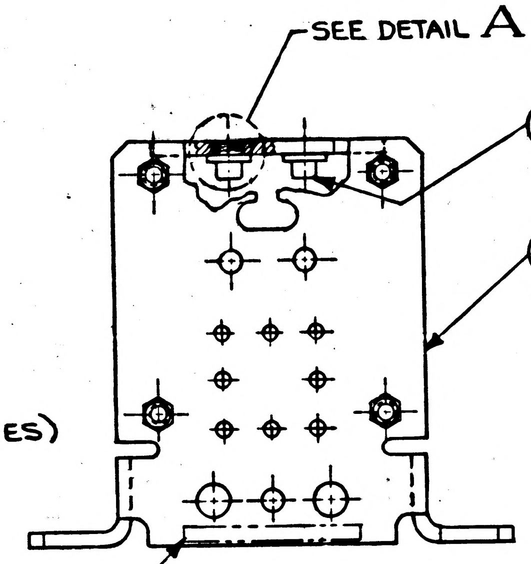
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA DRAWING NO. REVISION LETTER AND MANUFACTURERS SYMBOL IN ACCORDANCE WITH ND 1002019.
3. PRESS ITEMS 2 & 3 INTO ITEM 1, AND SWAGE TO DIMENSION SHOWN IN DETAILS A & B.

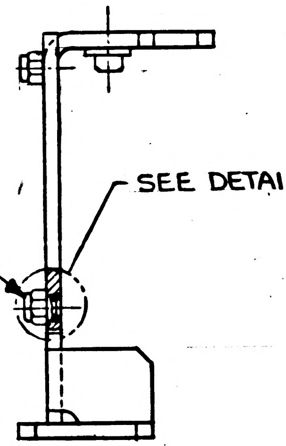


DETAIL "B" (TYP 4 PLACES)
SCALE 10/1



DETAIL A (TYP 2 PLACES)
SCALE 10/1





ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
3	4	*	1011766-3			NUT, CLINCH, SELF LOCKING			
2	2	*	1000076-5	—"—		NUT, CLINCH, FLUSH MOUNTED			
1	1		1011941	59386900040		BRACKET, COMPONENT MOUNTING			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM: SEE SPECIFICATION CONTROL DWG BEFORE ORDERING.

NEXT ASSY	USED ON
1011945	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	±.010	± ~

DO NOT SCALE THIS DRAWING
MATERIAL ~
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386901070

DRAWN F. Schiller DATE 9-11-63
CHECKED 10-19-63
APPROVAL 10-17-63
APPROVAL E. Thorup 10-31-63
NASA APPROVAL W. J. Rhine 11-5-63
MIT APPROVAL 5Nov63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
BRACKET & NUT,
ASSEMBLY OF

CODE IDENT NO.
SIZE C
NASA NUMBER 1011942
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011945	A

REVISIONS TDRR04378

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A6		REVISED PER TDRR NO. 07523	4-764	JWB

10/28/30U

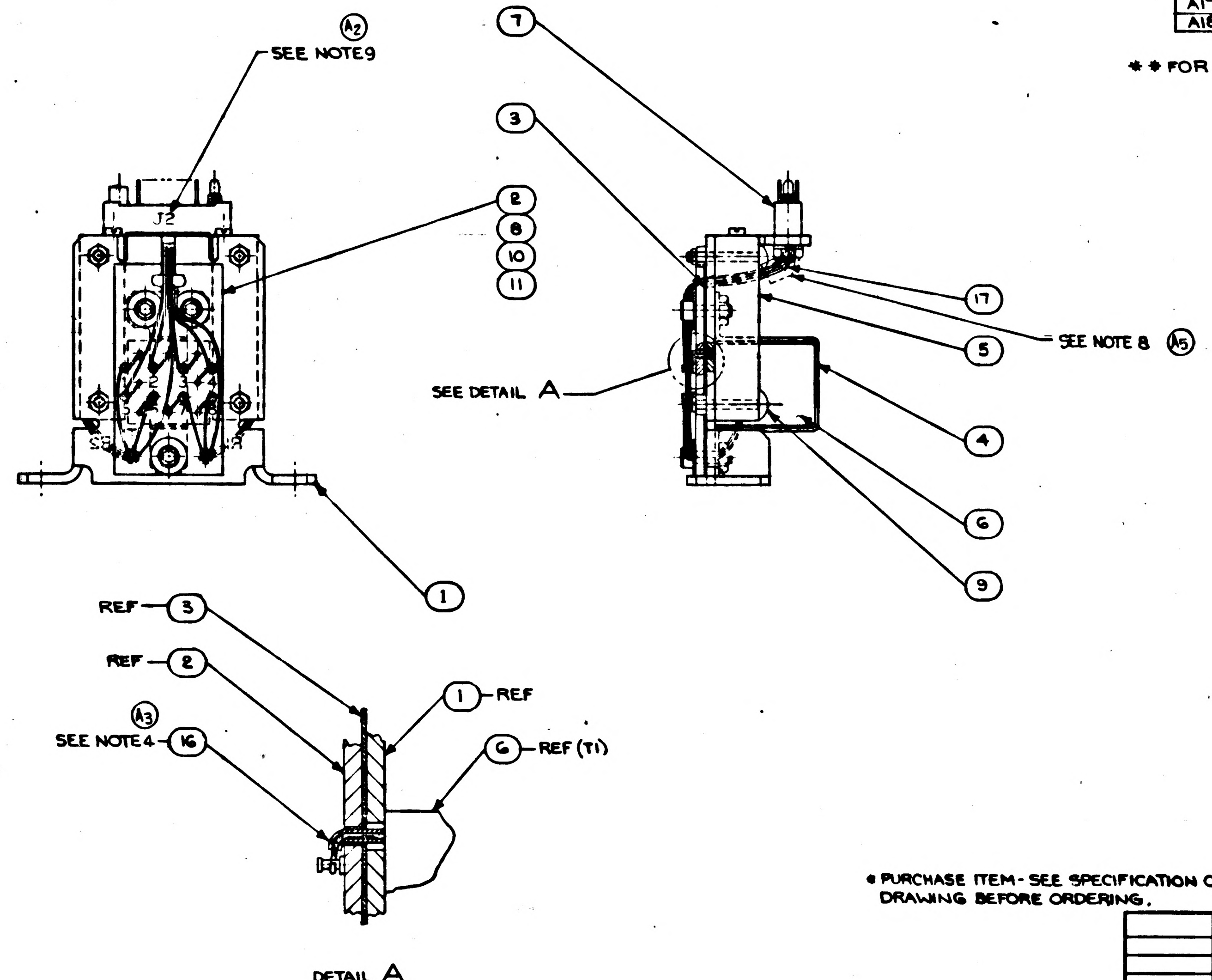
NOTES: Ⓐ1

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70З.
2. REFER TO WIRING SCHEMATIC, NASA DWG NO. 1011949.
3. SLIDE ITEM 17 OVER WIRES BEYOND STRIPPED ENDS.
4. PLACE ITEM 16 ON EIGHT (8) LEADS EMANATING FROM TRANSFORMER (ITEM 6) ONLY.
5. SOLDER CONDUCTORS, PER WIRING LEGEND, WITH Sn60WRP2 PER QQ-S-571 PER MSFC-PROC-158.
6. PERFORM CONTINUITY CHECK.
7. SLIDE ITEM 17 OVER SOLDERED JOINTS AND SHRINK
8. POT IN ACCORDANCE WITH ND-1002009, METHOD C.
   - A- POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
   - B- POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH
9. MARK REF. DESIGNATION 1/8 INCH HIGH IN ACCORDANCE WITH ND-1002019.

WIRING LEGEND

COND. NO.**	COLOR	ITEM NO.	FROM	TO
A1	RED	13	TB1-3	J2-A
A2	BLACK	15	TB1-4	J2-C
A3	BROWN	14	TB1-2	J2-K
A4	ORANGE	12	TB1-5	J2-F
A5	RED	—	R1-RED	J2-J
A6	RED	—	R2-RED	J2-H
A7	—	—	T1-1	TB1-3
A8	—	—	T1-2	TB1-4
A9	—	—	T1-3	TB1-8
A10	—	—	T1-4	TB1-2
A11	—	—	T1-5	TB1-7
A12	—	—	T1-6	TB1-1
A13	—	—	T1-7	TB1-5
A14	—	—	T1-8	TB1-6
A15	GREEN	—	R1-GREEN	TB1-8
A16	YELLOW	—	R1-YELLOW	TB1-7
A17	GREEN	—	R2-GREEN	TB1-1
A18	YELLOW	—	R2-YELLOW	TB1-6

** FOR REF ONLY



DETAIL A
SCALE 4/1

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
Ⓐ4 17	6	*	1010490-060	—		INSULATION SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
16	AR	*	1006776-22	—		INSULATION SLEEVING, ELECTRICAL			
15	1	*	1010416-11	—		WIRE, ELECTRICAL, STRANDED, INSULATED			
14	1	*	1010416-12	—		↕			
13	1	*	1010416-13	—		↕			
12	1	*	1010416-14	—		WIRE, ELECTRICAL, STRANDED, INSULATED			
11	3		MS35649-24	61501051002		NUT, PLAIN, HEXAGON			
Ⓐ6 10	3		NAS1352C02LL4	74455157006		SCREW, CAP, HEX SOC HD, SELF LOCKING			
9	4		AN520C1-8	—		SCREW, MACHINE, ROUND HEAD			
8	3		MS15795-302	—		WASHER, FLAT			
7	1	*	1000222	—		CONNECTOR, ELECTRICAL, PLUG, 9 CONTACTS			
6	1	*	1010651	—		TRANSFORMER, POWER, STEP DOWN			
5	2	*	1010360-22	—		RESISTOR, VARIABLE, TRIMMER			
4	1		1011939	59386900030		BRACKET, TRANSFORMER RETAINING			
3	1		1011937	25386900100		INSULATION, ELECTRICAL			
2	1		1011938	85386901050		TERMINAL BOARD, ASSY OF			
1	1		1011942	85386901070		BRACKET AND NUT, ASSY OF			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

NEXT ASSY	USED ON
1011946	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386901080

DRAWN DATE 9-16-63
CHECKED 9-26-63
APPROVAL 10-7-63
APPROVAL E. Thomp 10-31-63
NASA APPROVAL 11-5-63
MIT APPROVAL 5 Nov 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RESOLVER TRIMMING MODULE, ASSEMBLY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011945
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

1011945 A

MASTER

1011945 B

10/28/30V

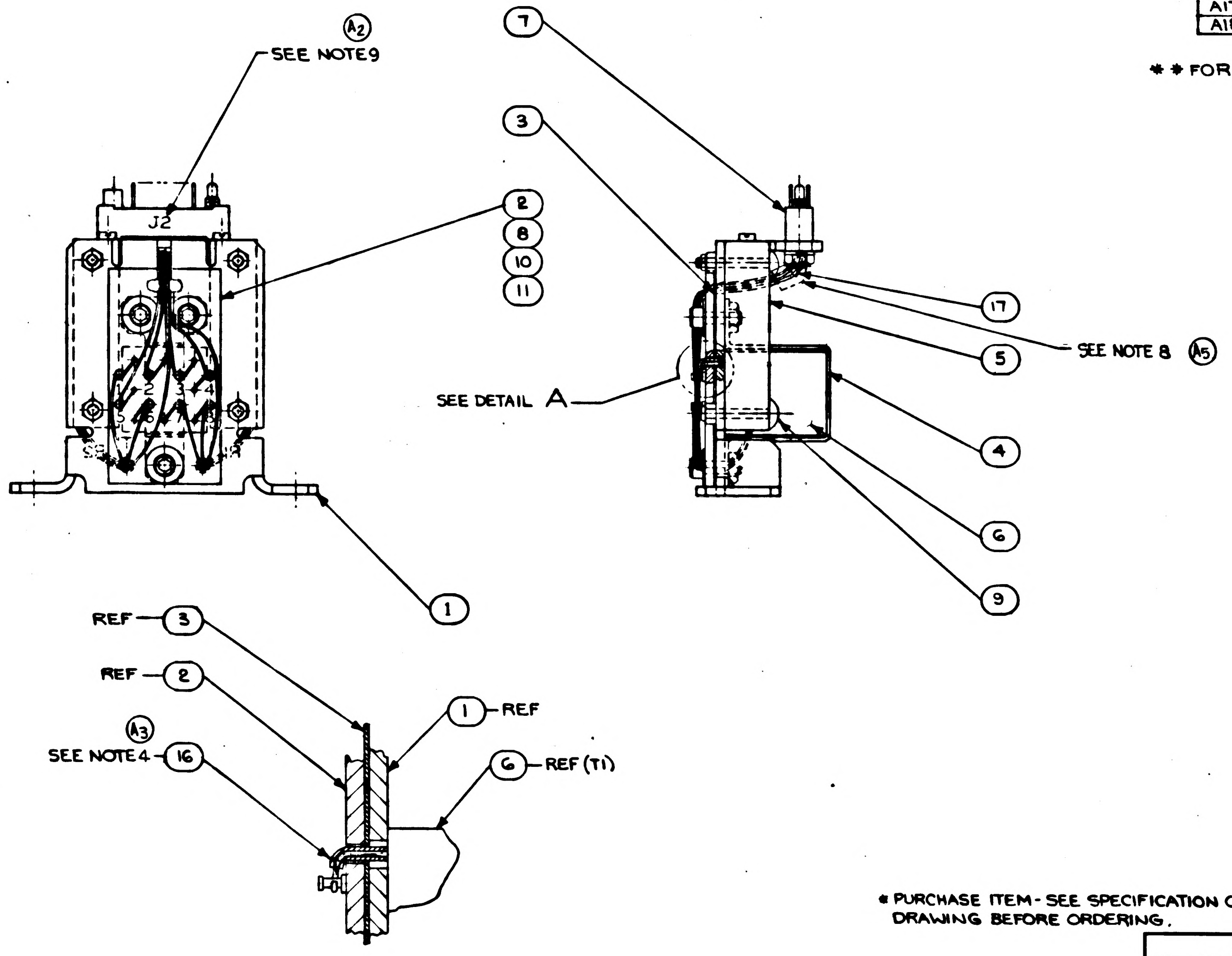
REVISIONS TDRR04375				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A6		REVISED PER TDRR NO. 07523	4-7-64	JWB
B		REVISED PER TDRR NO. 11111	7-21-64	JWB

NOTES: (A1) (B)

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. REFER TO WIRING SCHEMATIC, NASA DWG NO. 1011949.
3. SLIDE ITEM 17 OVER WIRES BEYOND STRIPPED ENDS.
4. PLACE ITEM 16 ON EIGHT (8) LEADS EMANATING FROM TRANSFORMER (ITEM 6) ONLY.
5. SOLDER CONDUCTORS, PER WIRING LEGEND, WITH Sn60WRP2 PER QQ-S-571 PER MSFC-PROC-158.
6. PERFORM CONTINUITY CHECK.
7. SLIDE ITEM 17 OVER SOLDERED JOINTS AND SHRINK
8. POT IN ACCORDANCE WITH ND-1002009, METHOD C.
   A- POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION.
   B- POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH
9. MARK REF. DESIGNATION 1/8 INCH HIGH IN ACCORDANCE WITH ND-1002019.

WIRING LEGEND				
COND. NO.**	COLOR	ITEM NO.	FROM	TO
A1	RED	13	TB1-3	J2-A
A2	BLACK	15	TB1-4	J2-C
A3	BROWN	14	TB1-2	J2-K
A4	ORANGE	12	TB1-5	J2-F
A5	RED	—	R1-RED	J2-J
A6	RED	—	R2-RED	J2-H
A7	—	—	T1-1	TB1-3
A8	—	—	T1-2	TB1-4
A9	—	—	T1-3	TB1-8
A10	—	—	T1-4	TB1-2
A11	—	—	T1-5	TB1-7
A12	—	—	T1-6	TB1-1
A13	—	—	T1-7	TB1-5
A14	—	—	T1-8	TB1-6
A15	GREEN	—	R1-GREEN	TB1-8
A16	YELLOW	—	R1-YELLOW	TB1-7
A17	GREEN	—	R2-GREEN	TB1-1
A18	YELLOW	—	R2-YELLOW	TB1-6

** FOR REF ONLY



DETAIL A
SCALE 4/1

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
(A4) 17	6	*	1010490-060	—		INSULATION SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
16	AR	*	1006776-22	—		INSULATION SLEEVING, ELECTRICAL			
15	1	*	1010416-11	—		WIRE, ELECTRICAL, STRANDED, INSULATED			
14	1	*	1010416-12	—		↕ ↕			
13	1	*	1010416-13	—		↕ ↕			
12	1	*	1010416-14	—		WIRE, ELECTRICAL, STRANDED, INSULATED			
11	3		MS35649-24	61501051002		NUT, PLAIN, HEXAGON			
(A6) 10	3		NAS1352C02LL4	74455157006		SCREW, CAP, HEX SOC HD, SELF LOCKING			
9	4		AN520C1-8	—		SCREW, MACHINE, ROUND HEAD.			
8	3		MS15795-302	—		WASHER, FLAT			
7	1	*	1000222	—		CONNECTOR, ELECTRICAL, PLUG, 9 CONTACTS			
6	1	*	1010651	—		TRANSFORMER, POWER, STEP DOWN			
5	2	*	1010360-22	—		RESISTOR, VARIABLE, TRIMMER			
4	1		1011939	59386900030		BRACKET, TRANSFORMER RETAINING			
3	1		1011937	25386900100		INSULATION, ELECTRICAL			
2	1		1011938	85386901050		TERMINAL BOARD, ASSY OF			
1	1		1011942	85386901070		BRACKET AND NUT, ASSY OF			

LIST OF PARTS AND MATERIALS

* PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

NEXT ASSY	USED ON
1011946	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386901080
DRAWN DATE 9-16-63
CHECKED 9-26-63
APPROVAL 10-17-63
APPROVAL E. Thomp 10-31-63
NASA APPROVAL WJ 11-5-63
MIT APPROVAL W Kupfer 5 Nov 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RESOLVER TRIMMING MODULE,
ASSEMBLY OF

CODE IDENT NO.
SIZE D
NASA NUMBER 1011945
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF

1011945 B

1011945

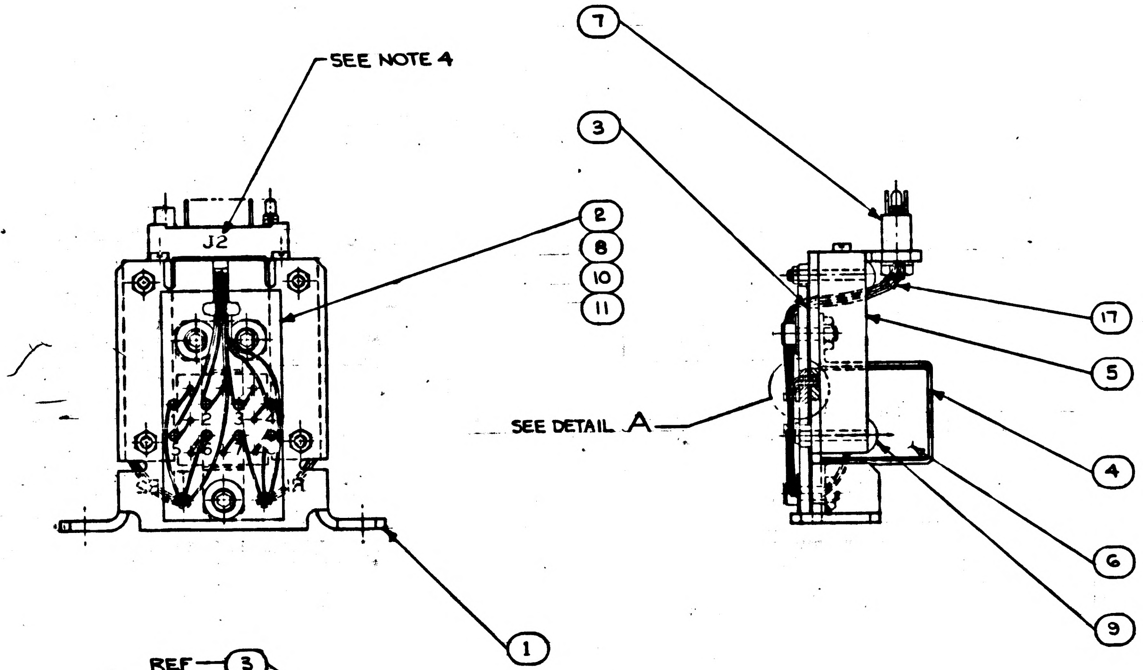
10/28/36V

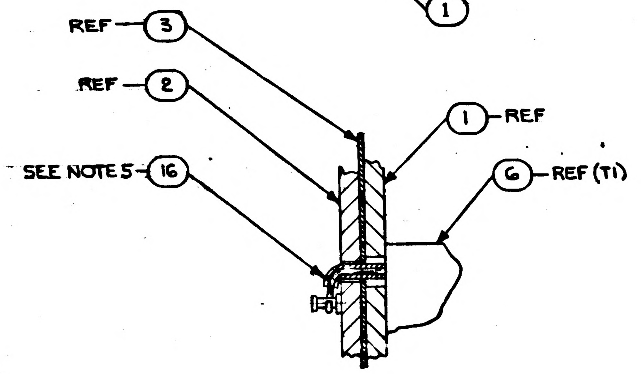
REVISIONS ORI 24378				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. REFER TO WIRING SCHEMATIC, NASA DWG NO. 1011949.
3. SOLDER WIRES IN ACCORDANCE WITH MSFC-PROC-158, USING TYPE SN60WAR P2 SOLDER PER QQ-S-571.
4. MARK CHARACTERS IN APPROX LOCATION SHOWN, IN ACCORDANCE WITH ND1002019.
5. ITEM 16 TO BE USED ON EIGHT(8) LEADS EMANATING FROM TRANSFORMER (ITEM 6) ONLY.

WIRING LEGEND				
COND. NO.✱✱	COLOR	ITEM NO.	FROM	TO
A1	RED	13	TB1-3	J2-A
A2	BLACK	15	TB1-4	J2-C
A3	BROWN	14	TB1-2	J2-K
A4	ORANGE	12	TB1-5	J2-F
A5	RED	—	R1-RED	J2-J
A6	RED	—	R2-RED	J2-H
A7	—	—	T1-1	TB1-3
A8	—	—	T1-2	TB1-4
A9	—	—	T1-3	TB1-8
A10	—	—	T1-4	TB1-2
A11	—	—	T1-5	TB1-7
A12	—	—	T1-6	TB1-1
A13	—	—	T1-7	TB1-5
A14	—	—	T1-8	TB1-6
A15	GREEN	—	R1-GREEN	TB1-8
A16	YELLOW	—	R1-YELLOW	TB1-7
A17	GREEN	—	R2-GREEN	TB1-1
A18	YELLOW	—	R2-YELLOW	TB1-6

✱✱ FOR REF ONLY





DETAIL A
SCALE 4/1

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
17	AR	✱	1010490-[illegible]	—		INSULATION SLEEVING, ELECTRICAL, HEAT SHRINKABLE			
16	AR	✱	1006776-22	—		INSULATION SLEEVING, ELECTRICAL			
15	1	✱	1010416-11	—		WIRE, ELECTRICAL, STRANDED, INSULATED			
14	1	✱	1010416-12	—		↕			
13	1	✱	1010416-13	—		↕			
12	1	✱	1010416-14	—		WIRE, ELECTRICAL, STRANDED, INSULATED			
11	3		MS35649-24	61501051002		NUT, PLAIN, HEXAGON			
10	3		NAS1352C0LL4	74455157006		SCREW, CAP, HEX SOC HD, SELF LOCKING			
9	4		AN520C1-8	—		SCREW, MACHINE, ROUND HEAD			
8	3		MS15795-302	—		WASHER, FLAT			
7	1	✱	1000222	—		CONNECTOR, ELECTRICAL, PLUG, 9 CONTACTS			
6	1	✱	1010651	—		TRANSFORMER, POWER, STEP DOWN			
5	2	✱	1010360-22	—		RESISTOR, VARIABLE, TRIMMER			
4	1		1011939	59386900030		BRACKET, TRANSFORMER RETAINING			
3	1		1011937	25386900100		INSULATION, ELECTRICAL			
2	1		1011938	85386901050		TERMINAL BOARD, ASSY OF			
1	1		1011942	85386901070		BRACKET AND NUT, ASSY OF			

LIST OF PARTS AND MATERIALS

✱ PURCHASE ITEM - SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING.

1011946	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386901080

DRAWN [illegible] DATE 9-16-63
CHECKED [illegible] 9-26-63
APPROVAL [illegible] 10-17-63
APPROVAL E. Thomp 10-31-63
NASA APPROVAL W.J. [illegible] 11-5-63
MIT APPROVAL W. [illegible] 5 Nov 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RESOLVER TRIMMING MODULE,
ASSEMBLY OF

CODE IDENT NO. | SIZE D | NASA NUMBER 1011945
SCALE 2/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

MASTER

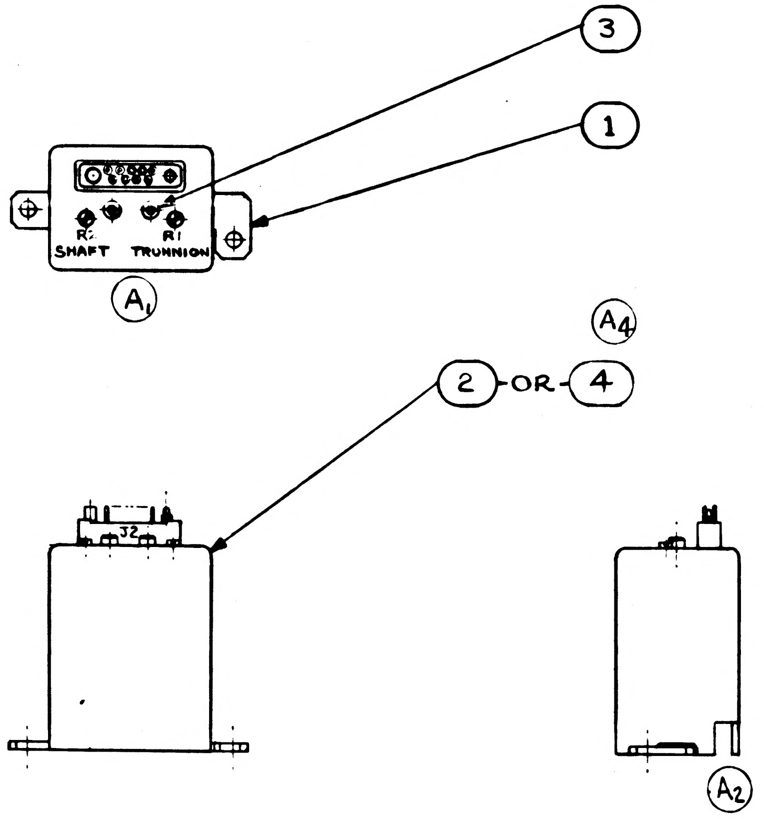
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011946 A

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A4		REVISED PER TDRR NO. 14528	11-25-64	JWB

REVISIONS TDRR 04378

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.



A3

QTY REQD 001	QTY REQD 000	ITEM NO.		SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
1	0	4			1011969	50386900110		COVER, MODULE			
2	2	3			NAS1352C024			SCREW, CAP, HEX SOC HD, PLAIN			
0	1	2			1011943	50386900080		COVER, MODULE			
1	1	1			1011945	85386901080		RESOLVER TRIMMING MODULE, ASSY OF			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± —	± —

DO NOT SCALE THIS DRAWING

MATERIAL —

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386901090

DRAWN F. Schille DATE 9-16-63
CHECKED E. Drapala 9-19-63
APPROVAL F. Kinsleman 10/17/63
APPROVAL E. Morup 10-31-63
NASA APPROVAL W. J. Rhine 11-5-63
MIT APPROVAL W. Kupfer SNB

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RESOLVER TRIMMING MODULE
ASSEMBLY

CODE IDENT NO.
SIZE C
NASA NUMBER 1011946
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

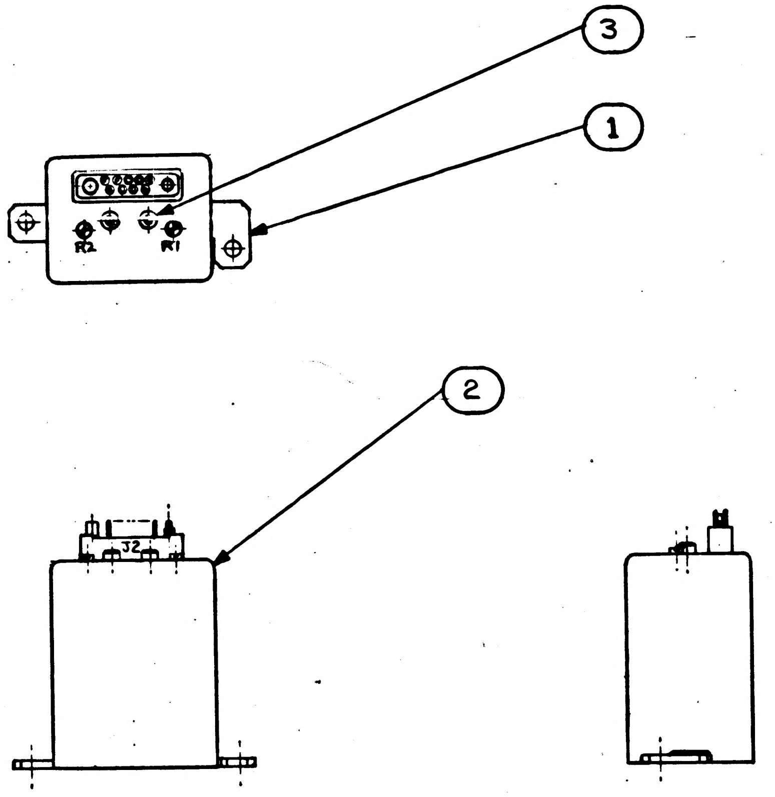
1011946 A

1011946

REVISIONS TDRR 04378				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
3	2		NAS1352C024			SCREW, CAP, HEX SOC HD, PLAIN			
2	1		1011943	50386900080		COVER, MODULE			
1	1		1011945	85386901080		RESOLVER TRIMMING MODULE, ASSY OF			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± –	± –	± –

DO NOT SCALE THIS DRAWING

MATERIAL –

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK

KIC PN 85386901090

DRAWN F. Schiller DATE 9-16-63
CHECKED E. Drapala 9-19-63
APPROVAL F. Kuhlman 10/17/63
APPROVAL E. Moray 10-31-63
NASA APPROVAL W. J. Rhine 11-5-63
MIT APPROVAL W. Kupfer 5 Nov 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
RESOLVER TRIMMING MODULE
ASSEMBLY

CODE IDENT NO.
SIZE C
NASA NUMBER 1011946

SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

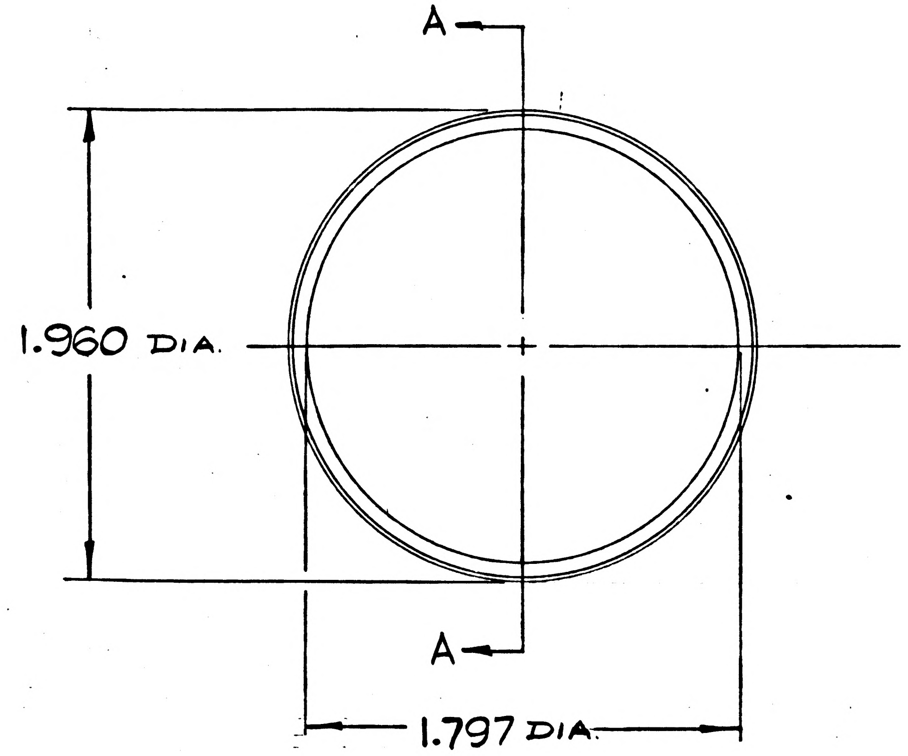
E-154

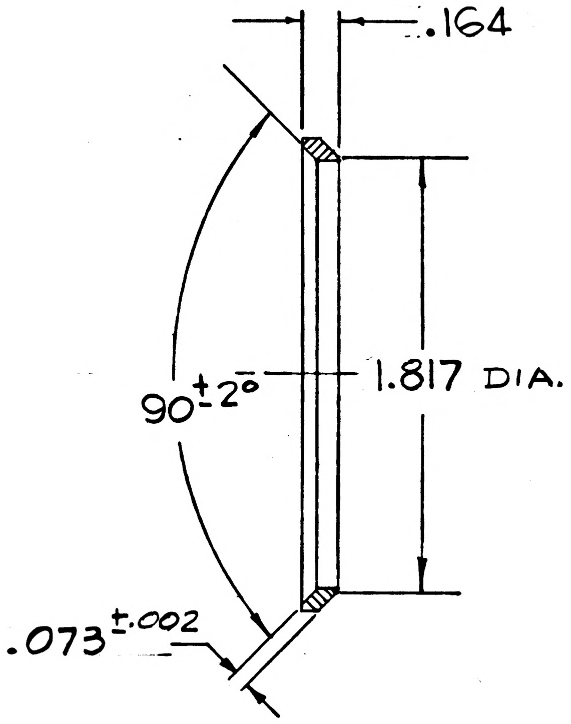
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

REVISIONS TDRR 05001				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

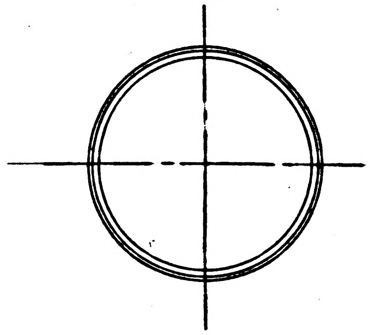
NOTES:

1. INTERPRET DWG. IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078
3. UNLESS OTHERWISE SPECIFIED: a. 63/ FINISH ALL OVER.
4. REMOVE BURRS IN ACCORDANCE WITH ND1002079
5. FINISH: BLACK ANODIZE IN ACCORDANCE WITH MIL-A-8625, TYPE II BLACK (KPS.1005 A.201) ALL OVER
6. IDENTIFY USING NASA DWG. NO. REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019.





SECTION A-A



ACTUAL SIZE

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

1011732	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± —

DO NOT SCALE THIS DRAWING

MATERIAL
ALUMINUM ALLOY
2024-T4
FED. SPEC QQ-A-268
TEMPER T4

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 5738690 1600

DRAWN H. Jalewsky DATE 11/1/63
CHECKED M. Fairwell 11/1/63
APPROVAL G. Ruschman 11/15/63
APPROVAL E. Mourg 12-4-63
NASA APPROVAL K. Mihuko 12/4/63
MIT APPROVAL J. Hazel 12/14/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SPACER, LENS

CODE IDENT NO.
SIZE C
NASA NUMBER 1011954
SCALE 2/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

E-154

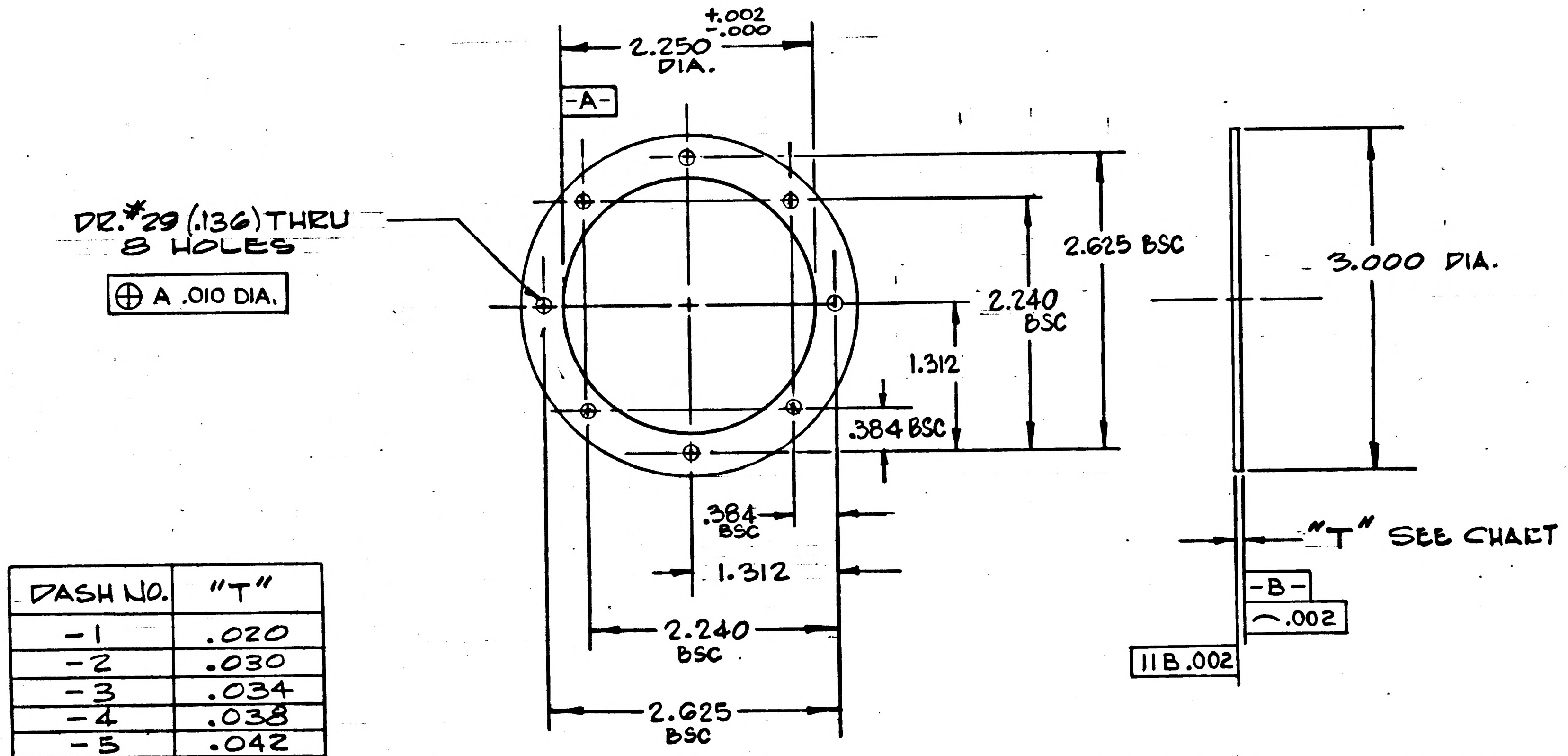
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

REVISIONS TDRR 03001

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:

1. INTERPRET DWG. IN ACCORDANCE WITH MIL-D-70327
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND 1002078
3. UNLESS OTHERWISE SPECIFIED: a. 63/ FINISH ALL OVER
4. REMOVE BURRS IN ACCORDANCE WITH ND 1002079
5. FINISH: BLACK ANODIZE IN ACCORDANCE WITH MIL-A-8625 TYPE II BLACK (KPS.1005A.201) ALL OVER
6. IDENTIFY USING NASA DWG. NO. REVISION LETTER AND MANUFACTURERS SYMBOL PER ND 1002019



DASH NO.	"T"
-1	.020
-2	.030
-3	.034
-4	.038
-5	.042
-6	.046

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011784	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	±.005	± —

DO NOT SCALE THIS DRAWING

MATERIAL
ALUMINUM ALLOY
2024-T3
FED. SPEC. QQ-A-355
TEMPER T3

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 5738690 1610

DRAWN H. JALEWSKY DATE 11/1/63
CHECKED M. Jaswell 11/1/63
APPROVAL E. Rosenman 11/8/63
APPROVAL E. Dhoup 12-4-63
NASA APPROVAL 12/10/63
MIT APPROVAL J. Hazel 12/10/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SPACER

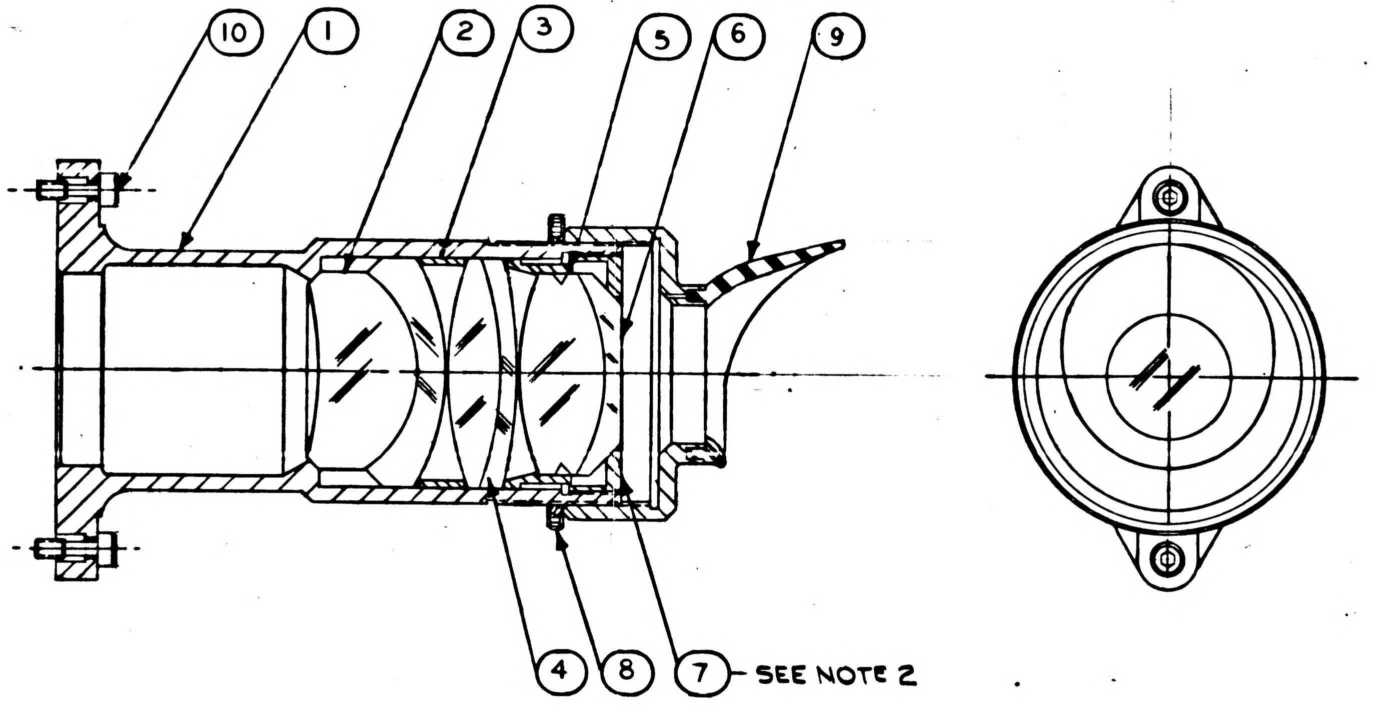
CODE IDENT NO.
SIZE C
NASA NUMBER 1011955
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1011960 A

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. APPLY TO 1/3 CIRC. OF THE LAST THREAD TO ENTER THREADED HOLE, SEALING COMPOUND PER MIL-S-22473 GRADE HV.

REVISIONS TDRR 05238				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		REVISED PER TDRR NO. 07526	4/7/64	



ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
10	2		1011282	45386900140		SCREW, CAPTIVE HEX SOCKET HEAD			
9	1		1011965	85386901130		SCT EYEGUARD ASSEMBLY			
8	1		1011962	57386901630		RING, LOCKING			
7	1		1011963	57386901640		RING, LOCKING			
6	1		1011967	76386900310		LENS, ASSY OF (TELESCOPE OBJECTIVE)			
5	1		1011661	57386901140		SPACER, LENS			
4	1		1011708	76386900180		LENS, ASSY OF (TELESCOPE OBJECTIVE)			
3	1		1011660	57386901130		SPACER LENS			
2	1		1011707	76386900170		LENS, ASSY OF (TELESCOPE OBJECTIVE)			
1	1		1011961	52386901000		HOUSING, EYEPIECE SCT			

LIST OF PARTS AND MATERIALS

1011000	1011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 85386901120

DRAWN E.DRAPALA DATE 12-6-63
CHECKED J.SULLIVAN 12-13-63
APPROVAL 12/11/63
APPROVAL 12/13/63
NASA APPROVAL 12/17/63
MIT APPROVAL 12/17/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCT EYEPIECE, ASSEMBLY

CODE IDENT NO. | SIZE C | NASA NUMBER 1011960
SCALE 1/1 | WEIGHT CALC ACTUAL | SHEET 1 OF 1

MASTER

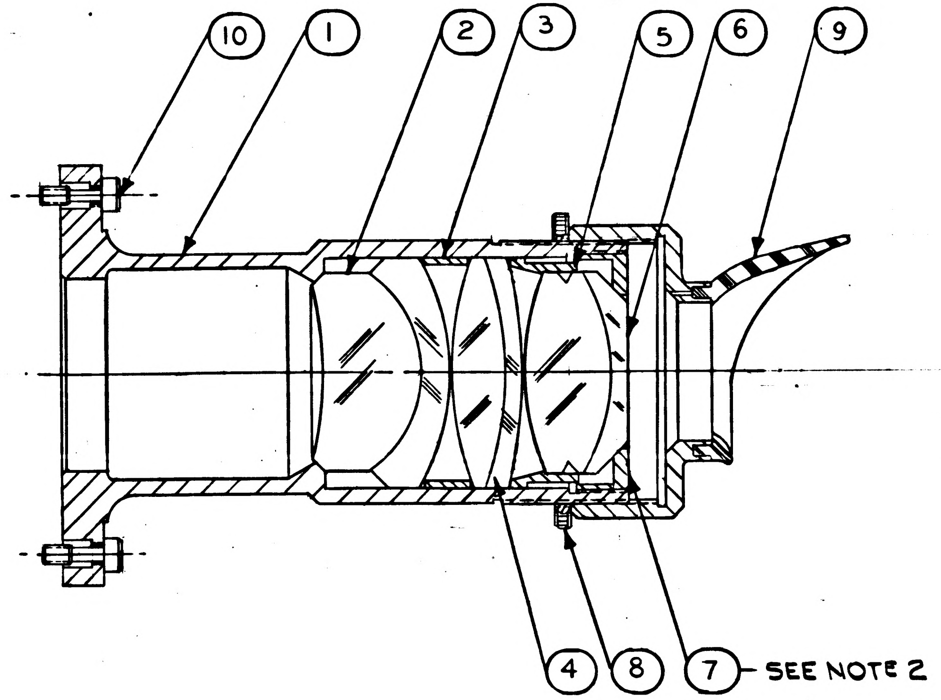
1011960 A

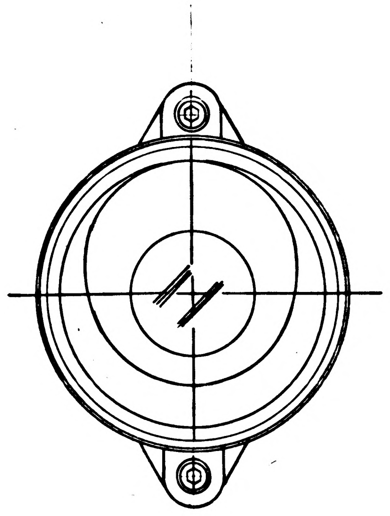
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. VIBRATION PROOF IN ACCORDANCE WITH MIL-3-22473 GRADE B

0961101

REVISIONS TDRR 05238

SYM	ZONE	DESCRIPTION	DATE	APPROVAL





ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
10	2		1011282	45386900140		SCREW, CAPTIVE HEX SOCKET HEAD			
9	1		1011965	85386901130		SCT EYEGUARD ASSEMBLY			
8	1		1011962	57386901630		RING, LOCKING			
7	1		1011963	57386901640		RING, LOCKING			
6	1		1011967	76386900310		LENS, ASSY OF (TELESCOPE OBJECTIVE)			
5	1		1011661	57386901140		SPACER, LENS			
4	1		1011708	76386900180		LENS, ASSY OF (TELESCOPE OBJECTIVE)			
3	1		1011660	57386901130		SPACER LENS			
2	1		1011707	76386900170		LENS, ASSY OF (TELESCOPE OBJECTIVE)			
1	1		1011961	52386901000		HOUSING, EYEPIECE SCT			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011000	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	±	±	±

DO NOT SCALE THIS DRAWING

MATERIAL

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK

KIC PN 85386901120

DRAWN E.DRAPALA DATE 12-6-63
CHECKED J.SULLIVAN 12-13-63
APPROVAL 12/14/63
APPROVAL 12/13/63
NASA APPROVAL 12/17/63
MIT APPROVAL 12/17/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
SCT EYEPIECE, ASSEMBLY

CODE IDENT NO.
SIZE C
NASA NUMBER 1011960
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

MASTER

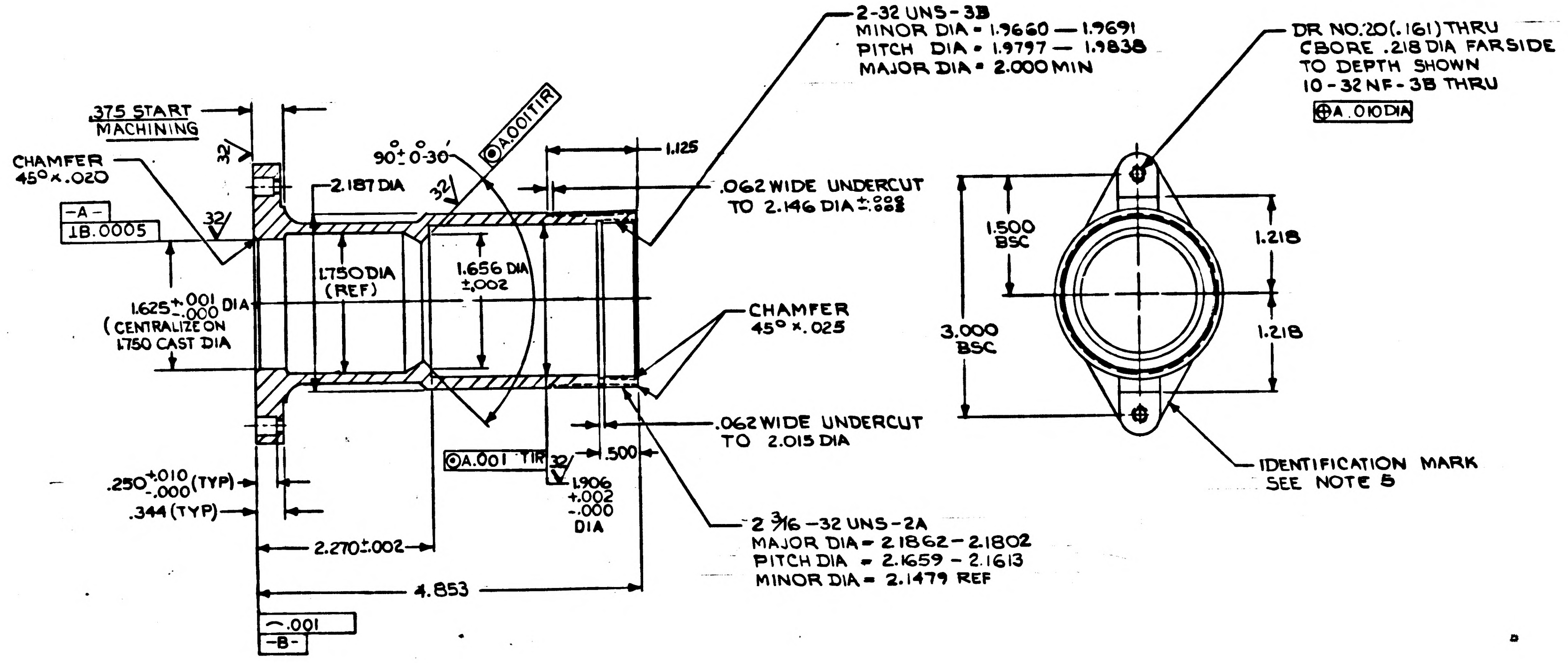
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1961101

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

REVISIONS TORR 052

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. GENERAL MACHINING STANDARDS IN ACCORDANCE WITH ND1002078.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63√ FINISH ON ALL MACHINED SURFACES
   b. BREAK SHARP CORNERS IN ACCORDANCE WITH ND1002078.
4. BLACK ANODIZE PER MIL-A-8625 TYPE II BLACK (KPS-1005A.201)
5. IDENTIFY USING NASA DRAWING NO. REVISION LETTER AND MANUFACTURERS SYMBOL PER ND1002019.


.375 START MACHINING
CHAMFER 45° × .020
32
-A-
1B.0005
2.187 DIA
90° ± 0° 30'
A.001 TIR
1.125
.062 WIDE UNDERCUT TO 2.146 DIA ±.008
2-32 UNS-3B
MINOR DIA = 1.9660 — 1.9691
PITCH DIA = 1.9797 — 1.9838
MAJOR DIA = 2.000 MIN
1.750 DIA (REF)
1.656 DIA ±.002
1.625 +.001 -.000 DIA (CENTRALIZE ON 1.750 CAST DIA
CHAMFER 45° × .025
.062 WIDE UNDERCUT TO 2.015 DIA
A.001 TIR
.500
1.906 +.002 -.000 DIA
.250 +.010 -.000 (TYP)
.344 (TYP)
2.270 ± .002
4.853
2 3/16 -32 UNS-2A
MAJOR DIA = 2.1862 - 2.1802
PITCH DIA = 2.1659 - 2.1613
MINOR DIA = 2.1479 REF
.001
-B-
DR NO. 20 (.161) THRU
CBORE .218 DIA FARSIDE
TO DEPTH SHOWN
10-32 NF-3B THRU
A .010 DIA
1.500 BSC
3.000 BSC
1.218
1.218
IDENTIFICATION MARK SEE NOTE 5

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011960	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL 1011914

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 52386901000

DRAWN E. DRAPALA DATE 12-3-63
CHECKED T. SULLIVAN 12-13-63
APPROVAL 12/16/63
APPROVAL E. Mornep 12/17/63
NASA APPROVAL 12/17/63
MIT APPROVAL 12/17/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE HOUSING, EYEPIECE SCT

CODE IDENT NO.
SIZE D
NASA NUMBER 1011961
SCALE 1/1
WEIGHT CALC ACTUAL
SHEET OF

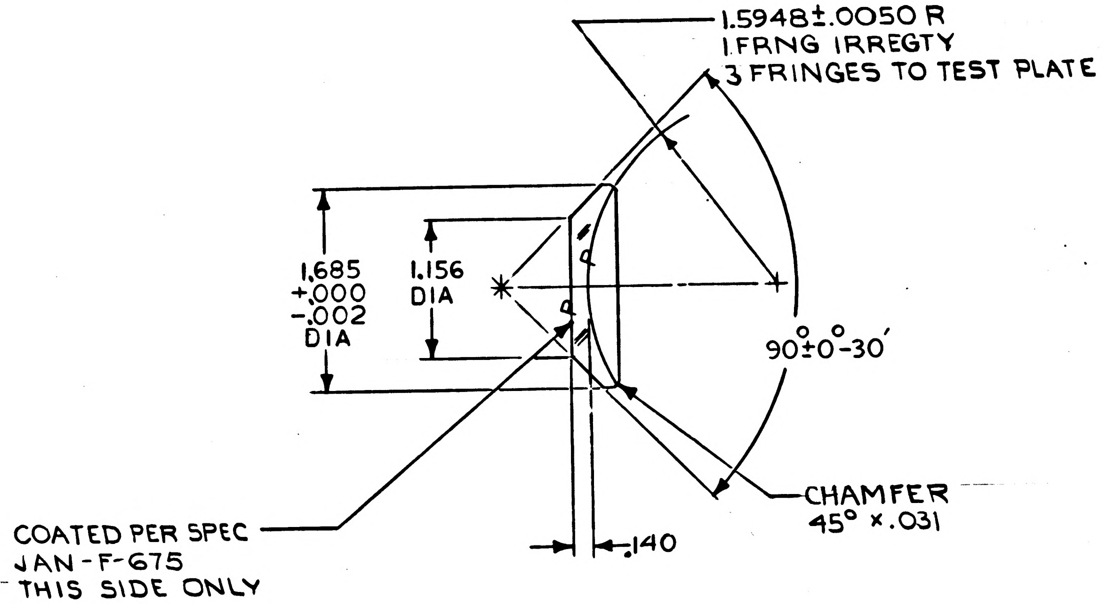
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

9961101

REVISIONS TJRR 05238

SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES:
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. ELEMENT IN ACCORDANCE WITH MIL-O-13830.
3. MATL: GLASS, OPTICAL PER JAN-G-174.
   GRADE B, FINE ANNEALED
   TYPE 648-337
4. CA: ENT = 1.140 EXIT = 1.302
   SURF. QUAL: 60-40
   CTRG ERROR 3 MINUTES MAX
5. SURFACES MARKED "P" POLISHED, ALL OTHER GROUND


1.5948±.0050 R
1 FRNG IRREGTY
3 FRINGES TO TEST PLATE
1.685
+.000
-.002
DIA
1.156
DIA
P
P
90°±0°-30'
CHAMFER
45° × .031
COATED PER SPEC
JAN-F-675
THIS SIDE ONLY
.140

MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011967	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± —	± .005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 3

CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 28386900800

DRAWN E. DRAPALA DATE 12-9-63
CHECKED J. SULLIVAN 12-13-63
APPROVAL R. Cushman 12/16/63
APPROVAL E. Thomas 12/17/63
NASA APPROVAL K. Michael 12/17/63
MIT APPROVAL R. Vogel 12/17/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
LENS, NEGATIVE
(TELESCOPE OBJECTIVE)

CODE IDENT NO.
SIZE C
NASA NUMBER 1011966
SCALE 1/1
WEIGHT
CALC ACTUAL
SHEET 1 OF 1

E-154

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

9961101

A	1012041

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

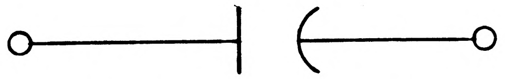
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 10062	6-9-64	WR
A	REVISED PER TDRR 14042	11-12-64	WR

REQUIREMENTS:

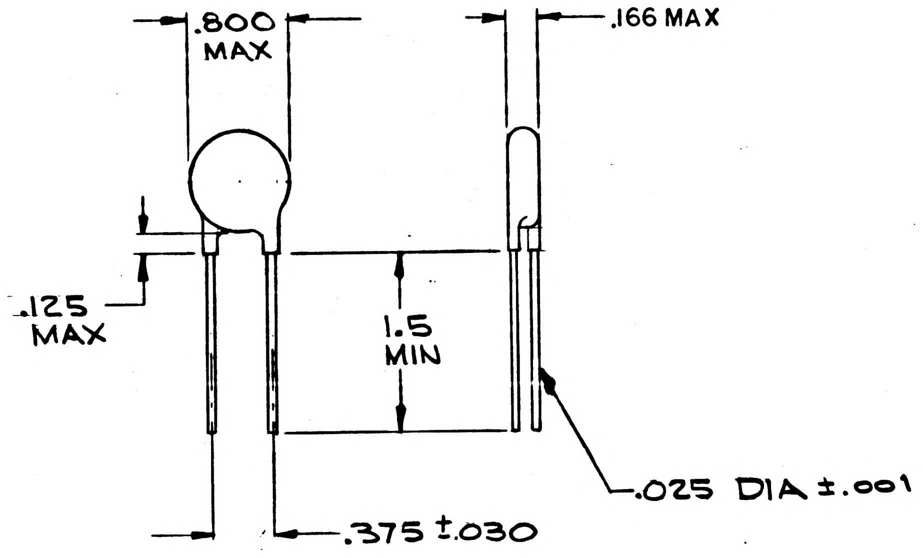
1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002045 UNLESS MODIFIED OR AMENDED BY DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-C-11015.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - 1. DIMENSIONS PER OUTLINE.
     - 2. MARKING: EACH CAPACITOR SHALL BE PERMANENTLY IDENTIFIED WITH THE NASA PART NUMBER, LATEST REVISION LETTER, AND THE MANUFACTURER'S NAME OR SYMBOL, CAPACITANCE VALUE & TOLERANCE PER ND 1002019.
   - B. ELECTRICAL REQUIREMENTS:
     - 1. CAPACITANCE: PER TABLE I AT +25°C, 1 KC.
     - 2. CAPACITANCE TOLERANCE: +80%, -20% AT +25°C, 1 KC.
     - 3. DIELECTRIC WITHSTANDING VOLTAGE: CAPACITORS SHALL WITHSTAND 7000 VDC FOR 2 SECONDS WITHOUT DAMAGE, ARCING OR BREAKDOWN.
     - 4. INSULATION RESISTANCE: 10K MEGOHMS MIN AT 25°C.

3. DESIGN REQUIREMENTS:
   - A. DC WORKING VOLTAGE: 4KV AT 85°C.
   - B. OPERATING TEMPERATURE RANGE: +10°C TO +85°C.
   - C. DISSIPATION FACTOR: 2% MAX.
   - D. CAPACITANCE CHANGE VS TEMPERATURE: CAPACITANCE SHALL NOT DEVIATE BY MORE THAN +22%, -5% OVER OPERATING TEMPERATURE RANGE.
   - E. LEAD DATA: DUMET. PER ND 1015401.
     A CERTIFICATE OF COMPLIANCE SHALL ACCOMPANY EACH SHIPMENT.



GRAPHICAL SYMBOL



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

NEXT ASSY	USED ON
APPLICATION	

K.I.C. NO	69190456001 THRU 6003

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN M. MENZORIO DATE 4-7-64
CHECKED S. Zukoski 4-7-64
APPROVAL M. Goston 6-9-64
APPROVAL D.A. Koso 6-9-64
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CAPACITOR, FIXED,
CERAMIC DIELECTRIC
(HIGH VOLTAGE)
SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	C	1012041
SCALE —	WT	SHEET 1 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1012041 A

Ⓜ

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 10062	6/9/64	WH
A	REVISED PER TDRR 14042	8-12-64	WH

DESIGN REQUIREMENTS: (CONTINUED)

F. ENVIRONMENTAL:

1. REDUCED PRESSURE: UNIT SHALL BE OPERATIVE DURING AND AFTER AND SHALL SUSTAIN NO DAMAGE AS A RESULT OF EXPOSURE TO 10^{-4} MM OF MERCURY FOR 96 HOURS.

TABLE 1

DASH NO.	CAP. IN MFDS
-1	.0039
-2	.0043
-3	.0047

4. SPECIAL CONDITIONING BY SUPPLIER

A. BURN-IN: ALL CAPACITORS SHALL BE SUBJECTED TO 5.5 KVDC AT +85°C $^{+0}_{-5}$ °C FOR A MINIMUM OF 100 HOURS.

B. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN AT +25° ± 2°C:

CAPACITANCE
DISSIPATION FACTOR
INSULATION RESISTANCE

C. THE BURN-IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOLLOWING BURN-IN, SHALL NOT BE ACCEPTABLE.

LIMITS:		
	CAPACITANCE	±10% OF INITIAL READING
	DISSIPATION FACTOR:	2% MAXIMUM
	INSULATION RESISTANCE:	10K MEGOHM MINIMUM WHEN TESTED IN ACCORDANCE WITH MIL-C-11015.

KIC DASH NO.	NASA DASH NO.
6001	-1
6002	-2
6003	-3

MASTER

NEXT ASSY	USED ON
APPLICATION	

KIC NO 69190456001 THRU 6003

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN M Menzorio DATE 4-7-64
CHECKED S Zakaluk R 4-7-64
APPROVAL M Goston 6-9-64
APPROVAL D G Koso 6-9-64
NASA APPROVAL
MIT APPROVAL 9 Jun 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CAPACITOR, FIXED,
CERAMIC DIELECTRIC
(HIGH VOLTAGE)
SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	C	1012041
SCALE —	WT	SHEET 2 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

— 1012041

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 10062		

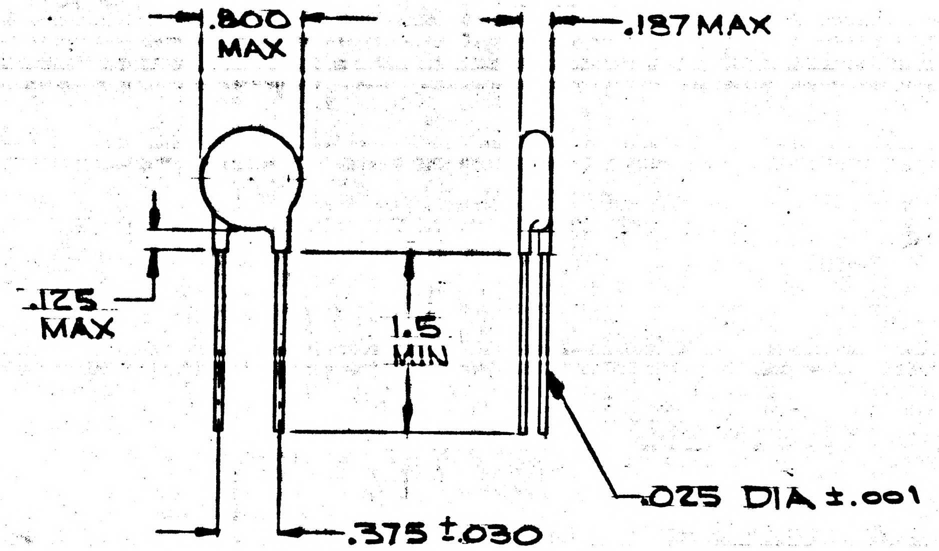
REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002045 UNLESS MODIFIED OR AMENDED BY DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-C-11015.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - 1. DIMENSIONS PER OUTLINE.
     - 2. MARKING: EACH CAPACITOR SHALL BE PERMANENTLY IDENTIFIED WITH THE NASA PART NUMBER, LATEST REVISION LETTER, AND THE MANUFACTURER'S NAME OR SYMBOL, CAPACITANCE VALUE & TOLERANCE PER ND 1002019.
   - B. ELECTRICAL REQUIREMENTS:
     - 1. CAPACITANCE: PER TABLE I AT +25°C, 1 KC.
     - 2. CAPACITANCE TOLERANCE: +80%, -20% AT +25°C, 1 KC.
     - 3. DIELECTRIC WITHSTANDING VOLTAGE: CAPACITORS SHALL WITHSTAND 7000 VDC FOR 2 SECONDS WITHOUT DAMAGE, ARCING OR BREAKDOWN.
     - 4. INSULATION RESISTANCE: 10K MEGOHMS MIN AT 25°C.

3. DESIGN REQUIREMENTS:
   - A. DC WORKING VOLTAGE: 4KV AT 85°C.
   - B. OPERATING TEMPERATURE RANGE: +10°C TO +85°C.
   - C. DISSIPATION FACTOR: 2% MAX.
   - D. CAPACITANCE CHANGE VS TEMPERATURE: CAPACITANCE SHALL NOT DEVIATE BY MORE THAN +22%, -56% OVER OPERATING TEMPERATURE RANGE.
   - E. LEAD DATA: DUMET, PER ND 1015401.
   - A CERTIFICATE OF COMPLIANCE SHALL ACCOMPANY EACH SHIPMENT.

GRAPHICAL SYMBOL



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

K.I.C. NO 69190456001 THRU 6003

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN M. MENZORIO DATE 4-7-64
CHECKED E. Zakash 4-7-64
APPROVAL M. Gustin 6-9-64
APPROVAL Ed Kosmo 6-9-64
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CAPACITOR, FIXED,
CERAMIC DIELECTRIC
(HIGH VOLTAGE)
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1012041
SCALE — WT SHEET 1 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE KEY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

—	1012041

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 1062	6/9/64	WR

Ⓜ

DESIGN REQUIREMENTS: (CONTINUED)

E. ENVIRONMENTAL:

1. REDUCED PRESSURE: UNIT SHALL BE OPERATIVE DURING AND AFTER AND SHALL SUSTAIN NO DAMAGE AS A RESULT OF EXPOSURE TO 10^{-4} MM OF MERCURY FOR 96 HOURS.

TABLE 1	
NASA DASH NO.	CAP. IN MFDS
-1	.0039
-2	.0043
-3	.0047

4.4. SPECIAL CONDITIONING BY SUPPLIER

A. BURN-IN: ALL CAPACITORS SHALL BE SUBJECTED TO 5,5 KVDC AT +85°C $^{+0}_{-5}$ °C FOR A MINIMUM OF 100 HOURS.

B. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN AT +25° ± 2°C:

CAPACITANCE
DISSIPATION FACTOR
INSULATION RESISTANCE

C. THE BURN-IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOLLOWING BURN-IN, SHALL NOT BE ACCEPTABLE.

LIMITS:		
	CAPACITANCE	±10% OF INITIAL READING
	DISSIPATION FACTOR:	2% MAXIMUM
	INSULATION RESISTANCE:	10K MEGOHM MINIMUM WHEN TESTED IN ACCORDANCE WITH MIL-C-11015.

KIC DASH NO.	NASA DASH NO.
6001	-1
6002	-2
6003	-3

MASTER

KIC NO 69190456001 THRU 6003

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN M. Menzoein DATE 4-7-64
CHECKED Szekaluk, R. 4-7-64
APPROVAL M Gosten 6-9-64
APPROVAL DuKoss 6-9-64
NASA APPROVAL
MIT APPROVAL 9 Jun 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CAPACITOR, FIXED, CERAMIC DIELECTRIC (HIGH VOLTAGE)
SPECIFICATION CONTROL DWG

CODE IDENT NO. SIZE C NASA DRAWING NO. 1012041
SCALE — WT SHEET 2 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

— 1012042

REVISIONS

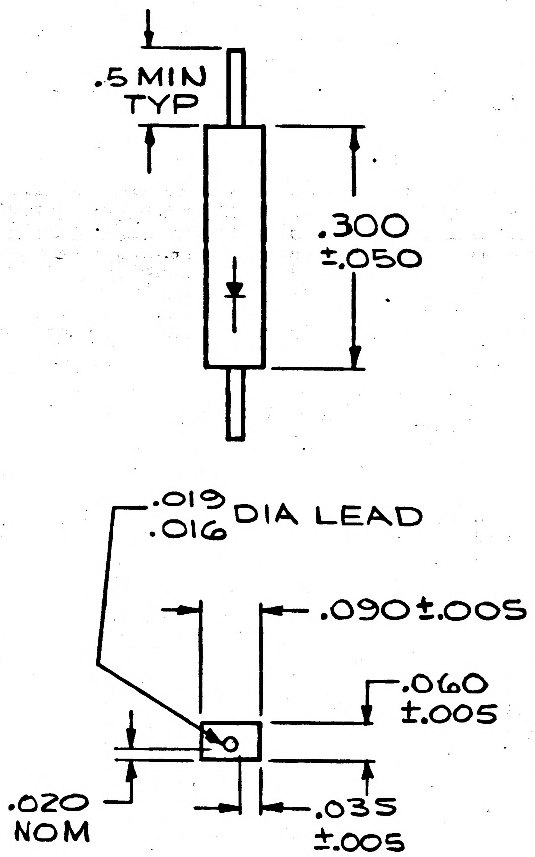
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 08924	5/26/64	

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH ND 1002129.

2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS:
     - 1. DIMENSIONS: AS SHOWN
     - 2. PARTS SHALL BE IDENTIFIED WITH NASA DRAWING NUMBER, LATEST REVISION LETTER AND MANUFACTURER'S IDENTIFICATION PER ND 1002019.
   - B. ELECTRICAL REQUIREMENTS: PER TABLE II

3. DESIGN REQUIREMENTS
   - A. ELECTRICAL CHARACTERISTICS: PER TABLE I
   - B. LEAD MATERIAL: KOVAR WITH GOLD PLATING PER ND 1015402.



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

MASTER

KIC NO 68 41500 9701

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN M. MENZORIO DATE 4-9-64
CHECKED Szakaluk R 4-9-64
APPROVAL DAK 5-26-64
APPROVAL
NASA APPROVAL
MIT APPROVAL 5/26/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SEMICONDUCTOR DEVICE,
SILICON DIODE
(HIGH VOLTAGE)
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1012042
SCALE ~
WT
SHEET 1 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

— 1012042

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 08924	5/26/64	

4. SPECIAL CONDITIONING (BY SUPPLIER)
    - A. BURN-IN SHALL BE FOR A PERIOD OF 240 HOURS UNDER THE FOLLOWING CONDITIONS:
        1. AMBIENT TEMPERATURE: SHALL BE +25 ± 10°C.
        2. POWER DISSIPATION AND VOLTAGE STRESS: THE DIODE SHALL BE STRESSED BY AN APPROXIMATE SINE WAVE HAVING A FREQUENCY OF 60 ± 6 CPS AT 50% OF RATED PEAK VOLTAGE. THE DIODE SHALL HAVE A RESISTIVE LOAD SUCH THAT THE AVERAGE RECTIFIED CURRENT IS 50 ± 5% OF RATING AT 25°C AMBIENT TEMPERATURE.
    - B. PARAMETRIC STABILITY: DATA TAKEN AT 0, 120, 240 HOURS
        1. ACCEPTANCE LIMITS
            - (a) FORWARD VOLTAGE DROP: NO GREATER THAN 0.01 VOLT ABSOLUTE CHANGE.
            - (b) REVERSE LEAKAGE CURRENT: 2X INITIAL VALUE.
    - C. THIS DATA SHALL BE RECORDED FOR EACH UNIT AND SUBMITTED WITH SHIPMENT IN ADDITION TO THE INSPECTION AND ACCEPTANCE DATA TO BE FURNISHED IN ACCORDANCE WITH ND 1015404.

TABLE I

1. MAX INVERSE WORKING VOLTAGE AT 25°C: 2000 VDC
2. MAX DC FORWARD CURRENT AT 25°C: .100 ADC

TABLE II

1. FORWARD CHARACTERISTICS AT 100 MA, 2 VDC MAX
2. INVERSE CURRENT 1500 VDC, .1 UA MAX. AT 25°C
   2000 VDC, 50 UA MAX. AT 100°C
3. RECOVERY CHARACTERISTICS: RECOVERS TO 0.1 MA IN 3 SECONDS
   CONDITIONS 1 MA FORWARD CURRENT TO 100 V REVERSE

MASTER

KIC NO 68415009701

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN M Menzoerio DATE 4-9-64
CHECKED Szakaluk R 4-9-64
APPROVAL DAKoso 5-26-64
APPROVAL
NASA APPROVAL
MIT APPROVAL 5/26/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SEMICONDUCTOR DEVICE,
SILICON DIODE
(HIGH VOLTAGE)
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1012042
SCALE ~
WT
SHEET 2 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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A	1012043

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 10061	6/8/64	WK
A	REVISED PER TDRR 10885	8 July 64	WK

Ⓜ

REQUIREMENTS

1. GENERAL

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIERS SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

C. PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-P-19491, LEVEL A, IN BOTH INSTANCES MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-STD-129 AND SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION LETTER.

CATHODE SHALL HAVE A DARK LIGHT SHIELDING PROTECTIVE COVER.

2. INSPECTION AND ACCEPTANCE: [PRIOR TO INSPECTION AND ACCEPTANCE TESTS, SUBJECT THE TUBE TO A SHARP TAP ONCE (USING A FELT TUBE TAPPER) IN DIRECTION A, DIRECTION B AND DIRECTION C AS SHOWN.

THE TUBE SHALL BE TAPPED IN SUCH A MANNER SO AS NOT TO EXCEED 15 g'S. THIS PROCEDURE SHALL BE PERFORMED ONLY ONCE FOR EACH TUBE.]

A. ELECTRICAL CHARACTERISTICS

1. PER TABLE II

2. MARKING: PARTS SHALL BE IDENTIFIED WITH NASA DRAWING NUMBER, LATEST REVISION, SERIAL NUMBER AND MANUFACTURER'S IDENTIFICATION PER ND 1002019.

B. MECHANICAL: DIMENSIONS AS SHOWN.

3. DESIGN REQUIREMENTS

A. STORAGE TEMPERATURE: -45°C TO + 75°C

B. ELECTRICAL RATING: PER TABLE I

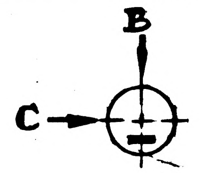
C. LEAD MATERIAL: KOVAR PER ND 1015402, GOLD PLATED

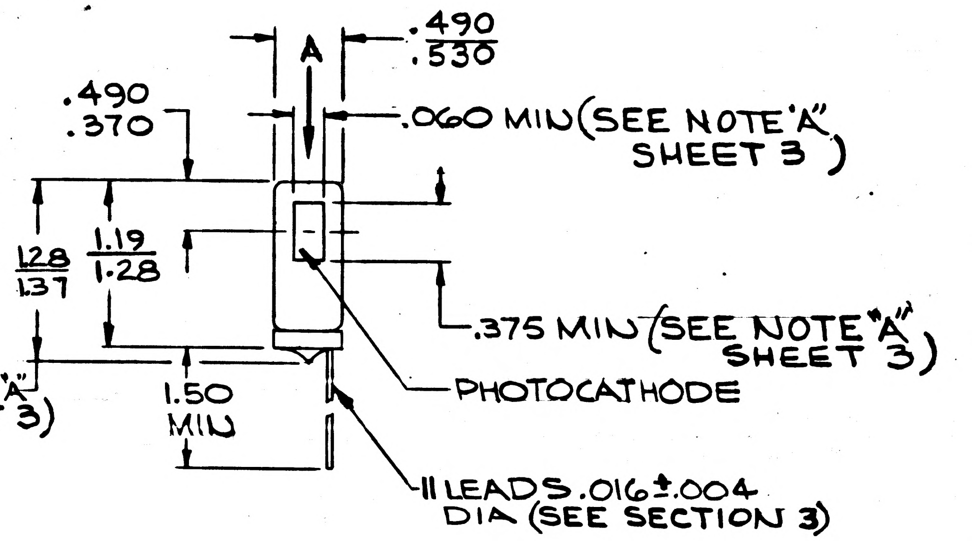
D. CURRENT AMPLIFICATION: $3x10^6$

1012043-1	REFER TO
1012043-2	TABLE II

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING.

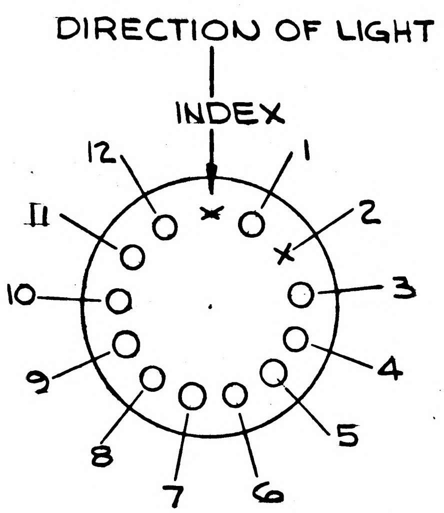
MASTER





A
.490
.530
.490
.370
.060 MIN (SEE NOTE 'A' SHEET 3)
1.28
1.37
1.19
1.28
.375 MIN (SEE NOTE 'A' SHEET 3)
(SEE NOTE 'A' SHEET 3)
1.50 MIN
PHOTOCATHODE
11 LEADS .016±.004 DIA (SEE SECTION 3)

LEAD DIAGRAM (BOTTOM VIEW)



INDEX: CUTOFF

LEAD NO. 1:ANODE
LEAD NO. 2:CUTOFF
LEAD NO. 3:DYNODE NO. 8
LEAD NO. 4:DYNODE NO. 7
LEAD NO. 5:DYNODE NO. 6
LEAD NO. 6:DYNODE NO. 5

INDEX: CUTOFF

LEAD NO.7: DYNODE NO. 4
LEAD NO.8: DYNODE NO. 3
LEAD NO.9: DYNODE NO. 2
LEAD NO.10:DYNODE NO. 1
LEAD NO.11:PHOTOCATHODE
LEAD NO.12:DYNODE NO. 9

KIC NO 66604008001	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± — DECIMALS ± — ANGLES ± — DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DWG. NO. CONTRACT
		MATERIAL	DRAWN H.Venzorio DATE 4-8-64 CHECKED J.E.Kelty 4-8-64 APPROVAL M Gostend 6-9-64 APPROVAL D.A.Koso 6-9-64
		HEAT TREATMENT	NASA APPROVAL
NEXT ASSY	USED ON	FINAL FINISH	MIT APPROVAL June 64
APPLICATION			

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ELECTRON TUBE
(PHOTO MULTIPLIER)
SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	C	1012043
SCALE —	WT	SHEET 1 OF 5

INCHES

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REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 10061	6/9/64	wk
A	REVISED PER TDRR 10885	8/4/64	wk

4. ENVIRONMENTAL DATA (THIS TUBE HAS BEEN DESIGNED TO WITHSTAND THE FOLLOWING):

A. SHOCK: THREE IMPACT SHOCKS IN BOTH DIRECTIONS OF THE X1-X2, Y1-Y2 AND Z1-Z2 AXES WITH EACH IMPACT SHOCK HAVING A PEAK ACCELERATION OF 30 G'S AND A TIME DURATION OF 11 ± 1 MILLISECONDS. FIGURE IV

B. OPERATIONAL VIBRATION: VIBRATION HAVING SINUSOIDAL MOTION APPLIED IN EACH OF THE THREE ORTHOGONAL AXES ACCORDING TO THE FOLLOWING SCHEDULES: 5 TO 30 CYCLES PER SECOND WITH DOUBLE AMPLITUDE OF 0.45 INCHES AND 30 TO 2000 TO 30 CYCLES PER SECOND WITH AN ACCELERATION OF 20 G'S AT A SWEEP RATE OF 1 OCTAVE PER MINUTE HAVING A TOTAL TIME DURATION OF 30 MIN. PER AXIS.

C. LINEAR ACCELERATION: LINEAR ACCELERATION OF 15 G'S ALONG EACH OF THE TWO DIRECTIONS OF THE THREE AXES SHOWN IN FIGURE IV FOR A DURATION OF 5 MINUTES IN EACH DIRECTION.

D. TEMPERATURE (NON OPERATING): THREE CYCLES FROM -45°C TO +75 TO -45°C WITH 8 HOURS BEING REQUIRED FOR EACH CYCLE.

TABLE I

GENERAL		
SPECTRAL RESPONSE	S-4	
WAVELENGTH OF MAXIMUM RESPONSE	4000± 500	ANGSTROMS
OPERATING POSITION	ANY	
WEIGHT (APPROX)	0.17	OZ
DYNODE MATERIAL	Cs_3Sb_2	
DIRECT INTERELECTRODE CAPACITANCES (APPROX.):		
ANODE TO DYNODE NO. 9	2.6	UUF
ANODE TO ALL OTHER ELECTRODES	2.8	UUF
MAXIMUM OVERALL LENGTH (EXCLUDING SEMI-FLEXIBLE LEADS)	1.37	INCHES
MAXIMUM RATINGS, ABSOLUTE-MAXIMUM VALUES: (B)		
SUPPLY VOLTAGE (DC)		
BETWEEN ANODE AND CATHODE (C)	1250 MAX.	VOLTS
BETWEEN DYNODE NO. 9 AND ANODE	250 MAX.	VOLTS
BETWEEN CONSECUTIVE DYNODES	250 MAX.	VOLTS
BETWEEN DYNODE NO. 1 AND CATHODE	250 MAX.	VOLTS
AVERAGE ANODE CURRENT (D)	20	UA
AMBIENT TEMPERATURE	75 MAX.	°C

MASTER

KIC NO	66604008001

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON
FRACTIONS ±— DECIMALS ±— ANGLES ±—
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN M. Menzori DATE 4-8-64
CHECKED J.E. Kelly 4-8-64
APPROVAL M. Gustan 6-9-64
APPROVAL D. W. Kosso 6-9-64
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ELECTRON TUBE
(PHOTO MULTIPLIER)
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1012043
SCALE —
WT
SHEET 2 OF 5

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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1012043 A

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 10061	[illegible]	WK
A	REVISED PER TDRR 10885	[illegible]	WK

TABLE II

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN AT 25°±5°C UNDER CONDITIONS WITH DC SUPPLY VOLTAGE (E) ACROSS A VOLTAGE DIVIDER PROVIDING 1/10 OF E BETWEEN CATHODE AND DYNODE NO. 1: 1/10 OF E FOR EACH SUCCEEDING DYNODE STAGE: AND 1/10 OF E BETWEEN DYNODE NO. 9 AND ANODE.
WITH E = 1000 VOLTS (EXCEPT AS NOTED)

	MIN.	TYPICAL	MAX.	
SENSITIVITY:				
LUMINOUS				
AT 0 CPS (E)	100		260	AMP/L
CATHODE RADIANT, AT				
4000 ANGSTROMS	.029		-	AMP/WATT
CATHODE LUMINOUS (F)	2×10^{-5}	3×10^{-5}	4×10^{-5}	AMP/L
EQUIVALENT ANODE-DARK-CURRENT	1012043-1		7.5×10^{-9}	AMP
	1012043 2		10.0×10^{-9}	AMP
ANODE-PULSE RISE TIME (G)			1.5×10^{-9}	SEC
ELECTRON TRANSIT TIME (H)			$7.0\times10^{+9}$	SEC

NOTES

A. ON PLANE PERPENDICULAR TO THE INDICATED DIRECTION OF INCIDENT LIGHT AND PASSING THROUGH THE MAJOR AXIS OF TUBE.

B. ABSOLUTE-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS.

C. OPERATION WITH A SUPPLY VOLTAGE (E) OF LESS THAN 500 VOLTS DC IS NOT RECOMMENDED. IF SUCH A SUPPLY VOLTAGE IS USED, ILLUMINATION MUST BE LIMITED TO SUCH A VALUE THAT THE AVERAGE CATHODE PHOTOCURRENT DOES NOT EXCEED APPROXIMATELY 2×10^{-8} AMPERE.

D. AVERAGED OVER ANY INTERVAL OF 30 SECONDS MAXIMUM.

E. UNDER THE FOLLOWING CONDITIONS: THE LIGHT SOURCE IS A TUNGSTEN-FILAMENT IN A LIME GLASS ENVELOPE OPERATED AT A COLOR TEMPERATURE OF 2870°K. A LIGHT INPUT OF 1 MICROLUMEN IS USED.

F. UNDER THE FOLLOWING CONDITIONS: THE LIGHT SOURCE IS A TUNGSTEN-FILAMENT IN A LIME GLASS ENVELOPE OPERATED AT A COLOR TEMPERATURE OF 2870°K. THE VALUE OF LIGHT FLUX IS 1000 MICROLUMEN AND 100 VOLTS ARE APPLIED BETWEEN CATHODE AND ALL OTHER ELECTRODES CONNECTED TOGETHER AS ANODE.

G. MEASURED BETWEEN 10 PERCENT AND 90 PERCENT OF THE MAXIMUM ANODE-PULSE HEIGHT. THIS ANODE-PULSE RISE TIME IS PRIMARILY A FUNCTION OF TRANSIT-TIME VARIATION AND IS MEASURED UNDER CONDITIONS WITH THE INCIDENT LIGHT FULLY ILLUMINATING THE PHOTOCATHODE.

H. THE ELECTRON TRANSIT TIME IS THE TIME INTERVAL BETWEEN THE ARRIVAL OF A DELTA FUNCTION LIGHT PULSE AT THE ENTRANCE WINDOW OF THE TUBE AND THE TIME AT WHICH THE OUTPUT PULSE AT THE ANODE TERMINAL REACHES PEAK AMPLITUDE. THE TRANSIT TIME IS MEASURED UNDER CONDITIONS WITH THE INCIDENT LIGHT FULLY ILLUMINATING THE PHOTOCATHODE.

MASTER

KIC NO 66604008001	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT

DRAWN M. MENZORIO DATE 4-8-64
CHECKED J.E. Kelly 4-8-64
APPROVAL M. Gorstan 6-9-64
APPROVAL D. U. Koso 6-9-64
NASA APPROVAL
MIT APPROVAL

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HOUSTON, TEXAS

ELECTRON TUBE
(PHOTO MULTIPLIER)
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1012043
SCALE —
WT
SHEET 3 OF 5

INCHES
0 1 2

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1012043 A

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
Ⓜ -	INITIAL RELEASE CLASS A PER TDRR 10061	6/9/64	wk
A	REVISED PER TDRR 10885	[illegible]	wk

SEMI-LOGARITHMIC PRESENTATION OF S-4 RESPONSE

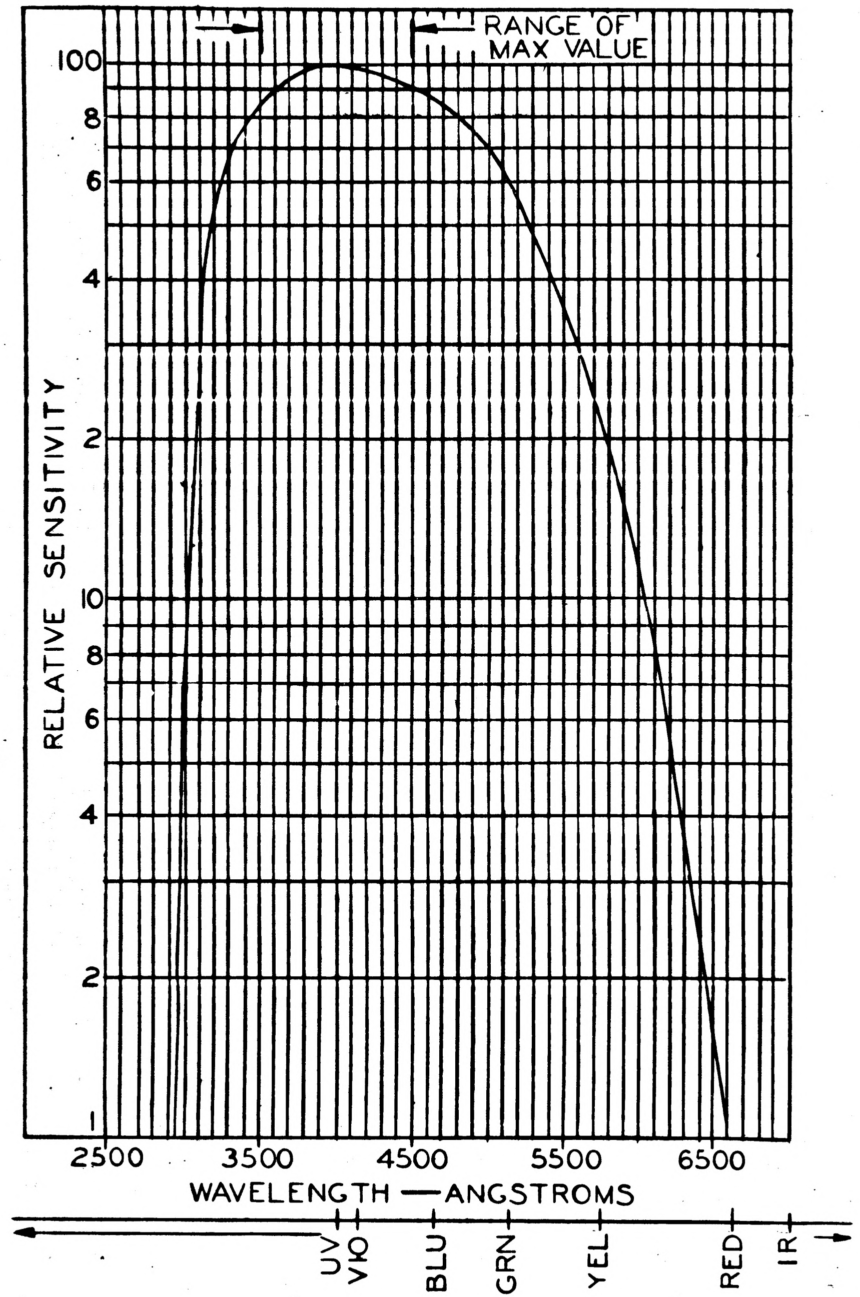

FIGURE I

MASTER

KIC NO	66604008001

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
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CHECKED J.E.Kelly 4-8-64
APPROVAL M. Gorton 6-9-64
APPROVAL DAKoso 6-9-64
NASA APPROVAL
MIT APPROVAL

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HOUSTON, TEXAS

ELECTRON TUBE
(PHOTO MULTIPLIER)
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1012043
SCALE —
WT
SHEET 4 OF 5

INCHES
0 1 2

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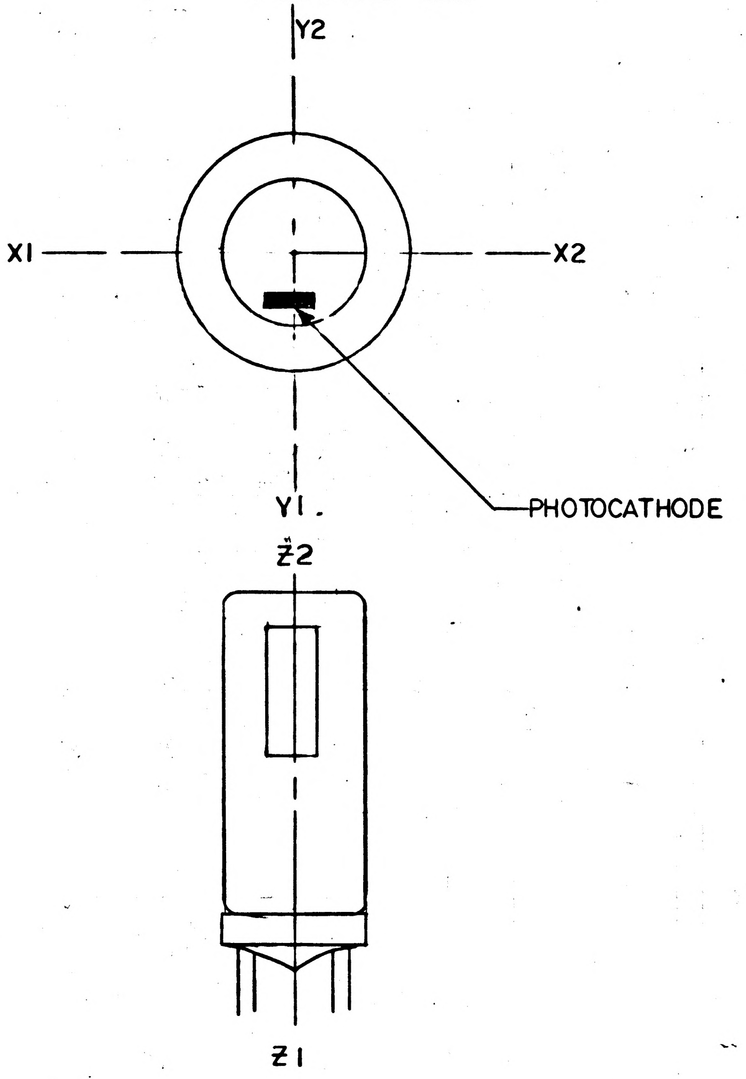
1012043 A

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 10061	6/9/64	WK
A	REVISED PER TDRR 10885	9/2/64	WK

ENVIRONMENTAL TESTING AXES

FIGURE IV



TYPICAL ANODE CHARACTERISTICS

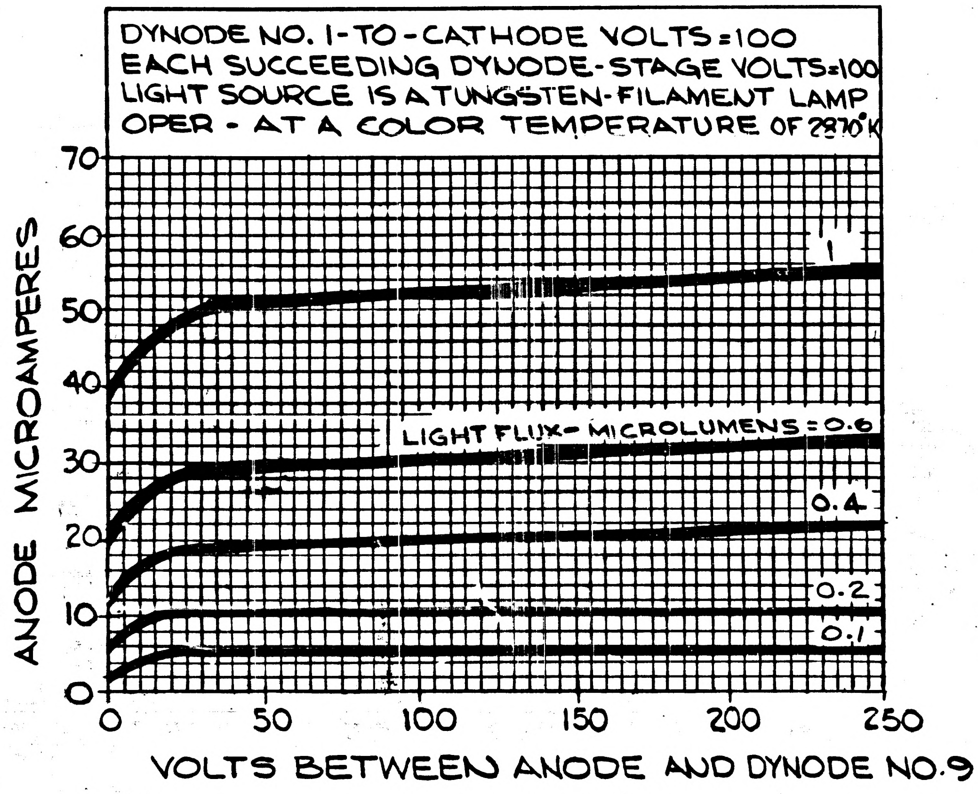


FIGURE II

TYPICAL TIME RESOLUTION CHARACTERISTICS

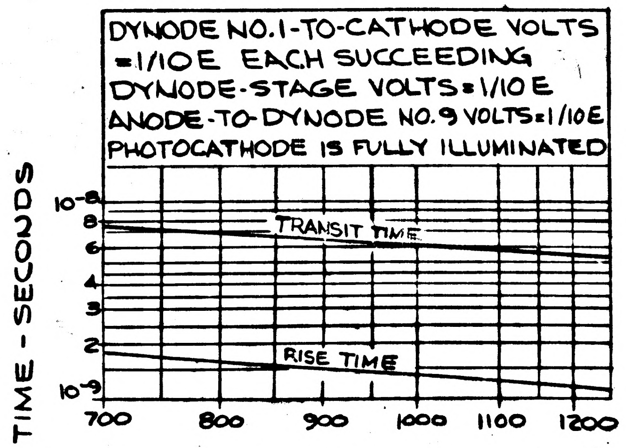


FIGURE III

MASTER

KIC NO 66604008001	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN M. Menzorio DATE 4-8-64
CHECKED J.E. Kelly 4-8-64
APPROVAL M. Gorstein 6-5-64
APPROVAL 6-9-64
NASA APPROVAL
MIT APPROVAL 9/2/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ELECTRON TUBE
(PHOTO MULTIPLIER)
SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	C	1012043
SCALE ~	WT	SHEET 5 OF 5

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

4 3 2 1

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B	1012043

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 10061	6/9/64	WK
A	REVISED PER TDRR 10885	8 [illegible] 64	WK
B	REVISED PER TDRR 15772	2/2/65	WK

REQUIREMENTS

1. GENERAL

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIERS SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

C. PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-E-75 LEVEL A, IN BOTH INSTANCES MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-STD-129 AND SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION LETTER.

CATHODE SHALL HAVE A DARK LIGHT SHIELDING PROTECTIVE COVER.

2. INSPECTION AND ACCEPTANCE: [PRIOR TO INSPECTION AND ACCEPTANCE TESTS, SUBJECT THE TUBE TO A SHARP TAP ONCE (USING A FELT TUBE TAPPER) IN DIRECTION A, DIRECTION B AND DIRECTION C AS SHOWN.

THE TUBE SHALL BE TAPPED IN SUCH A MANNER SO AS NOT TO EXCEED 15 g'S. THIS PROCEDURE SHALL BE PERFORMED ONLY ONCE FOR EACH TUBE.]

A. ELECTRICAL CHARACTERISTICS

1. PER TABLE II
2. MARKING: PARTS SHALL BE IDENTIFIED WITH NASA DRAWING NUMBER, LATEST REVISION, SERIAL NUMBER AND MANUFACTURER'S IDENTIFICATION PER ND 1002019.

B. MECHANICAL: DIMENSIONS AS SHOWN.

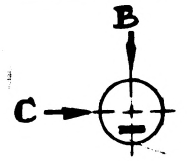
3. DESIGN REQUIREMENTS

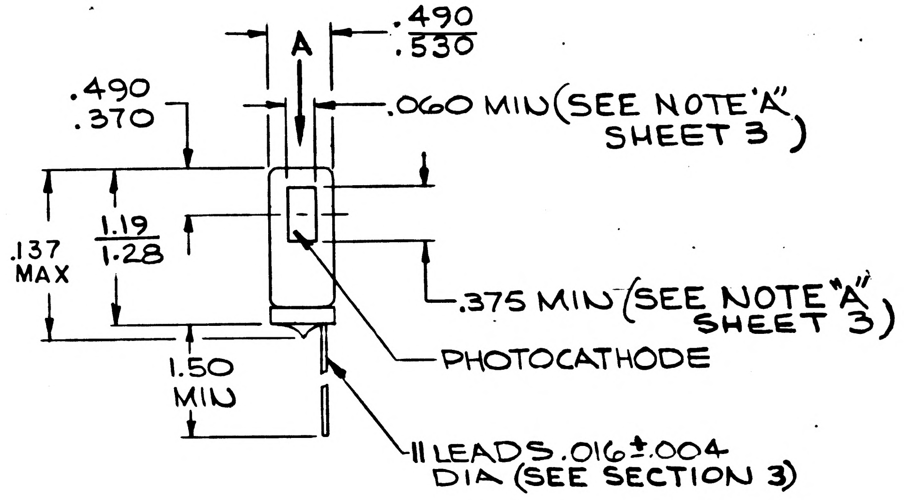
A. STORAGE TEMPERATURE: -45°C TO + 75°C

B. ELECTRICAL RATING: PER TABLE I

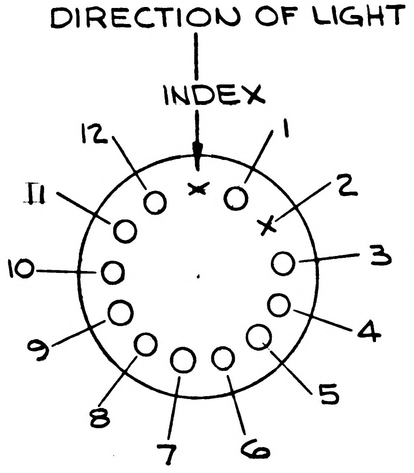
C. LEAD MATERIAL: DUMET PER ND 1015401, GOLD PLATED

D. CURRENT AMPLIFICATION: 3×10^6




A
.490
.530
.490
.370
.060 MIN (SEE NOTE 'A' SHEET 3)
.137 MAX
1.19
1.28
.375 MIN (SEE NOTE "A" SHEET 3)
PHOTOCATHODE
1.50 MIN
11 LEADS .016±.004 DIA (SEE SECTION 3)

LEAD DIAGRAM (BOTTOM VIEW)



INDEX: CUTOFF

LEAD NO. 1: ANODE
LEAD NO. 2: CUTOFF
LEAD NO. 3: DYNODE NO. 8
LEAD NO. 4: DYNODE NO. 7
LEAD NO. 5: DYNODE NO. 6
LEAD NO. 6: DYNODE NO. 5

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LEAD NO. 7: DYNODE NO. 4
LEAD NO. 8: DYNODE NO. 3
LEAD NO. 9: DYNODE NO. 2
LEAD NO. 10: DYNODE NO. 1
LEAD NO. 11: PHOTOCATHODE
LEAD NO. 12: DYNODE NO. 9

1012043-1	REFER TO TABLE II
1012043-2	

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING.

MASTER

KIC NO	66604008001	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
		LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN H. Wenzorio DATE 4-8-64
CHECKED J.E.Kelly 4-8-64
APPROVAL M. Gosten 6-9-64
APPROVAL S.A.Koso 6-9-64
NASA APPROVAL
MIT APPROVAL [illegible] 9 June 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ELECTRON TUBE
(PHOTO MULTIPLIER)
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1012043
SCALE —
WT
SHEET 1 OF 5

4 3 2 1

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REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 10061	6/9/64	WK
A	REVISED PER TDRR 10885	8/14/64	WK
B	REVISED PER TDRR 15772	4/2/65	WK

4. ENVIRONMENTAL DATA (THIS TUBE HAS BEEN DESIGNED TO WITHSTAND THE FOLLOWING):

A. SHOCK: THREE IMPACT SHOCKS IN BOTH DIRECTIONS OF THE X1-X2, Y1-Y2 AND Z1-Z2 AXES WITH EACH INPACT SHOCK HAVING A PEAK ACCELERATION OF 30 G'S AND A TIME DURATION OF 11 ± 1 MILLISECONDS. FIGURE IV

B. OPERATIONAL VIBRATION: VIBRATION HAVING SINUSOIDAL MOTION APPLIED IN EACH OF THE THREE ORTHOGONAL AXES ACCORDING TO THE FOLLOWING SCHEDULES: 5 TO 30 CYCLES PER SECOND WITH DOUBLE AMPLITUDE OF 0.45 INCHES AND 30 TO 2000 TO 30 CYCLES PER SECOND WITH AN ACCELERATION OF 20 G'S AT A SWEEP RATE OF 1 OCTAVE PER MINUTE HAVING A TOTAL TIME DURATION OF 30 MIN. PER AXIS.

C. LINEAR ACCELERATION: LINEAR ACCELERATION OF 15 G'S ALONG EACH OF THE TWO DIRECTIONS OF THE THREE AXES SHOWN IN FIGURE IV FOR A DURATION OF 5 MINUTES IN EACH DIRECTION.

D. TEMPERATURE (NON OPERATING): THREE CYCLES FROM -45°C TO +75 TO -45°C WITH 8 HOURS BEING REQUIRED FOR EACH CYCLE.

TABLE I

GENERAL		
SPECTRAL RESPONSE	S-4	
WAVELENGTH OF MAXIMUM RESPONSE	4000± 500	ANGSTROMS
OPERATING POSITION	ANY	
WEIGHT (APPROX)	0.17	OZ
DYNODE MATERIAL	$Cs_3 Sb$	
DIRECT INTERELECTRODE CAPACITANCES (APPROX.):		
ANODE TO DYNODE NO. 9	2.5	UUF
ANODE TO ALL OTHER ELECTRODES	3.0	UUF
MAXIMUM OVERALL LENGTH (EXCLUDING SEMI-FLEXIBLE LEADS)	1.37	INCHES
MAXIMUM RATINGS, ABSOLUTE-MAXIMUM VALUES: (B)		
SUPPLY VOLTAGE (DC)		
BETWEEN ANODE AND CATHODE (C)	1250 MAX.	VOLTS
BETWEEN DYNODE NO. 9 AND ANODE	250 MAX.	VOLTS
BETWEEN CONSECUTIVE DYNODES	250 MAX.	VOLTS
BETWEEN DYNODE NO. 1 AND CATHODE	250 MAX.	VOLTS
AVERAGE ANODE CURRENT (D)	20	UA
AMBIENT TEMPERATURE	75 MAX.	°C

5. SPECIAL CONDITIONING

5.1 THE FOLLOWING INITIAL MEASUREMENTS WILL BE MADE FOR THE TUBE.

5.1.1 CATHODE LUMINOUS SENSITIVITY: 30×10^{-6} AMPS./LUMEN (TYPICAL VALUE) TEST CONDITIONS::

A. 100 VOLTS BETWEEN CATHODE AND ALL OTHER ELECTRODES.

B. 10^{-2} LUMENS INCIDENT ON CATHODE FROM A TUNGSTEN-FILAMENT LIGHT SOURCE IN A LIME GLASS ENVELOPE AT A COLOR TEMPERATURE OF 2870°K.

5.1.2 CATHODE LUMINOUS SENSITIVITY: 3×10^{-8} AMPS. (TYPICAL VALUE) TEST CONDITIONS:

A. 100 VOLTS BETWEEN CATHODE AND ALL OTHER ELECTRODES.

B. 10^{-2} LUMENS INCIDENT ON CATHODE FROM A TUNGSTEN-FILAMENT LIGHT SOURCE IN A LIME GLASS ENVELOPE AT A COLOR TEMPERATURE OF 2870°K AND A BLUE FILTER CORNING CS 558, 5113, 1/2 STOCK THICKNESS INSERTED BETWEEN LIGHT SOURCE AND CATHODE.

5.1.3 ANODE CURRENT: 1×10^{-6} AMPS. (TYPICAL VALUE). TEST CONDITIONS

A. 1000 VOLTS OPERATING VOLTAGE.

B. 1 MICRO LUMEN INCIDENT ON CATHODE FROM A TUNGSTEN-FILAMENT LIGHT SOURCE IN A LIME GLASS ENVELOPE AT A COLOR TEMPERATURE OF 2870°K.

C. LIGHT SPOT SIZE TO BE 0.060 INCHES IN DIAMETER PROJECTED ONTO CENTER OF CATHODE.

D. AVERAGE ANODE CURRENT FOR ANY 30 SECOND INTERVAL MAY NOT EXCEED 20×10^{-6} AMPS.

5.1.4 ANODE DARK CURRENT: 8.5×10^{-9} AMPS. (MAX.VALUE)
P/N 1012043-1
11.3×10^{-9} AMPS. (MAX. VALUE)
P/N 1012043-2

TEST CONDITIONS:

A. ANODE SENSITIVITY 100 AMPS/LUMEN

5.1.5 SIGNAL TO NOISE RATIO: 45 (TYPICAL VALUE)
TEST CONDITIONS:

A. 1000 VOLTS OPERATING VOLTAGE.

B. .01 MICROLUMEN INCIDENT ON CATHODE FROM A TUNGSTEN-FILAMENT LIGHT SOURCE IN A LIME GLASS ENVELOPE AT A COLOR TEMP. OF 2870°K.

C. LIGHT SOPT SIZE 0.060 INCHES IN DIAMETER PROJECTED ONTO CENTER OF CATHODE.

D. NOISE MEASUREMENT MADE WITH A SQUARE WAVE 90 CPS (EQUAL ON OFF) LIGHT WAVE FORM AND WITH AN EQUIVALENT POWER PASS BAND OF 1000 CPS.

5.2 TEST SEQUENCE: AFTER INITIAL MEASUREMENT SPECIFIED UNDER ITEM 5.1. HAVE BEEN MADE, AND AFTER TUBE HAS BEEN INOPERATIVE FOR 24 HOURS MINIMUM WITH LIGHT SENSITIVE AREA COVERED, THE TUBE WILL BE SUBJECTED TO THE FOLLOWING TESTING:

A. 1000 VOLTS OPERATING VOLTAGE.

B. LIGHT INCIDENT ON THE CATHODE SHALL BE FROM A TUNGSTEN-FILAMENT LIGHT SOURCE IN A LIME GLASS ENVELOPE WHICH HAS A COLOR TEMPERATURE OF 2870°K, AND A BLUE FILTER CORNING CS-558, 5113, 1/2 STOCK THICKNESS INTERPOSED BETWEEN THE TUBE AND THE LIGHT SOURCE.

C. LIGHT SPOT SIZE TO BE 0.060 INCHES IN DIAMETER PROJECTED ONTO CENTER OF CATHODE.

5.2.1 THE LIGHT LEVEL SHALL BE ADJUSTED BY CONTROLLING THE CURRENT THROUGH THE TUNGSTEN-FILAMENT TO PRODUCE A TUBE ANODE CURRENT OF 5.0+0.1 MICROAMPERES. THE ADJUSTMENT OF THE LIGHT SOURCE SHALL NOT EXCEED 120 SECONDS COMMENCING WITH THE APPLICATION OF LIGHT. THE LIGHT LEVEL SHALL BE MAINTAINED CONSTANT THROUGHOUT ALL TESTS MADE UNDER ITEM 5.2 BY HOLDING THE TUNGSTEN-FILAMENT CURRENT WITHIN ±0.5% OF THE VALUE READ AT THE 120 SECOND INTERVAL. MEASURE AND RECORD ANODE CURRENT AT THE 120 SECOND INTERVAL.

5.2.2 MEASURE AND RECORD ANODE CURRENT AT THE END OF 30 MINUTES OF OPERATION.

5.2.3 MEASURE AND RECORD ANODE CURRENT AT THE END OF ADDITIONAL 4 HOURS OF OPERATION.

5.2.4 LEAVE TUBE INOPERATIVE IN ITS SOCKET FOR 24 HOURS WITH LIGHT SENSITIVE AREA COVERED.

5.2.5 REPEAT ALL TESTS SPECIFIED UNDER ITEMS 5.2.1, 5.2.2, AND 5.2.3.

5.3 REPEAT ALL TEST SPECIFIED UNDER ITEM 5.1. MEASURE AND RECORD ALL INDICATED CHARACTERISTICS.

5.4 ALL RECORDED TEST DATA IS TO BE FORWARDED TO PROCUREMENT AGENCY.

MASTER

NEXT ASSY	USED ON
APPLICATION	

KIC NO 66604008001

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN M. Menzori DATE 4-8-64
CHECKED J.E.Kelly 4-8-64
APPROVAL M Gaston 6-9-64
APPROVAL DUKosso 6-9-64
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ELECTRON TUBE
(PHOTO MULTIPLIER)
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1012043
SCALE —
WT
SHEET 2 OF 5

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 10061	[illegible]	WK
A	REVISED PER TDRR 10885	[illegible]	WK
B	REVISED PER TDRR 15772	2/24/65	WK

TABLE II

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN AT 72°F $^{+5°F}_{-2°F}$
UNDER CONDITIONS WITH DC SUPPLY VOLTAGE (E)
ACROSS A VOLTAGE DIVIDER PROVIDING 1/10 OF E
BETWEEN CATHODE AND DYNODE NO. 1: 1/10 OF E
FOR EACH SUCCEEDING DYNODE STAGE: AND 1/10 OF E
BETWEEN DYNODE NO. 9 AND ANODE.
WITH E = 1000 VOLTS (EXCEPT AS NOTED)

	MIN.	TYPICAL	MAX.	
SENSITIVITY:				
LUMINOUS AT 0 CPS (E)	100 [900-1100V]	260 [1000V]		AMP/L
CATHODE RADIANT, AT 4000 ANGSTROMS		.029	-	AMP/WATT
CATHODE LUMINOUS (F)	$2x10^{-5}$	$3x10^{-5}$	-	AMP/L
ANODE-DARK-CURRENT 1012043-1			$8.5X10^{-9}$ AMP	[AT 100 AMPS/L]
ANODE-DARK-CURRENT 1012043-2			$11.3X10^{-9}$ AMP	[AT 100 AMPS/L]
ANODE-PULSE RISE TIME (G)		$1.5x10^{-9}$		
ELECTRON TRANSIT TIME (H)	-	$7.0x10^{-9}$		

ABOVE DATA APPLICATION AFTER SECTION 5 SPECIAL CONDITIONING

NOTES

A. ON PLANE PERPENDICULAR TO THE INDICATED DIRECTION OF INCIDENT LIGHT AND PASSING THROUGH THE MAJOR AXIS OF TUBE.

B. ABSOLUTE-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS.

C. OPERATION WITH A SUPPLY VOLTAGE (E) OF LESS THAN 500 VOLTS DC IS NOT RECOMMENDED. IF SUCH A SUPPLY VOLTAGE IS USED, ILLUMINATION MUST BE LIMITED TO SUCH A VALUE THAT THE AVERAGE CATHODE PHOTOCURRENT DOES NOT EXCEED APPROXIMATELY $2x10^{-8}$ AMPERE.

D. AVERAGED OVER ANY INTERVAL OF 30 SECONDS MAXIMUM.

E. UNDER THE FOLLOWING CONDITIONS: THE LIGHT SOURCE IS A TUNGSTEN-FILAMENT IN A LIME GLASS ENVELOPE OPERATED AT A COLOR TEMPERATURE OF 2870°K. A LIGHT INPUT OF 1 MICROLUMEN IS USED.

F. UNDER THE FOLLOWING CONDITIONS: THE LIGHT SOURCE IS A TUNGSTEN-FILAMENT IN A LIME GLASS ENVELOPE OPERATED AT A COLOR TEMPERATURE OF 2870°K. THE VALUE OF LIGHT FLUX IS 1000 MICROLUMEN AND 100 VOLTS ARE APPLIED BETWEEN CATHODE AND ALL OTHER ELECTRODES CONNECTED TOGETHER AS ANODE.

G. MEASURED BETWEEN 10 PERCENT AND 90 PERCENT OF THE MAXIMUM ANODE-PULSE HEIGHT. THIS ANODE-PULSE RISE TIME IS PRIMARILY A FUNCTION OF TRANSIT-TIME VARIATION AND IS MEASURED UNDER CONDITIONS WITH THE INCIDENT LIGHT FULLY ILLUMINATING THE PHOTOCATHODE.

H. THE ELECTRON TRANSIT TIME IS THE TIME INTERVAL BETWEEN THE ARRIVAL OF A DELTA FUNCTION LIGHT PULSE AT THE ENTRANCE WINDOW OF THE TUBE AND THE TIME AT WHICH THE OUTPUT PULSE AT THE ANODE TERMINAL REACHES PEAK AMPLITUDE. THE TRANSIT TIME IS MEASURED UNDER CONDITIONS WITH THE INCIDENT LIGHT FULLY ILLUMINATING THE PHOTOCATHODE.

MASTER

KIC NO 66604008001

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS		

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN M. MENZORIO DATE 4 8 64
CHECKED J.E. Kelly 4-8-64
APPROVAL M. Gorstein 6-9-64
APPROVAL [illegible] 6-4-64
NASA APPROVAL
MIT APPROVAL

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HOUSTON, TEXAS

ELECTRON TUBE
(PHOTO MULTIPLIER)
SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	C	1012043
SCALE —	WT	SHEET 3 OF 5

1012043 B

SYM	DESCRIPTION	DATE	APPROVAL
REVISIONS			
ⓜ -	INITIAL RELEASE CLASS A PER TDRR 10061	6/9/64	WK
A	REVISED PER TDRR 10885	6/24/64	WK
ⓜ B	REVISED PER TDRR 15772	2/2/65	WK

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SEMI-LOGARITHMIC PRESENTATION OF S-4 RESPONSE

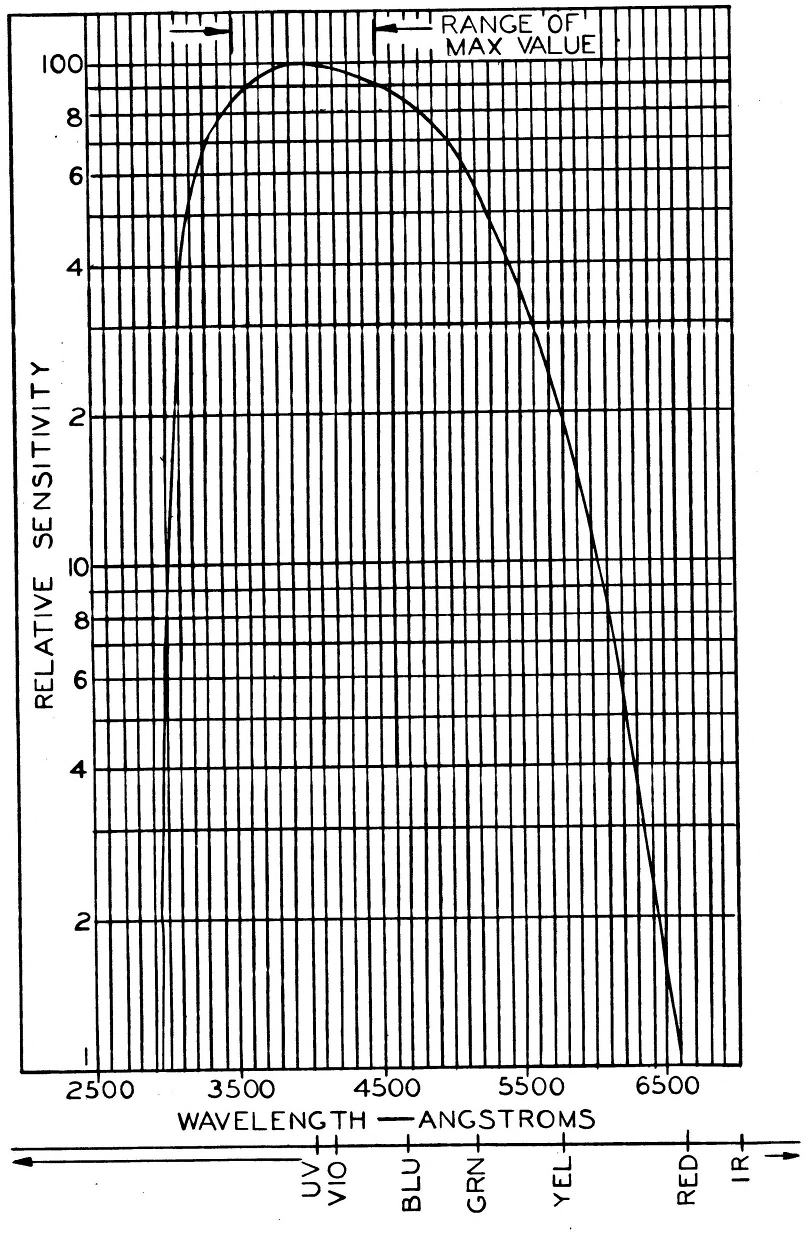

FIGURE I

MASTER

KIC NO 6660400800I	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± — DECIMALS ± — ANGLES ± — DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DWG. NO. CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
MATERIAL	DRAWN N Menzoro DATE 4-8-64 CHECKED J.E.Kelly 4-8-64 APPROVAL M. Gouton 6-9-64 APPROVAL DAKoso 6-4-64	ELECTRON TUBE (PHOTO MULTIPLIER) SPECIFICATION CONTROL DWG	
HEAT TREATMENT	NASA APPROVAL	CODE IDENT NO.	SIZE C · NASA DRAWING NO. 1012043
FINAL FINISH	MIT APPROVAL	SCALE —	WT · SHEET 4 OF 5

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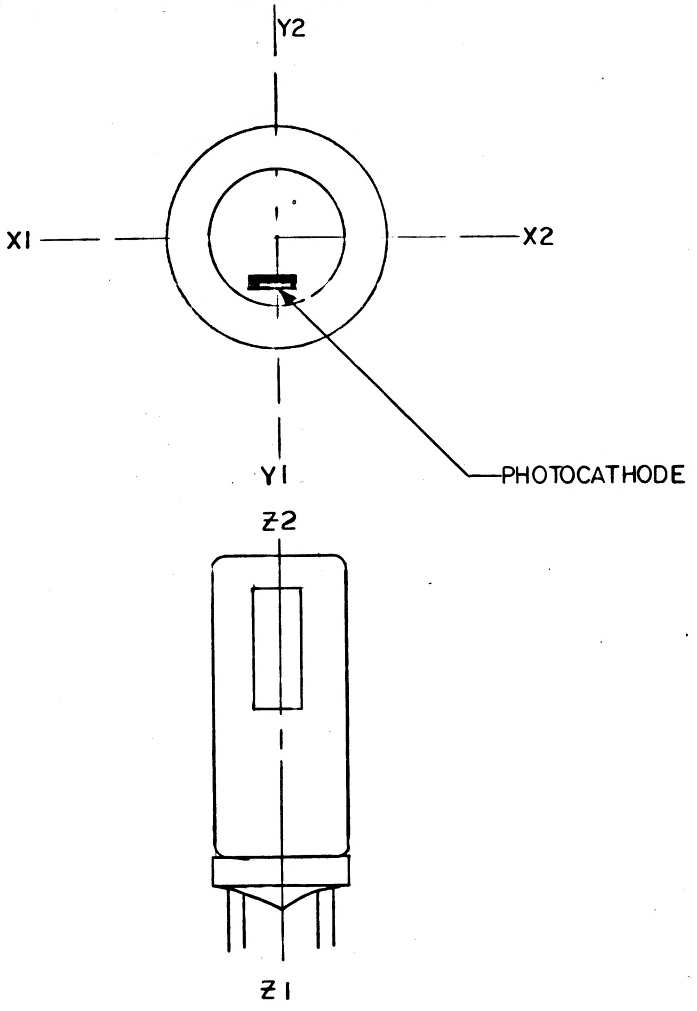
1012043 B

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 10061	6/6/64	WH
A	REVISED PER TDRR 10885	8 July 64	WH
B	REVISED PER TDRR 15772	2/2/65	WK

ENVIRONMENTAL TESTING AXES

FIGURE IV



TYPICAL ANODE CHARACTERISTICS

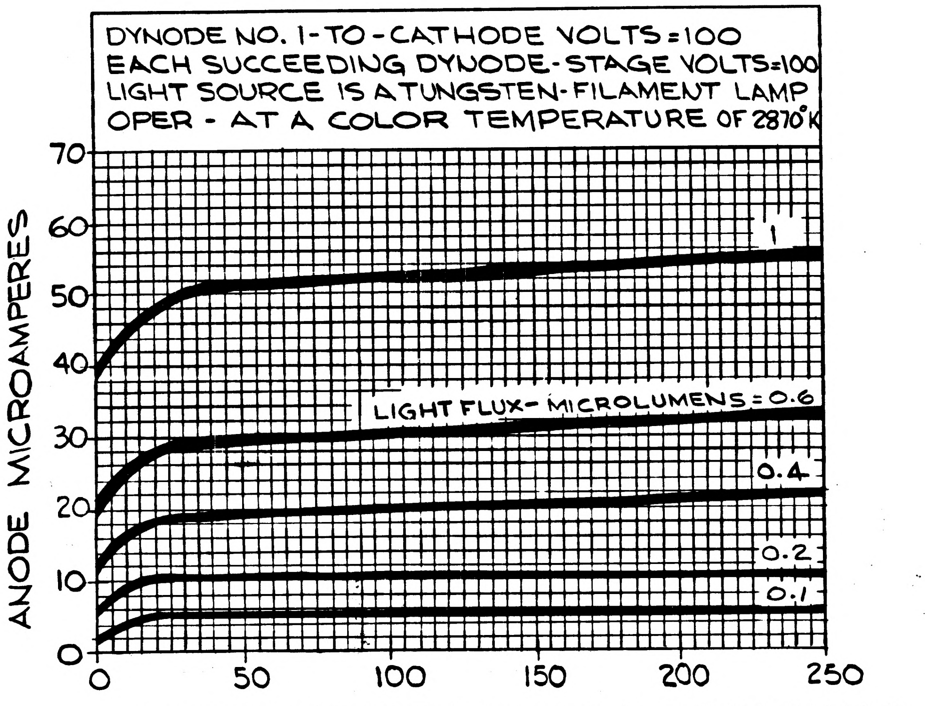


FIGURE II

TYPICAL TIME RESOLUTION CHARACTERISTICS

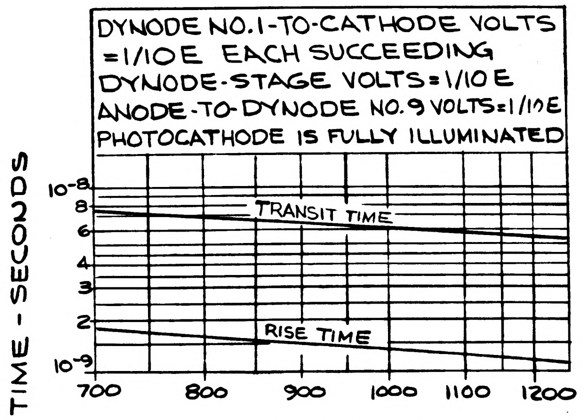


FIGURE III

MASTER

KIC NO 66604008001	QTY REQD	PART OR IDENTIFYING NO.
	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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DWG. NO. CONTRACT

DRAWN M. Menzorio DATE 4-8-64
CHECKED J.E. Kelly 4-8-64
APPROVAL M. Gorstein 6-9-64
APPROVAL D.G. Koso 6-9-64
NASA APPROVAL
MIT APPROVAL 9 Jun 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ELECTRON TUBE
(PHOTO MULTIPLIER)
SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	C	1012043
SCALE ~	WT	SHEET 5 OF 5

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1012043 C

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 10061	6/9/64	WK
A	REVISED PER TDRR 10885	8 Jul 64	WK
B	REVISED PER TDRR 15772	2/2/65	WK
C	REVISED PER TDRR 18619	5/11/65	WK

REQUIREMENTS

1. GENERAL

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

   B. SUPPLIERS SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

   C. PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-E-75 LEVEL A, IN BOTH INSTANCES MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-STD-129 AND SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION LETTER.

   CATHODE SHALL HAVE A DARK LIGHT SHIELDING PROTECTIVE COVER.

2. INSPECTION AND ACCEPTANCE: [PRIOR TO INSPECTION AND ACCEPTANCE TESTS, SUBJECT THE TUBE TO A SHARP TAP ONCE (USING A FELT TUBE TAPPER) IN DIRECTION A, DIRECTION B AND DIRECTION C AS SHOWN.

   THE TUBE SHALL BE TAPPED IN SUCH A MANNER SO AS NOT TO EXCEED 15 g'S. THIS PROCEDURE SHALL BE PERFORMED ONLY ONCE FOR EACH TUBE.]

   A. ELECTRICAL CHARACTERISTICS

      1. PER TABLE II

      2. MARKING: PARTS SHALL BE IDENTIFIED WITH NASA DRAWING NUMBER, LATEST REVISION, SERIAL NUMBER AND MANUFACTURER'S IDENTIFICATION PER ND 1002019.

   B. MECHANICAL: DIMENSIONS AS SHOWN.

3. DESIGN REQUIREMENTS

   A. STORAGE TEMPERATURE: -45°C TO + 75°C

   B. ELECTRICAL RATING: PER TABLE I

   C. LEAD MATERIAL: DUMET PER ND 1015401, GOLD PLATED

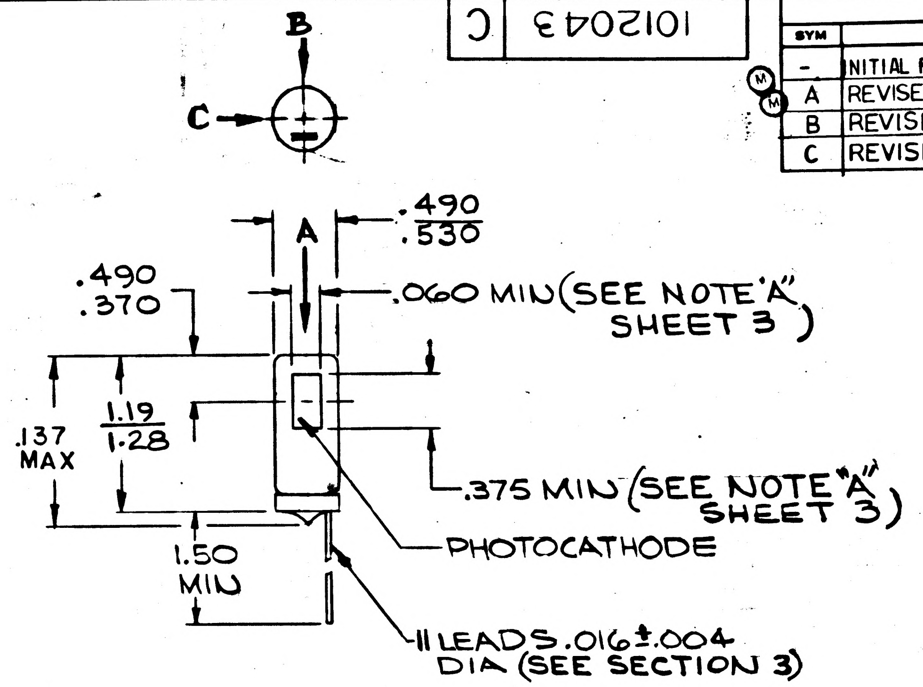
   D. CURRENT AMPLIFICATION: 3×10^6

   E. ANODE-PULSE RISE TIME 1.5×10^{-9} TYPICAL MEASURED BETWEEN 10 PERCENT AND 90 PERCENT OF THE MAXIMUM ANODE-PULSE HEIGHT. THIS ANODE-PULSE RISE TIME IS PRIMARILY A FUNCTION OF TRANSIT-TIME VARIATION & IS MEASURED UNDER CONDITIONS WITH THE INCIDENT LIGHT FULLY ILLUMINATING THE PHOTOCATHODE.

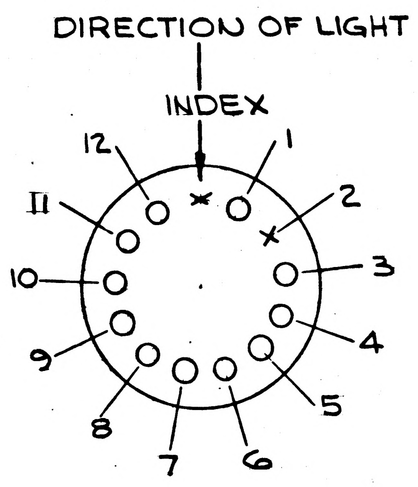
   F. ELECTRON TRANSIT TIME 7.0×10^{-9} TYPICAL. THE ELECTRON TRANSIT TIME IS THE TIME INTERVAL BETWEEN THE ARRIVAL OF A DELTA FUNCTION LIGHT PULSE AT THE ENTRANCE WINDOW OF THE TUBE AND THE TIME AT WHICH THE OUTPUT PULSE AT THE ANODE TERMINAL REACHES PEAK AMPLITUDE. THE TRANSIT TIME IS MEASURED UNDER CONDITIONS WITH THE INCIDENT LIGHT FULLY ILLUMINATING THE PHOTOCATHODE.

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND1002034 FOR THIS DRAWING.

MASTER


B
C
A
.490
.530
.490
.370
.060 MIN (SEE NOTE "A" SHEET 3)
.137 MAX
1.19
1.28
.375 MIN (SEE NOTE "A" SHEET 3)
PHOTOCATHODE
1.50 MIN
11 LEADS .016±.004 DIA (SEE SECTION 3)

LEAD DIAGRAM (BOTTOM VIEW)



INDEX: CUTOFF
LEAD NO. 1:ANODE
LEAD NO. 2:CUTOFF
LEAD NO. 3:DYNODE NO. 8
LEAD NO. 4:DYNODE NO. 7
LEAD NO. 5:DYNODE NO. 6
LEAD NO. 6:DYNODE NO. 5

INDEX: CUTOFF
LEAD NO.7: DYNODE NO. 4
LEAD NO.8: DYNODE NO. 3
LEAD NO.9: DYNODE NO. 2
LEAD NO.10:DYNODE NO. 1
LEAD NO.11:PHOTOCATHODE
LEAD NO.12:DYNODE NO. 9

1012043-1	REFER TO TABLE II
1012043-2	

KIC NO 66604008001

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN H Menzorio DATE 4-8-64
CHECKED J.E.Kelly 4-8-64
APPROVAL M Gosten 6-9-64
APPROVAL DA Koso 6-9-64
NASA APPROVAL
MIT APPROVAL 9 June 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ELECTRON TUBE
(PHOTO MULTIPLIER)
SPECIFICATION CONTROL DWG

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1012043
SCALE —
WT
SHEET 1 OF 5

C 1012043

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REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 10061	6/9/64	WK
A	REVISED PER TDRR 10885	8/[illegible]/64	WK
B	REVISED PER TDRR 15772	1/2/65	WK
C	REVISED PER TDRR 18619	5/1/65	WK

Ⓜ Ⓜ

4. ENVIRONMENTAL DATA (THIS TUBE HAS BEEN DESIGNED TO WITHSTAND THE FOLLOWING):

A. SHOCK: THREE IMPACT SHOCKS IN BOTH DIRECTIONS OF THE X1-X2, Y1-Y2 AND Z1-Z2 AXES WITH EACH INPACT SHOCK HAVING A PEAK ACCELERATION OF 30 G'S AND A TIME DURATION OF 11 ± 1 MILLISECONDS. FIGURE IV

B. OPERATIONAL VIBRATION: VIBRATION HAVING SINUSOIDAL MOTION APPLIED IN EACH OF THE THREE ORTHOGONAL AXES ACCORDING TO THE FOLLOWING SCHEDULES: 5 TO 30 CYCLES PER SECOND WITH DOUBLE AMPLITUDE OF 0.45 INCHES AND 30 TO 2000 TO 30 CYCLES PER SECOND WITH AN ACCELERATION OF 20 G'S AT A SWEEP RATE OF 1 OCTAVE PER MINUTE HAVING A TOTAL TIME DURATION OF 30 MIN. PER AXIS.

C. LINEAR ACCELERATION: LINEAR ACCELERATION OF 15 G'S ALONG EACH OF THE TWO DIRECTIONS OF THE THREE AXES SHOWN IN FIGURE IV FOR A DURATION OF 5 MINUTES IN EACH DIRECTION.

D. TEMPERATURE (NON OPERATING): THREE CYCLES FROM -45°C TO +75 TO -45°C WITH 8 HOURS BEING REQUIRED FOR EACH CYCLE.

TABLE I

GENERAL		
SPECTRAL RESPONSE	S-4	
WAVELENGTH OF MAXIMUM RESPONSE	4000 ± 500	ANGSTROMS
OPERATING POSITION	ANY	
WEIGHT (APPROX)	0.17	OZ
DYNODE MATERIAL	Cs_3Sb	
DIRECT INTERELECTRODE CAPACITANCES (APPROX.):		
ANODE TO DYNODE NO. 9	2.5	UUF
ANODE TO ALL OTHER ELECTRODES	3.0	UUF
MAXIMUM OVERALL LENGTH (EXCLUDING SEMI-FLEXIBLE LEADS)	1.37	INCHES
MAXIMUM RATINGS, ABSOLUTE-MAXIMUM VALUES: (B)		
SUPPLY VOLTAGE (DC)		
BETWEEN ANODE AND CATHODE (C)	1250 MAX.	VOLTS
BETWEEN DYNODE NO. 9 AND ANODE	250 MAX.	VOLTS
BETWEEN CONSECUTIVE DYNODES	250 MAX.	VOLTS
BETWEEN DYNODE NO. 1 AND CATHODE	250 MAX.	VOLTS
AVERAGE ANODE CURRENT (D)	20	UA
AMBIENT TEMPERATURE	75 MAX.	°C

5. SPECIAL CONDITIONING

5.1 THE FOLLOWING INITIAL MEASUREMENTS WILL BE MADE FOR THE TUBE.

5.1.1 CATHODE LUMINOUS SENSITIVITY: 30×10^{-6} AMPS./LUMEN (TYPICAL VALUE) TEST CONDITIONS::

A. 100 VOLTS BETWEEN CATHODE AND ALL OTHER ELECTRODES.

B. 10^{-2} LUMENS INCIDENT ON CATHODE FROM A TUNGSTEN-FILAMENT LIGHT SOURCE IN A LIME GLASS ENVELOPE AT A COLOR TEMPERATURE OF 2870°K.

5.1.2 CATHODE LUMINOUS SENSITIVITY: 3×10^{-8} AMPS. (TYPICAL VALUE) TEST CONDITIONS:

A. 100 VOLTS BETWEEN CATHODE AND ALL OTHER ELECTRODES.

B. 10^{-2} LUMENS INCIDENT ON CATHODE FROM A TUNGSTEN-FILAMENT LIGHT SOURCE IN A LIME GLASS ENVELOPE AT A COLOR TEMPERATURE OF 2870°K AND A BLUE FILTER CORNING CS 558, 5113, 1/2 STOCK THICKNESS INSERTED BETWEEN LIGHT SOURCE AND CATHODE.

5.1.3 ANODE CURRENT: 1×10^{-6} AMPS. (TYPICAL VALUE). TEST CONDITIONS

A. 1000 VOLTS OPERATING VOLTAGE.

B. 1 MICRO LUMEN INCIDENT ON CATHODE FROM A TUNGSTEN-FILAMENT LIGHT SOURCE IN A LIME GLASS ENVELOPE AT A COLOR TEMPERATURE OF 2870°K.

C. LIGHT SPOT SIZE TO BE 0.060 INCHES IN DIAMETER PROJECTED ONTO CENTER OF CATHODE.

D. AVERAGE ANODE CURRENT FOR ANY 30 SECOND INTERVAL MAY NOT EXCEED 20×10^{-6} AMPS.

5.1.4 ANODE DARK CURRENT: 8.5×10^{-9} AMPS. (MAX.VALUE)
P/N 1012043-1
11.3×10^{-9} AMPS. (MAX. VALUE)
P/N 1012043-2

TEST CONDITIONS:

A. ANODE SENSITIVITY 100 AMPS/LUMEN

5.1.5 SIGNAL TO NOISE RATIO: 45 (TYPICAL VALUE) TEST CONDITIONS:

A. 1000 VOLTS OPERATING VOLTAGE.

B. .01 MICROLUMEN INCIDENT ON CATHODE FROM A TUNGSTEN-FILAMENT LIGHT SOURCE IN A LIME GLASS ENVELOPE AT A COLOR TEMP. OF 2870°K.

C. LIGHT SOPT SIZE 0.060 INCHES IN DIAMETER PROJECTED ONTO CENTER OF CATHODE.

D. NOISE MEASUREMENT MADE WITH A SQUARE WAVE 90 CPS (EQUAL ON OFF) LIGHT WAVE FORM AND WITH AN EQUIVALENT POWER PASS BAND OF 1000 CPS.

5.2 TEST SEQUENCE: AFTER INITIAL MEASUREMENT SPECIFIED UNDER ITEM 5.1. HAVE BEEN MADE, AND AFTER TUBE HAS BEEN INOPERATIVE FOR 24 HOURS MINIMUM WITH LIGHT SENSITIVE AREA COVERED, THE TUBE WILL BE SUBJECTED TO THE FOLLOWING TESTING:

A. 1000 VOLTS OPERATING VOLTAGE.

B. LIGHT INCIDENT ON THE CATHODE SHALL BE FROM A TUNGSTEN-FILAMENT LIGHT SOURCE IN A LIME GLASS ENVELOPE WHICH HAS A COLOR TEMPERATURE OF 2870°K, AND A BLUE FILTER CORNING CS-558, 5113, 1/2 STOCK THICKNESS INTERPOSED BETWEEN THE TUBE AND THE LIGHT SOURCE.

C. LIGHT SPOT SIZE TO BE 0.060 INCHES IN DIAMETER PROJECTED ONTO CENTER OF CATHODE.

5.2.1 THE LIGHT LEVEL SHALL BE ADJUSTED BY CONTROLLING THE CURRENT THROUGH THE TUNGSTEN-FILAMENT TO PRODUCE A TUBE ANODE CURRENT OF 5.0+0.1 MICROAMPERES. THE ADJUSTMENT OF THE LIGHT SOURCE SHALL NOT EXCEED 120 SECONDS COMMENCING WITH THE APPLICATION OF LIGHT. THE LIGHT LEVEL SHALL BE MAINTAINED CONSTANT THROUGHOUT ALL TESTS MADE UNDER ITEM 5.2 BY HOLDING THE TUNGSTEN-FILAMENT CURRENT WITHIN ±0.5% OF THE VALUE READ AT THE 120 SECOND INTERVAL. MEASURE AND RECORD ANODE CURRENT AT THE 120 SECOND INTERVAL.

5.2.2 MEASURE AND RECORD ANODE CURRENT AT THE END OF 30 MINUTES OF OPERATION.

5.2.3 MEASURE AND RECORD ANODE CURRENT AT THE END OF ADDITIONAL 4 HOURS OF OPERATION.

5.2.4 LEAVE TUBE INOPERATIVE IN ITS SOCKET FOR 24 HOURS WITH LIGHT SENSITIVE AREA COVERED.

5.2.5 REPEAT ALL TESTS SPECIFIED UNDER ITEMS 5.2.1, 5.2.2, AND 5.2.3.

5.3 REPEAT ALL TEST SPECIFIED UNDER ITEM 5.1. MEASURE AND RECORD ALL INDICATED CHARACTERISTICS.

5.4 ALL RECORDED TEST DATA IS TO BE FORWARDED TO PROCUREMENT AGENCY.

MASTER

1012043

KIC NO	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
66604008001				
	LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

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APPROVAL D W Koso 6-9-64
NASA APPROVAL
MIT APPROVAL

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HOUSTON, TEXAS

ELECTRON TUBE
(PHOTO MULTIPLIER)
SPECIFICATION CONTROL DWG

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1012043
SCALE —
WT
SHEET 2 OF 5

4 3 2 1

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1012043 | C

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 10061	1/9/64	WK
A	REVISED PER TDRR 10885		WK
B	REVISED PER TDRR 15772	2/2/65	WK
C	REVISED PER TDRR 18619	5/11/65	WK

TABLE II

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN AT 72°F $^{+5°F}_{-2°F}$
UNDER CONDITIONS WITH DC SUPPLY VOLTAGE (E)
ACROSS A VOLTAGE DIVIDER PROVIDING 1/10 OF E
BETWEEN CATHODE AND DYNODE NO. 1: 1/10 OF E
FOR EACH SUCCEEDING DYNODE STAGE: AND 1/10 OF E
BETWEEN DYNODE NO. 9 AND ANODE.
WITH E = 1000 VOLTS (EXCEPT AS NOTED)

	MIN.	TYPICAL	MAX.	
SENSITIVITY:				
LUMINOUS AT 0 CPS (E)	100 [900-1100 V]	260 [1000 V]		AMP/L
CATHODE RADIANT, AT 4000 ANGSTROMS		.029	-	AMP/WATT
CATHODE LUMINOUS (F)	2x10^{-5}	3x10^{-5}	-	AMP/L
ANODE-DARK-CURRENT	1012043-1 1012043-2	8.5 X 10^{-9} AMP 11.3 X 10^{-9} AMP		[AT 100 AMPS/L]
ANODE-PULSE RISE TIME (G)		1.5x10^{-9}	-	
ELECTRON TRANSIT TIME (H)	-	7.0x10^{-9}		

ABOVE DATA APPLICATION AFTER SECTION 5 SPECIAL CONDITIONING

NOTES

A. ON PLANE PERPENDICULAR TO THE INDICATED DIRECTION OF INCIDENT LIGHT AND PASSING THROUGH THE MAJOR AXIS OF TUBE.

B. ABSOLUTE-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS.

C. OPERATION WITH A SUPPLY VOLTAGE (E) OF LESS THAN 500 VOLTS DC IS NOT RECOMMENDED. IF SUCH A SUPPLY VOLTAGE IS USED, ILLUMINATION MUST BE LIMITED TO SUCH A VALUE THAT THE AVERAGE CATHODE PHOTOCURRENT DOES NOT EXCEED APPROXIMATELY 2x10^{-8} AMPERE.

D. AVERAGED OVER ANY INTERVAL OF 30 SECONDS MAXIMUM.

E. UNDER THE FOLLOWING CONDITIONS: THE LIGHT SOURCE IS A TUNGSTEN-FILAMENT IN A LIME GLASS ENVELOPE OPERATED AT A COLOR TEMPERATURE OF 2870°K. A LIGHT INPUT OF 1 MICROLUMEN IS USED.

F. UNDER THE FOLLOWING CONDITIONS: THE LIGHT SOURCE IS A TUNGSTEN-FILAMENT IN A LIME GLASS ENVELOPE OPERATED AT A COLOR TEMPERATURE OF 2870°K. THE VALUE OF LIGHT FLUX IS 1000 MICROLUMEN AND 100 VOLTS ARE APPLIED BETWEEN CATHODE AND ALL OTHER ELECTRODES CONNECTED TOGETHER AS ANODE.

MASTER

KIC NO 66604008001

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LIST OF MATERIALS

NEXT ASSY	USED ON
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FRACTIONS ± — DECIMALS ± — ANGLES ± —
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MATERIAL
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APPROVAL D.G.Koso 6-9-64
NASA APPROVAL
MIT APPROVAL 9 Jun 64

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ELECTRON TUBE
(PHOTO MULTIPLIER)
SPECIFICATION CONTROL DWG

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1012043
SCALE —
WT
SHEET 3 OF 5

4 3 2 1

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1012043 C

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
Ⓜ -	INITIAL RELEASE CLASS A PER TDRR 10061	6/9/64	WK
A	REVISED PER TDRR 10885	6/[illegible]/64	WK
Ⓜ B	REVISED PER TDRR 15772	2/2/65	WK
C	REVISED PER TDRR 18619	5/11/65	WK

SEMI-LOGARITHMIC PRESENTATION
OF S-4 RESPONSE

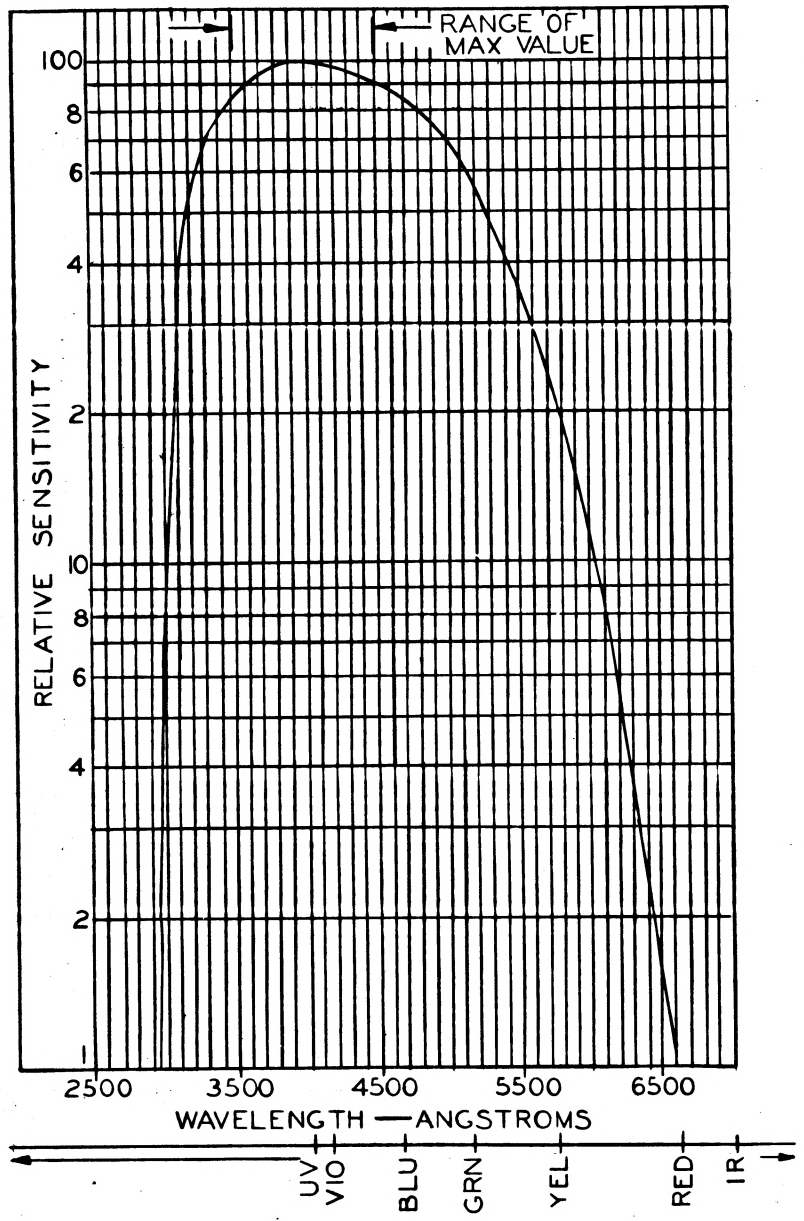

FIGURE I

MASTER

KIC NO 6660400800l	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

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CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1012043
SCALE —	WT	SHEET 4 OF 5

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SYM	DESCRIPTION	DATE	APPROVAL
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A	REVISED PER TDRR 10885	8 July 64	WK
B	REVISED PER TDRR 15772	2/2/65	WK
C	REVISED PER TDRR 18619	5/11/65	WK

TYPICAL ANODE CHARACTERISTICS

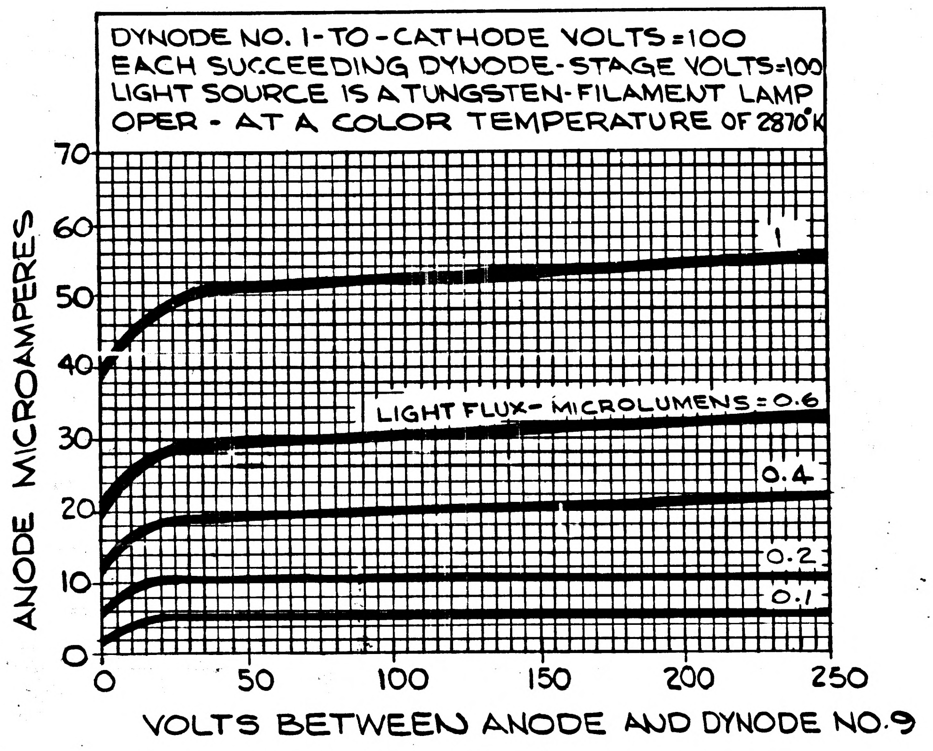
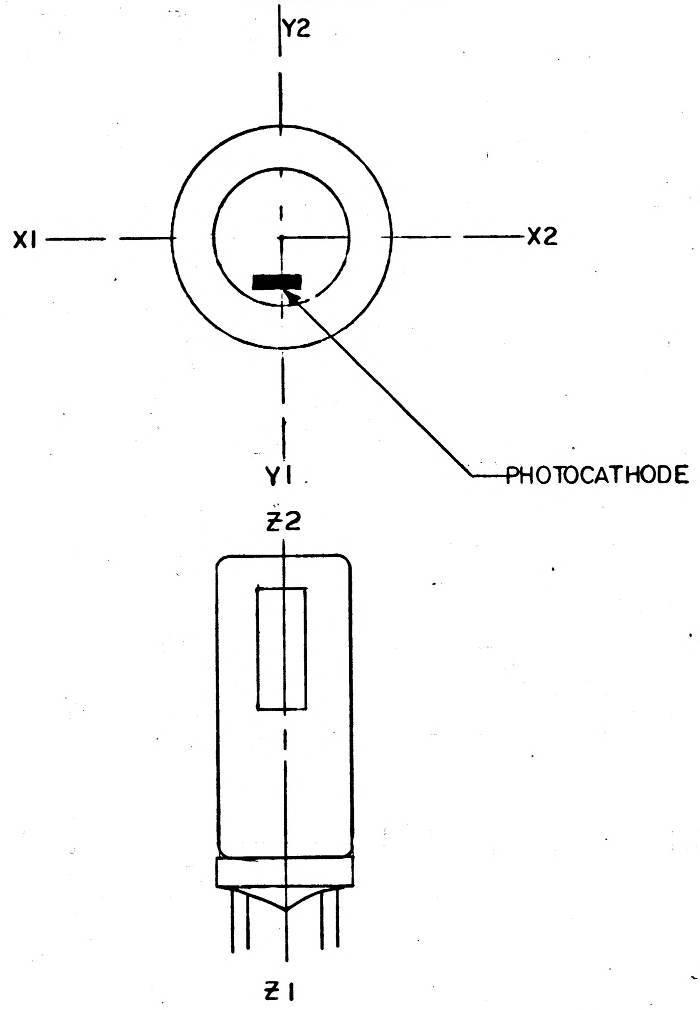


FIGURE II

ENVIRONMENTAL TESTING AXES

FIGURE IV



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KIC NO 66604008001

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1012043 D

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B	REVISED PER TDRR 15772	2/2/65	WK
C	REVISED PER TDRR 18619	5/11/65	WK
D	REVISED PER TDRR 19923	25 JUN 65	LK WK

REQUIREMENTS

1. GENERAL

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIERS SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

C. PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-E-75 LEVEL A. IN BOTH INSTANCES MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-STD-129 AND SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION LETTER.

CATHODE SHALL HAVE A DARK LIGHT SHIELDING PROTECTIVE COVER.

2. INSPECTION AND ACCEPTANCE: [PRIOR TO INSPECTION AND ACCEPTANCE TESTS, SUBJECT THE TUBE TO A SHARP TAP ONCE (USING A FELT TUBE TAPPER) IN DIRECTION A, DIRECTION B AND DIRECTION C AS SHOWN.

THE TUBE SHALL BE TAPPED IN SUCH A MANNER SO AS NOT TO EXCEED 15 g'S. THIS PROCEDURE SHALL BE PERFORMED ONLY ONCE FOR EACH TUBE.]

A. ELECTRICAL CHARACTERISTICS

1. PER TABLE II

2. MARKING: PARTS SHALL BE IDENTIFIED WITH NASA DRAWING NUMBER, LATEST REVISION, SERIAL NUMBER AND MANUFACTURER'S IDENTIFICATION PER ND 1002019.

B. MECHANICAL: DIMENSIONS AS SHOWN.

3. DESIGN REQUIREMENTS

A. STORAGE TEMPERATURE: -45°C TO + 75°C

B. ELECTRICAL RATING: PER TABLE I

C. LEAD MATERIAL: DUMET PER ND 1015401, GOLD PLATED

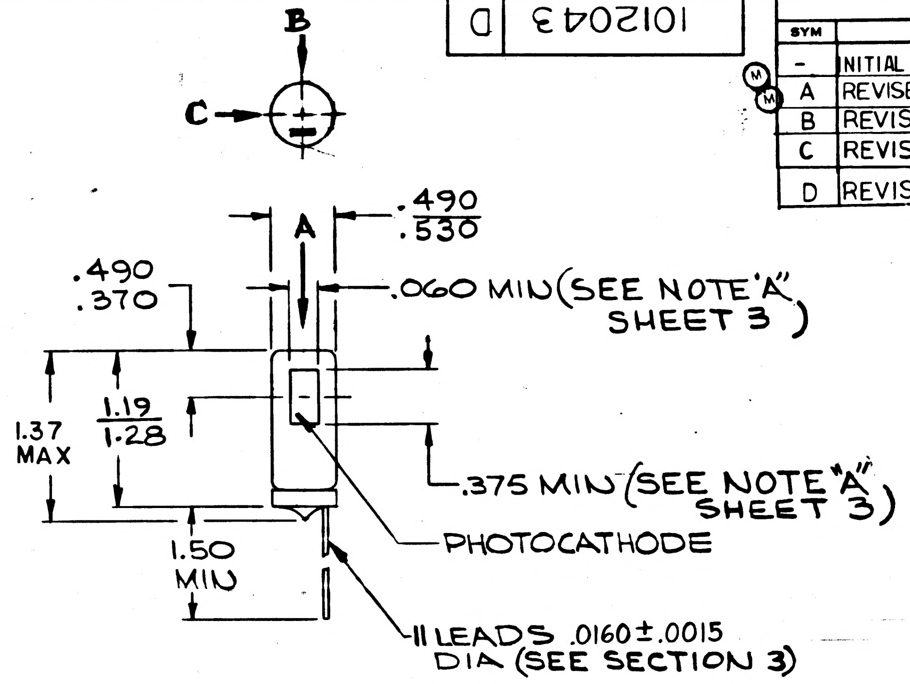
D. CURRENT AMPLIFICATION: 3×10^6

E. ANODE-PULSE RISE TIME 1.5×10^{-9} TYPICAL MEASURED BETWEEN 10 PERCENT AND 90 PERCENT OF THE MAXIMUM ANODE-PULSE HEIGHT. THIS ANODE-PULSE RISE TIME IS PRIMARILY A FUNCTION OF TRANSIT-TIME VARIATION & IS MEASURED UNDER CONDITIONS WITH THE INCIDENT LIGHT FULLY ILLUMINATING THE PHOTOCATHODE.

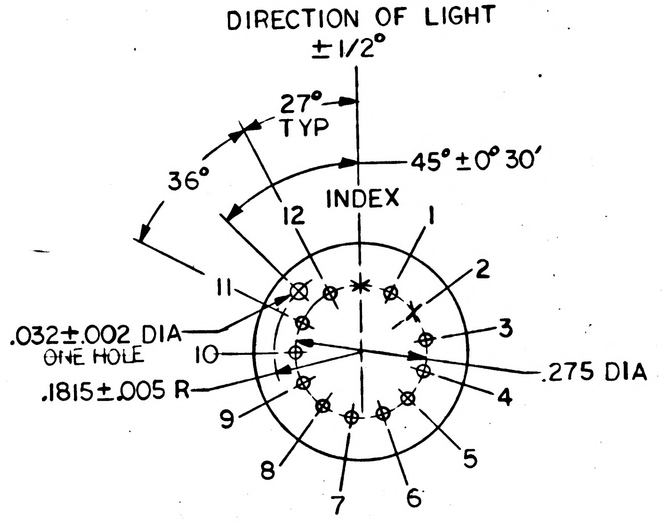
F. ELECTRON TRANSIT TIME 7.0×10^{-9} TYPICAL. THE ELECTRON TRANSIT TIME IS THE TIME INTERVAL BETWEEN THE ARRIVAL OF A DELTA FUNCTION LIGHT PULSE AT THE ENTRANCE WINDOW OF THE TUBE AND THE TIME AT WHICH THE OUTPUT PULSE AT THE ANODE TERMINAL REACHES PEAK AMPLITUDE. THE TRANSIT TIME IS MEASURED UNDER CONDITIONS WITH THE INCIDENT LIGHT FULLY ILLUMINATING THE PHOTOCATHODE.

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND1002034 FOR THIS DRAWING.

MASTER


B
C
A
.490
.530
.490
.370
.060 MIN (SEE NOTE "A" SHEET 3)
1.37 MAX
1.19
1.28
.375 MIN (SEE NOTE "A" SHEET 3)
PHOTOCATHODE
1.50 MIN
11 LEADS .0160±.0015 DIA (SEE SECTION 3)

LEAD DIAGRAM (BOTTOM VIEW)



INDEX: CUTOFF

LEAD NO. 1: ANODE

LEAD NO. 2: CUTOFF

LEAD NO. 3: DYNODE NO. 8

LEAD NO. 4: DYNODE NO. 7

LEAD NO. 5: DYNODE NO. 6

LEAD NO. 6: DYNODE NO. 5

INDEX: CUTOFF

LEAD NO. 7: DYNODE NO. 4

LEAD NO. 8: DYNODE NO. 3

LEAD NO. 9: DYNODE NO. 2

LEAD NO. 10: DYNODE NO. 1

LEAD NO. 11: PHOTOCATHODE

LEAD NO. 12: DYNODE NO. 9

1012043-1	REFER TO
1012043-2	TABLE II

NEXT ASSY	USED ON		
APPLICATION			

KIC NO 66604008001

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

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APPROVAL M Gosten 6-9-64
APPROVAL [illegible] 6-9-64
NASA APPROVAL
MIT APPROVAL 9 June 64

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HOUSTON, TEXAS

ELECTRON TUBE
(PHOTO MULTIPLIER)
SPECIFICATION CONTROL DWG

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1012043
SCALE —
WT
SHEET 1 OF 5

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1012043 D

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B	REVISED PER TDRR 15772	1/2/65	WK
C	REVISED PER TDRR 18619	5/1/65	WK
D	REVISED PER TDRR 19923	25 ... 65	WK

4. ENVIRONMENTAL DATA (THIS TUBE HAS BEEN DESIGNED TO WITHSTAND THE FOLLOWING):

A. SHOCK: THREE IMPACT SHOCKS IN BOTH DIRECTIONS OF THE X1-X2, Y1-Y2 AND Z1-Z2 AXES WITH EACH INPACT SHOCK HAVING A PEAK ACCELERATION OF 30 G'S AND A TIME DURATION OF 11 ± 1 MILLISECONDS. FIGURE IV

B. OPERATIONAL VIBRATION: VIBRATION HAVING SINUSOIDAL MOTION APPLIED IN EACH OF THE THREE ORTHOGONAL AXES ACCORDING TO THE FOLLOWING SCHEDULES: 5 TO 30 CYCLES PER SECOND WITH DOUBLE AMPLITUDE OF 0.45 INCHES AND 30 TO 2000 TO 30 CYCLES PER SECOND WITH AN ACCELERATION OF 20 G'S AT A SWEEP RATE OF 1 OCTAVE PER MINUTE HAVING A TOTAL TIME DURATION OF 30 MIN. PER AXIS.

C. LINEAR ACCELERATION: LINEAR ACCELERATOR OF 15 G'S (AS SIMULATED WITH A ROTARY ACCELERATOR) ALONG EACH OF THE TWO DIRECTIONS OF THE THREE AXES SHOWN IN FIG. IV FOR A DURATION OF 5 MINUTES IN EACH DIRECTION

D. TEMPERATURE (NON OPERATING): THREE CYCLES FROM -45°C TO +75 TO -45°C WITH 8 HOURS BEING REQUIRED FOR EACH CYCLE.

TABLE I

GENERAL		
SPECTRAL RESPONSE	S-4	
WAVELENGTH OF MAXIMUM RESPONSE	4000± 500	ANGSTROMS
OPERATING POSITION	ANY	
WEIGHT (APPROX)	0.17	OZ
DYNODE MATERIAL	Cs_3Sb	
DIRECT INTERELECTRODE CAPACITANCES (APPROX.):		
ANODE TO DYNODE NO. 9	2.5	UUF
ANODE TO ALL OTHER ELECTRODES	3.0	UUF
MAXIMUM OVERALL LENGTH (EXCLUDING SEMI-FLEXIBLE LEADS)	1.37	INCHES
MAXIMUM RATINGS, ABSOLUTE-MAXIMUM VALUES: (B)		
SUPPLY VOLTAGE (DC)		
BETWEEN ANODE AND CATHODE (C)	1250 MAX.	VOLTS
BETWEEN DYNODE NO. 9 AND ANODE	250 MAX.	VOLTS
BETWEEN CONSECUTIVE DYNODES	250 MAX.	VOLTS
BETWEEN DYNODE NO. 1 AND CATHODE	250 MAX.	VOLTS
AVERAGE ANODE CURRENT (D)	20	UA
AMBIENT TEMPERATURE	75 MAX.	°C

5. SPECIAL CONDITIONING

5.1 THE FOLLOWING INITIAL MEASUREMENTS WILL BE MADE FOR THE TUBE.

5.1.1 CATHODE LUMINOUS SENSITIVITY: 30×10^{-6} AMPS./LUMEN (TYPICAL VALUE) TEST CONDITIONS::

A. 100 VOLTS BETWEEN CATHODE AND ALL OTHER ELECTRODES.

B. 10^{-2} LUMENS INCIDENT ON CATHODE FROM A TUNGSTEN-FILAMENT LIGHT SOURCE IN A LIME GLASS ENVELOPE AT A COLOR TEMPERATURE OF 2870°K.

5.1.2 CATHODE LUMINOUS SENSITIVITY: 3×10^{-8} AMPS. (TYPICAL VALUE) TEST CONDITIONS:

A. 100 VOLTS BETWEEN CATHODE AND ALL OTHER ELECTRODES.

B. 10^{-2} LUMENS INCIDENT ON CATHODE FROM A TUNGSTEN-FILAMENT LIGHT SOURCE IN A LIME GLASS ENVELOPE AT A COLOR TEMPERATURE OF 2870°K AND A BLUE FILTER CORNING CS 558, 5113, 1/2 STOCK THICKNESS INSERTED BETWEEN LIGHT SOURCE AND CATHODE.

5.1.3 ANODE CURRENT: 1×10^{-6} AMPS. (TYPICAL VALUE). TEST CONDITIONS

A. 1000 VOLTS OPERATING VOLTAGE.

B. 1 MICRO LUMEN INCIDENT ON CATHODE FROM A TUNGSTEN-FILAMENT LIGHT SOURCE IN A LIME GLASS ENVELOPE AT A COLOR TEMPERATURE OF 2870°K.

C. LIGHT SPOT SIZE TO BE 0.060 INCHES IN DIAMETER PROJECTED ONTO CENTER OF CATHODE.

D. AVERAGE ANODE CURRENT FOR ANY 30 SECOND INTERVAL MAY NOT EXCEED 20×10^{-6} AMPS.

5.1.4 ANODE DARK CURRENT: 8.5×10^{-9} AMPS. (MAX.VALUE) P/N 1012043-1
11.3×10^{-9} AMPS. (MAX. VALUE) P/N 1012043-2

TEST CONDITIONS:

A. ANODE SENSITIVITY 100 AMPS/LUMEN

5.1.5 SIGNAL TO NOISE RATIO: 45 (TYPICAL VALUE) TEST CONDITIONS:

A. 1000 VOLTS OPERATING VOLTAGE.

B. .01 MICROLUMEN INCIDENT ON CATHODE FROM A TUNGSTEN-FILAMENT LIGHT SOURCE IN A LIME GLASS ENVELOPE AT A COLOR TEMP. OF 2870°K.

C. LIGHT SOPT SIZE 0.060 INCHES IN DIAMETER PROJECTED ONTO CENTER OF CATHODE.

D. NOISE MEASUREMENT MADE WITH A SQUARE WAVE 90 CPS (EQUAL ON OFF) LIGHT WAVE FORM AND WITH AN EQUIVALENT POWER PASS BAND OF 1000 CPS.

5.2 TEST SEQUENCE: AFTER INITIAL MEASUREMENT SPECIFIED UNDER ITEM 5.1. HAVE BEEN MADE, AND AFTER TUBE HAS BEEN INOPERATIVE FOR 24 HOURS MINIMUM WITH LIGHT SENSITIVE AREA COVERED, THE TUBE WILL BE SUBJECTED TO THE FOLLOWING TESTING:

A. 1000 VOLTS OPERATING VOLTAGE.

B. LIGHT INCIDENT ON THE CATHODE SHALL BE FROM A TUNGSTEN-FILAMENT LIGHT SOURCE IN A LIME GLASS ENVELOPE WHICH HAS A COLOR TEMPERATURE OF 2870°K, AND A BLUE FILTER CORNING CS-558, 5113, 1/2 STOCK THICKNESS INTERPOSED BETWEEN THE TUBE AND THE LIGHT SOURCE.

C. LIGHT SPOT SIZE TO BE 0.060 INCHES IN DIAMETER PROJECTED ONTO CENTER OF CATHODE.

5.2.1 THE LIGHT LEVEL SHALL BE ADJUSTED BY CONTROLLING THE CURRENT THROUGH THE TUNGSTEN-FILAMENT TO PRODUCE A TUBE ANODE CURRENT OF 5.0+0.1 MICROAMPERES. THE ADJUSTMENT OF THE LIGHT SOURCE SHALL NOT EXCEED 120 SECONDS COMMENCING WITH THE APPLICATION OF LIGHT. THE LIGHT LEVEL SHALL BE MAINTAINED CONSTANT THROUGHOUT ALL TESTS MADE UNDER ITEM 5.2 BY HOLDING THE TUNGSTEN-FILAMENT CURRENT WITHIN ±0.5% OF THE VALUE READ AT THE 120 SECOND INTERVAL. MEASURE AND RECORD ANODE CURRENT AT THE 120 SECOND INTERVAL.

5.2.2 MEASURE AND RECORD ANODE CURRENT AT THE END OF 30 MINUTES OF OPERATION.

5.2.3 MEASURE AND RECORD ANODE CURRENT AT THE END OF ADDITIONAL 4 HOURS OF OPERATION.

5.2.4 LEAVE TUBE INOPERATIVE IN ITS SOCKET FOR 24 HOURS WITH LIGHT SENSITIVE AREA COVERED.

5.2.5 REPEAT ALL TESTS SPECIFIED UNDER ITEMS 5.2.1, 5.2.2, AND 5.2.3.

5.3 REPEAT ALL TEST SPECIFIED UNDER ITEM 5.1. MEASURE AND RECORD ALL INDICATED CHARACTERISTICS

5.4 ALL RECORDED TEST DATA IS TO BE FORWARDED TO PROCUREMENT AGENCY.

MASTER

KIC NO 66604008001

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
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APPROVAL M. Gasten 6-9-64
APPROVAL D. U. Koso 6-9-64
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ELECTRON TUBE
(PHOTO MULTIPLIER)
SPECIFICATION CONTROL DWG

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1012043
SCALE —
WT
SHEET 2 OF 5

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1012043 D

SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 10061	6/8/64	WK
A	REVISED PER TDRR 10885		WK
B	REVISED PER TDRR 15772	2/12/65	WK
C	REVISED PER TDRR 18619	5/11/65	WK
D	REVISED PER TDRR 19923	25 JUN 65	LR WK

TABLE II

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN AT 72°F $\pm\,^{5^\circ F}_{2^\circ F}$
UNDER CONDITIONS WITH DC SUPPLY VOLTAGE (E)
ACROSS A VOLTAGE DIVIDER PROVIDING 1/10 OF E
BETWEEN CATHODE AND DYNODE NO. 1: 1/10 OF E
FOR EACH SUCCEEDING DYNODE STAGE: AND 1/10 OF E
BETWEEN DYNODE NO. 9 AND ANODE.
WITH E = 1000 VOLTS (EXCEPT AS NOTED)

	MIN.	TYPICAL	MAX.	
SENSITIVITY:				
LUMINOUS AT 0 CPS (E)	100 [900-1100V]	260 [1000V]		AMP/L
CATHODE RADIANT, AT 4000 ANGSTROMS		.029	-	AMP/WATT
CATHODE LUMINOUS (F)	$2x10^{-5}$	$3x10^{-5}$	-	AMP/L
ANODE-DARK-CURRENT	1012043-1 1012043-2		$8.5X10^{-9}$ AMP $11.3X10^{-9}$ AMP	[AT 100 AMPS/L]
ANODE-PULSE RISE TIME (G)		$1.5x10^{-9}$		
ELECTRON TRANSIT TIME (H)		$7.0x10^{-9}$		

ABOVE DATA APPLICATION AFTER SECTION 5 SPECIAL CONDITIONING

NOTES

A. ON PLANE PERPENDICULAR TO THE INDICATED DIRECTION OF INCIDENT LIGHT AND PASSING THROUGH THE MAJOR AXIS OF TUBE.

B. ABSOLUTE-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS.

C. OPERATION WITH A SUPPLY VOLTAGE (E) OF LESS THAN 500 VOLTS DC IS NOT RECOMMENDED. IF SUCH A SUPPLY VOLTAGE IS USED, ILLUMINATION MUST BE LIMITED TO SUCH A VALUE THAT THE AVERAGE CATHODE PHOTOCURRENT DOES NOT EXCEED APPROXIMATELY $2x10^{-8}$ AMPERE.

D. AVERAGED OVER ANY INTERVAL OF 30 SECONDS MAXIMUM.

E. UNDER THE FOLLOWING CONDITIONS: THE LIGHT SOURCE IS A TUNGSTEN-FILAMENT IN A LIME GLASS ENVELOPE OPERATED AT A COLOR TEMPERATURE OF 2870°K. A LIGHT INPUT OF 1 MICROLUMEN IS USED.

F. UNDER THE FOLLOWING CONDITIONS: THE LIGHT SOURCE IS A TUNGSTEN-FILAMENT IN A LIME GLASS ENVELOPE OPERATED AT A COLOR TEMPERATURE OF 2870°K. THE VALUE OF LIGHT FLUX IS 1000 MICROLUMEN AND 100 VOLTS ARE APPLIED BETWEEN CATHODE AND ALL OTHER ELECTRODES CONNECTED TOGETHER AS ANODE.

MASTER

KIC NO 66604008001

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL

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APPROVAL D.U. Koso 6-9-64
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ELECTRON TUBE
(PHOTO MULTIPLIER)
SPECIFICATION CONTROL DWG

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1012043
SCALE — WT
SHEET 3 OF 5

4 3 2 1

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1012043 D

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
Ⓜ -	INITIAL RELEASE CLASS A PER TDRR 10061	6/9/64	WK
A	REVISED PER TDRR 10885	6/[illegible]/64	WK
Ⓜ B	REVISED PER TDRR 15772	2/2/65	WK
C	REVISED PER TDRR 18619	5/11/65	WK
D	REVISED PER TDRR 19923	25 JUN 65	LK WK

SEMI-LOGARITHMIC PRESENTATION OF S-4 RESPONSE

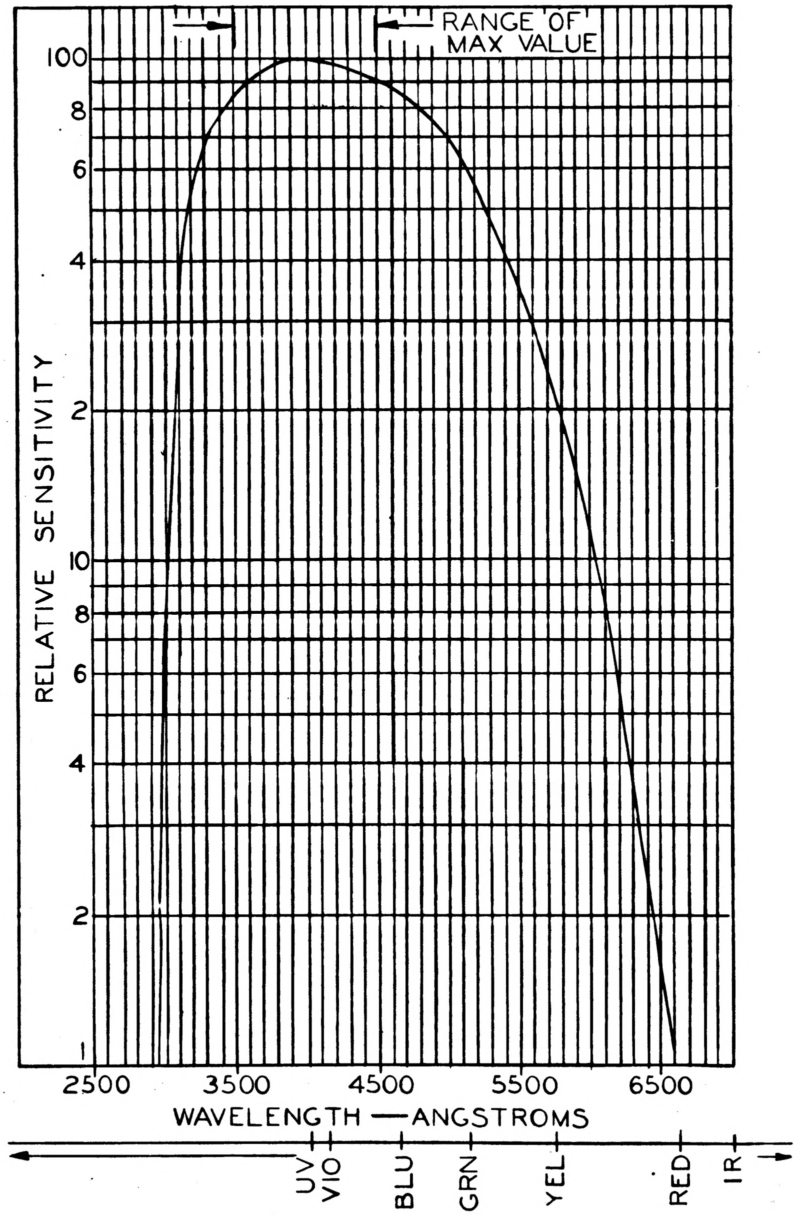

FIGURE I

MASTER

KIC NO 66604008001

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

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4 3 2 1

4 3 2 1

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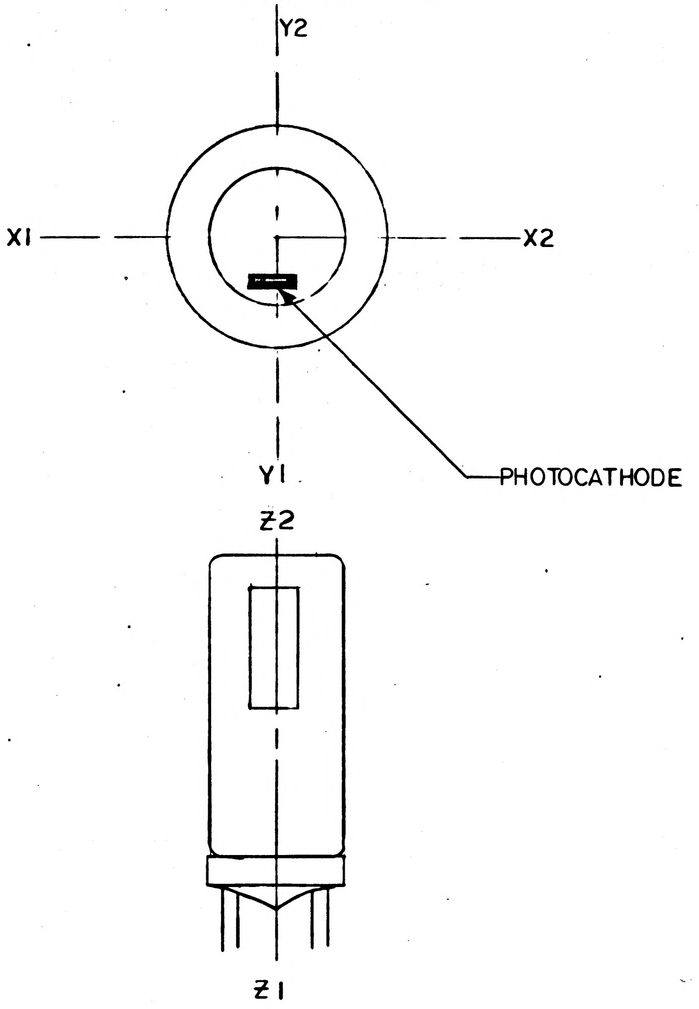
1012043 D

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 10061	6/8/64	WIL
A	REVISED PER TDRR 10885	8 July 64	WIL
B	REVISED PER TDRR 15772	2/2/65	WK
C	REVISED PER TDRR 18619	5/11/65	WK
D	REVISED PER TDRR 19923	25 JUN 65	LK WK

ENVIRONMENTAL TESTING AXES

FIGURE IV



MASTER

KIC NO 66604008001	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
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ELECTRON TUBE
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SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	NASA DRAWING NO.	
80230	C	1012043	
SCALE -	WT		SHEET 5 OF 5

4 3 2 1

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1012043 E

SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 10061	6/9/64	WK
A	REVISED PER TDRR 10885	8 July 64	WK
B	REVISED PER TDRR 15772	2/2/65	WK
C	REVISED PER TDRR 18619	5/11/65	WK
D	REVISED PER TDRR 19923	25 JUN 65	WK
E	REVISED PER TDRR 21256	10 Aug 65	WK

REQUIREMENTS

1. GENERAL

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

   B. SUPPLIERS SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

   C. PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-E-75 LEVEL A, IN BOTH INSTANCES MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-STD-129 AND SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION LETTER.

   CATHODE SHALL HAVE A DARK LIGHT SHIELDING PROTECTIVE COVER.

2. INSPECTION AND ACCEPTANCE: [PRIOR TO INSPECTION AND ACCEPTANCE TESTS, SUBJECT THE TUBE TO A SHARP TAP ONCE (USING A FELT TUBE TAPPER) IN DIRECTION A, DIRECTION B AND DIRECTION C AS SHOWN.

   THE TUBE SHALL BE TAPPED IN SUCH A MANNER SO AS NOT TO EXCEED 15 g'S. THIS PROCEDURE SHALL BE PERFORMED ONLY ONCE FOR EACH TUBE.]

   A. ELECTRICAL CHARACTERISTICS

      1. PER TABLE II

      2. MARKING: PARTS SHALL BE IDENTIFIED WITH NASA DRAWING NUMBER, LATEST REVISION, SERIAL NUMBER AND MANUFACTURER'S IDENTIFICATION PER ND 1002019.

   B. MECHANICAL: DIMENSIONS AS SHOWN.

3. DESIGN REQUIREMENTS

   A. STORAGE TEMPERATURE: -45°C TO + 75°C

   B. ELECTRICAL RATING: PER TABLE I

   C. LEAD MATERIAL: DUMET PER ND 1015401, GOLD PLATED

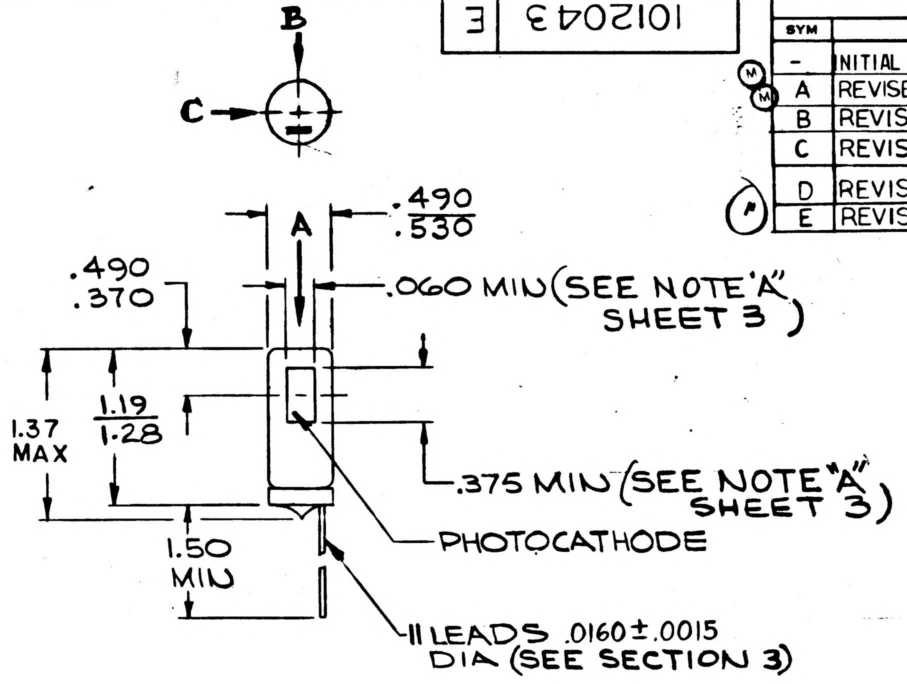
   D. CURRENT AMPLIFICATION: 3×10^6

   E. ANODE-PULSE RISE TIME 1.5×10^{-9} TYPICAL MEASURED BETWEEN 10 PERCENT AND 90 PERCENT OF THE MAXIMUM ANODE-PULSE HEIGHT. THIS ANODE-PULSE RISE TIME IS PRIMARILY A FUNCTION OF TRANSIT-TIME VARIATION & IS MEASURED UNDER CONDITIONS WITH THE INCIDENT LIGHT FULLY ILLUMINATING THE PHOTOCATHODE.

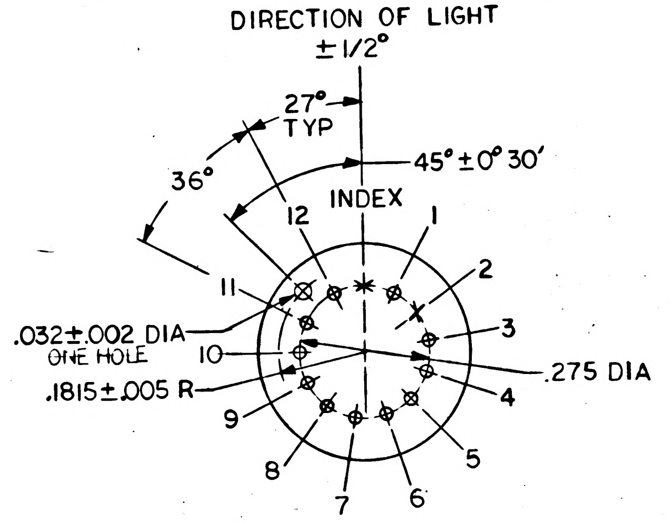
   F. ELECTRON TRANSIT TIME 7.0×10^{-9} TYPICAL. THE ELECTRON TRANSIT TIME IS THE TIME INTERVAL BETWEEN THE ARRIVAL OF A DELTA FUNCTION LIGHT PULSE AT THE ENTRANCE WINDOW OF THE TUBE AND THE TIME AT WHICH THE OUTPUT PULSE AT THE ANODE TERMINAL REACHES PEAK AMPLITUDE. THE TRANSIT TIME IS MEASURED UNDER CONDITIONS WITH THE INCIDENT LIGHT FULLY ILLUMINATING THE PHOTOCATHODE.

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND1002034 FOR THIS DRAWING.

MASTER


B
C
A
.490
.530
.490
.370
.060 MIN (SEE NOTE "A" SHEET 3)
1.37 MAX
1.19
1.28
.375 MIN (SEE NOTE "A" SHEET 3)
PHOTOCATHODE
1.50 MIN
11 LEADS .0160 ± .0015 DIA (SEE SECTION 3)

LEAD DIAGRAM (BOTTOM VIEW)



INDEX: CUTOFF
LEAD NO. 1:ANODE
LEAD NO. 2:CUTOFF
LEAD NO. 3:DYNODE NO. 8
LEAD NO. 4:DYNODE NO. 7
LEAD NO. 5:DYNODE NO. 6
LEAD NO. 6:DYNODE NO. 5

INDEX: CUTOFF
LEAD NO.7: DYNODE NO. 4
LEAD NO.8: DYNODE NO. 3
LEAD NO.9: DYNODE NO. 2
LEAD NO.10:DYNODE NO. 1
LEAD NO.11:PHOTOCATHODE
LEAD NO.12:DYNODE NO. 9

1012043-1	REFER TO TABLE II
1012043-2	

KIC NO 66604008001

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
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MATERIAL
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CHECKED J.E. Kelly 4-8-64
APPROVAL M Gosten 6-9-64
APPROVAL [illegible] 6-9-64
NASA APPROVAL
MIT APPROVAL 9 June 64

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HOUSTON, TEXAS

ELECTRON TUBE
(PHOTO MULTIPLIER)
SPECIFICATION CONTROL DWG

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1012043
SCALE —
WT
SHEET 1 OF 5

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REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 10061	6/9/64	WK
A	REVISED PER TDRR 10885	8/ /64	WK
B	REVISED PER TDRR 15772	1/2/65	WK
C	REVISED PER TDRR 18619	5/1/65	WK
D	REVISED PER TDRR 19923	25 JUN 65	WK
E	REVISED PER TDRR 21256	10 Aug 65	WK

4. ENVIRONMENTAL DATA (THIS TUBE HAS BEEN DESIGNED TO WITHSTAND THE FOLLOWING):

A. SHOCK: THREE IMPACT SHOCKS IN BOTH DIRECTIONS OF THE X1-X2, Y1-Y2 AND Z1-Z2 AXES WITH EACH INPACT SHOCK HAVING A PEAK ACCELERATION OF 30 G'S AND A TIME DURATION OF 11 ± 1 MILLISECONDS. FIGURE IV

B. OPERATIONAL VIBRATION: VIBRATION HAVING SINUSOIDAL MOTION APPLIED IN EACH OF THE THREE ORTHOGONAL AXES ACCORDING TO THE FOLLOWING SCHEDULES: 5 TO 30 CYCLES PER SECOND WITH DOUBLE AMPLITUDE OF 0.45 INCHES AND 30 TO 2000 TO 30 CYCLES PER SECOND WITH AN ACCELERATION OF 20 G'S AT A SWEEP RATE OF 1 OCTAVE PER MINUTE HAVING A TOTAL TIME DURATION OF 30 MIN. PER AXIS.

C. LINEAR ACCELERATION: LINEAR ACCELERATOR OF 15 G'S (AS SIMULATED WITH A ROTARY ACCELERATOR) ALONG EACH OF THE TWO DIRECTIONS OF THE THREE AXES SHOWN IN FIG. IV FOR A DURATION OF 5 MINUTES IN EACH DIRECTION

D. TEMPERATURE (NON OPERATING): THREE CYCLES FROM -45°C TO +75 TO -45°C WITH 8 HOURS BEING REQUIRED FOR EACH CYCLE.

TABLE I

GENERAL		
SPECTRAL RESPONSE	S-4	
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OPERATING POSITION	ANY	
WEIGHT (APPROX)	0.17	OZ
DYNODE MATERIAL	Cs_3Sb	
DIRECT INTERELECTRODE CAPACITANCES (APPROX.):		
ANODE TO DYNODE NO. 9	2.5	UUF
ANODE TO ALL OTHER ELECTRODES	3.0	UUF
MAXIMUM OVERALL LENGTH (EXCLUDING SEMI-FLEXIBLE LEADS)	1.37	INCHES
MAXIMUM RATINGS, ABSOLUTE-MAXIMUM VALUES: (B)		
SUPPLY VOLTAGE (DC)		
BETWEEN ANODE AND CATHODE (C)	1250 MAX.	VOLTS
BETWEEN DYNODE NO. 9 AND ANODE	250 MAX.	VOLTS
BETWEEN CONSECUTIVE DYNODES	250 MAX.	VOLTS
BETWEEN DYNODE NO. 1 AND CATHODE	250 MAX.	VOLTS
AVERAGE ANODE CURRENT (D)	20	UA
AMBIENT TEMPERATURE	75 MAX.	°C

5. SPECIAL CONDITIONING

5.1 THE FOLLOWING INITIAL MEASUREMENTS WILL BE MADE FOR THE TUBE.

5.1.1 CATHODE LUMINOUS SENSITIVITY: 30×10^{-6} AMPS./LUMEN (TYPICAL VALUE) TEST CONDITIONS::

A. 100 VOLTS BETWEEN CATHODE AND ALL OTHER ELECTRODES.

B. 10^{-2} LUMENS INCIDENT ON CATHODE FROM A TUNGSTEN-FILAMENT LIGHT SOURCE IN A LIME GLASS ENVELOPE AT A COLOR TEMPERATURE OF 2870°K.

5.1.2 CATHODE LUMINOUS SENSITIVITY: 3×10^{-8} AMPS. (TYPICAL VALUE) TEST CONDITIONS:

A. 100 VOLTS BETWEEN CATHODE AND ALL OTHER ELECTRODES.

B. 10^{-2} LUMENS INCIDENT ON CATHODE FROM A TUNGSTEN-FILAMENT LIGHT SOURCE IN A LIME GLASS ENVELOPE AT A COLOR TEMPERATURE OF 2870°K AND A BLUE FILTER CORNING CS 558, 5113, 1/2 STOCK THICKNESS INSERTED BETWEEN LIGHT SOURCE AND CATHODE.

5.1.3 ANODE CURRENT: 1×10^{-6} AMPS. (TYPICAL VALUE). TEST CONDITIONS

A. 1000 VOLTS OPERATING VOLTAGE.

B. 1 MICRO LUMEN INCIDENT ON CATHODE FROM A TUNGSTEN-FILAMENT LIGHT SOURCE IN A LIME GLASS ENVELOPE AT A COLOR TEMPERATURE OF 2870°K.

C. LIGHT SPOT SIZE TO BE 0.060 INCHES IN DIAMETER PROJECTED ONTO CENTER OF CATHODE.

D. AVERAGE ANODE CURRENT FOR ANY 30 SECOND INTERVAL MAY NOT EXCEED 20×10^{-6} AMPS.

5.1.4 ANODE DARK CURRENT: 8.5×10^{-9} AMPS. (MAX.VALUE)
P/N 1012043-1
11.3×10^{-9} AMPS. (MAX. VALUE)
P/N 1012043-2

TEST CONDITIONS:

A. ANODE SENSITIVITY 100 AMPS/LUMEN

5.1.5 SIGNAL TO NOISE RATIO: 45 (TYPICAL VALUE)
TEST CONDITIONS:

A. 1000 VOLTS OPERATING VOLTAGE.

B. .01 MICROLUMEN INCIDENT ON CATHODE FROM A TUNGSTEN-FILAMENT LIGHT SOURCE IN A LIME GLASS ENVELOPE AT A COLOR TEMP. OF 2870°K.

C. LIGHT SOPT SIZE 0.060 INCHES IN DIAMETER PROJECTED ONTO CENTER OF CATHODE.

D. NOISE MEASUREMENT MADE WITH A SQUARE WAVE 90 CPS (EQUAL ON OFF) LIGHT WAVE FORM AND WITH AN EQUIVALENT POWER PASS BAND OF 1000 CPS.

5.2 TEST SEQUENCE: AFTER INITIAL MEASUREMENT SPECIFIED UNDER ITEM 5.1. HAVE BEEN MADE, AND AFTER TUBE HAS BEEN INOPERATIVE FOR 24 HOURS MINIMUM WITH LIGHT SENSITIVE AREA COVERED, THE TUBE WILL BE SUBJECTED TO THE FOLLOWING TESTING:

A. 1000 VOLTS OPERATING VOLTAGE.

B. LIGHT INCIDENT ON THE CATHODE SHALL BE FROM A TUNGSTEN-FILAMENT LIGHT SOURCE IN A LIME GLASS ENVELOPE WHICH HAS A COLOR TEMPERATURE OF 2870°K, AND A BLUE FILTER CORNING CS-558, 5113, 1/2 STOCK THICKNESS INTERPOSED BETWEEN THE TUBE AND THE LIGHT SOURCE.

C. LIGHT SPOT SIZE TO BE 0.060 INCHES IN DIAMETER PROJECTED ONTO CENTER OF CATHODE.

5.2.1 THE LIGHT LEVEL SHALL BE ADJUSTED BY CONTROLLING THE CURRENT THROUGH THE TUNGSTEN-FILAMENT TO PRODUCE A TUBE ANODE CURRENT OF 5.0+0.1 MICROAMPERES. THE ADJUSTMENT OF THE LIGHT SOURCE SHALL NOT EXCEED 120 SECONDS COMMENCING WITH THE APPLICATION OF LIGHT. THE LIGHT LEVEL SHALL BE MAINTAINED CONSTANT THROUGHOUT ALL TESTS MADE UNDER ITEM 5.2 BY HOLDING THE TUNGSTEN-FILAMENT CURRENT WITHIN ±0.5% OF THE VALUE READ AT THE 120 SECOND INTERVAL. MEASURE AND RECORD ANODE CURRENT AT THE 120 SECOND INTERVAL.

5.2.2 MEASURE AND RECORD ANODE CURRENT AT THE END OF 30 MINUTES OF OPERATION.

5.2.3 MEASURE AND RECORD ANODE CURRENT AT THE END OF ADDITIONAL 4 HOURS OF OPERATION.

5.2.4 LEAVE TUBE INOPERATIVE IN ITS SOCKET FOR 24 HOURS WITH LIGHT SENSITIVE AREA COVERED.

5.2.5 REPEAT ALL TESTS SPECIFIED UNDER ITEMS 5.2.1, 5.2.2, AND 5.2.3.

5.3 REPEAT ALL TEST SPECIFIED UNDER ITEM 5.1. MEASURE AND RECORD ALL INDICATED CHARACTERISTICS.

5.4 ALL RECORDED TEST DATA IS TO BE FORWARDED TO PROCUREMENT AGENCY.

MASTER

KIC NO 66604008001

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
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MATERIAL
HEAT TREATMENT
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CONTRACT
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APPROVAL M. Gostin 6-9-64
APPROVAL D. U. Koso 6-9-64
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MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ELECTRON TUBE
(PHOTO MULTIPLIER)
SPECIFICATION CONTROL DWG

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1012043
SCALE —
WT
SHEET 2 OF 5

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REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 10061	[illegible]	WK
A	REVISED PER TDRR 10885	[illegible]	WK
B	REVISED PER TDRR 15772	2/12/65	WK
C	REVISED PER TDRR 18619	5/11/65	WK
D	REVISED PER TDRR 19923	25 JUN 65	LK WK
E	REVISED PER TDRR 21256	10 Aug 65	WK

TABLE II

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN AT 72°F $\pm{}^{5°F}_{2°F}$
UNDER CONDITIONS WITH DC SUPPLY VOLTAGE (E)
ACROSS A VOLTAGE DIVIDER PROVIDING 1/10 OF E
BETWEEN CATHODE AND DYNODE NO. 1: 1/10 OF E
FOR EACH SUCCEEDING DYNODE STAGE: AND 1/10 OF E
BETWEEN DYNODE NO. 9 AND ANODE.
WITH E = 1000 VOLTS (EXCEPT AS NOTED)

		MIN.	TYPICAL	MAX.	
SENSITIVITY:					
LUMINOUS AT 0 CPS (E)	1012043-1		100 [900-1100V]		AMP/L
	1012043-2		50 [AT 1000V]		
CATHODE RADIANT, AT 4000 ANGSTROMS			.029	-	AMP/WATT
CATHODE LUMINOUS (F)		$2x10^{-5}$	$3x10^{-5}$		AMP/L
ANODE-DARK-CURRENT	1012043-1			$8.5X10^{-9}$ AMP	[AT 100 AMPS/L]
	1012043-2			$11.3X10^{-9}$ AMP	
ANODE-PULSE RISE TIME (G)			$1.5x10^{-9}$		
ELECTRON TRANSIT TIME (H)			$7.0x10^{-9}$		

ABOVE DATA APPLICATION AFTER SECTION 5 SPECIAL CONDITIONING

NOTES

A. ON PLANE PERPENDICULAR TO THE INDICATED DIRECTION OF INCIDENT LIGHT AND PASSING THROUGH THE MAJOR AXIS OF TUBE.

B. ABSOLUTE-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS.

C. OPERATION WITH A SUPPLY VOLTAGE (E) OF LESS THAN 500 VOLTS DC IS NOT RECOMMENDED. IF SUCH A SUPPLY VOLTAGE IS USED, ILLUMINATION MUST BE LIMITED TO SUCH A VALUE THAT THE AVERAGE CATHODE PHOTOCURRENT DOES NOT EXCEED APPROXIMATELY $2x10^{-8}$ AMPERE.

D. AVERAGED OVER ANY INTERVAL OF 30 SECONDS MAXIMUM.

E. UNDER THE FOLLOWING CONDITIONS: THE LIGHT SOURCE IS A TUNGSTEN-FILAMENT IN A LIME GLASS ENVELOPE OPERATED AT A COLOR TEMPERATURE OF 2870°K. A LIGHT INPUT OF 1 MICROLUMEN IS USED.

F. UNDER THE FOLLOWING CONDITIONS: THE LIGHT SOURCE IS A TUNGSTEN-FILAMENT IN A LIME GLASS ENVELOPE OPERATED AT A COLOR TEMPERATURE OF 2870°K. THE VALUE OF LIGHT FLUX IS 1000 MICROLUMEN AND 100 VOLTS ARE APPLIED BETWEEN CATHODE AND ALL OTHER ELECTRODES CONNECTED TOGETHER AS ANODE.

MASTER

KIC NO 66604008001

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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UNLESS OTHERWISE SPECIFIED
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CHECKED J.E. Kelly 4-8-64
APPROVAL M. Gorstein 6-9-64
APPROVAL [illegible] 6-9-64
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ELECTRON TUBE
(PHOTO MULTIPLIER)
SPECIFICATION CONTROL DWG

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1012043
SCALE -
WT
SHEET 3 OF 5

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1012043 E

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
Ⓜ -	INITIAL RELEASE CLASS A PER TDRR 10061	6/9/64	WK
A	REVISED PER TDRR 10885	[illegible] 64	WK
Ⓜ B	REVISED PER TDRR 15772	2/2/65	WK
C	REVISED PER TDRR 18619	5/11/65	WK
D	REVISED PER TDRR 19923	25 JUN 65	WK
E	REVISED PER TDRR 21256	[illegible] 65	WK

SEMI-LOGARITHMIC PRESENTATION
OF S-4 RESPONSE

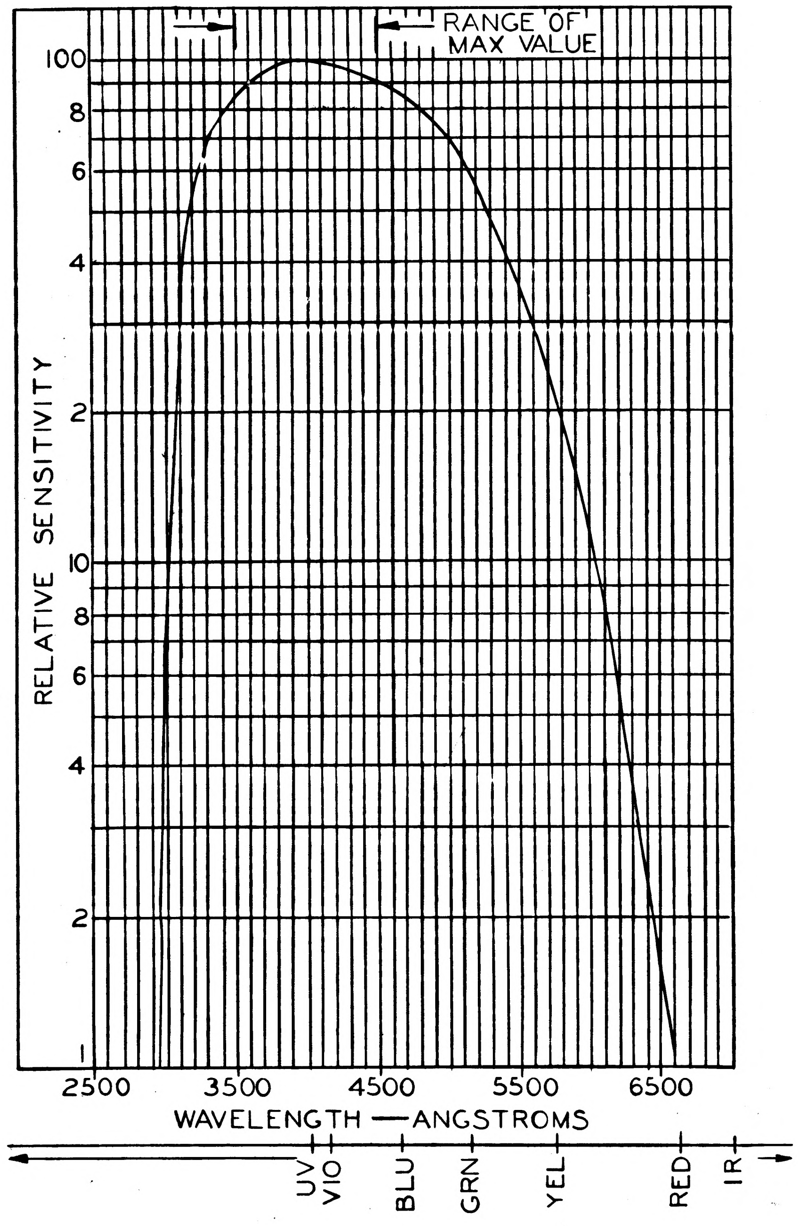

FIGURE I

MASTER

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APPROVAL WAKoss 6-4-64
NASA APPROVAL
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80230	C	1012043
SCALE —	WT	SHEET 4 OF 5

1012043 E

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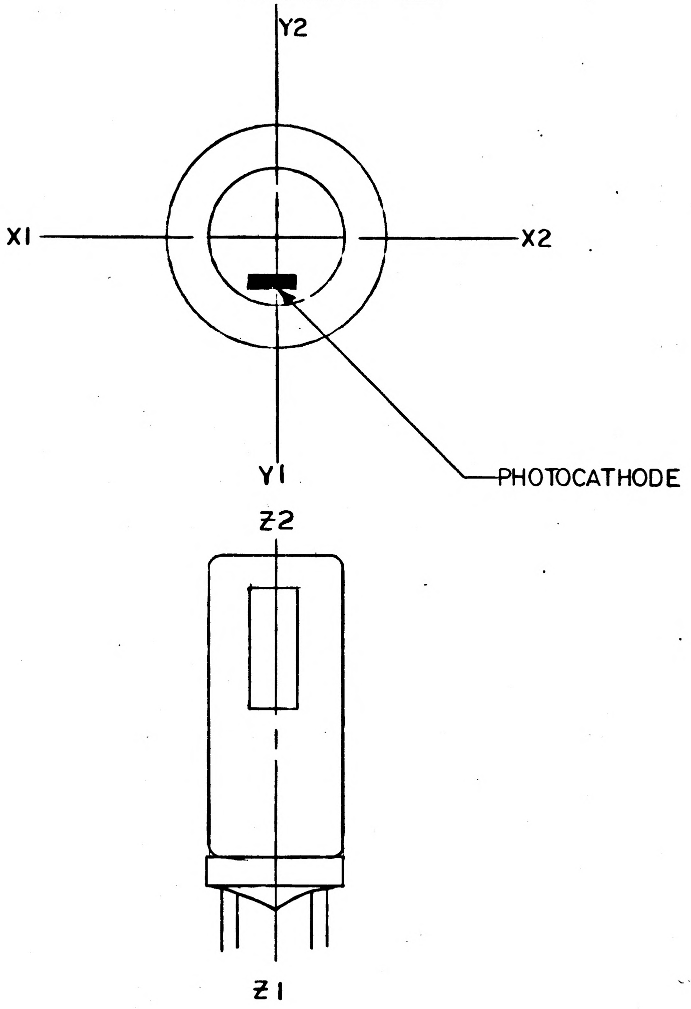
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 10061	6/4/64	WK
A	REVISED PER TDRR 10885	8 July 64	WK
B	REVISED PER TDRR 15772	2/2/65	WK
C	REVISED PER TDRR 18619	5/11/65	WK
D	REVISED PER TDRR 19923	25 JUN 65	LK WK
E	REVISED PER TDRR 21256	10 Aug 65	WK

ENVIRONMENTAL TESTING AXES

FIGURE IV



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KIC NO 66604008001	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

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APPLICATION	

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TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
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SIZE C
NASA DRAWING NO. 1012043
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WT
SHEET 5 OF 5

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—	1012043

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR /0061	6/9/64	WK

REQUIREMENTS

1. GENERAL

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIERS SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

C. PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-P-19491, LEVEL A, IN BOTH INSTANCES MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-P-19491 AND SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION LETTER.

CATHODE SHALL HAVE A DARK LIGHT SHIELDING PROTECTIVE COVER.

2. INSPECTION AND ACCEPTANCE: [PRIOR TO INSPECTION AND ACCEPTANCE TESTS, SUBJECT THE TUBE TO A SHARP TAP ONCE (USING A FELT TUBE TAPPER) IN DIRECTION A, DIRECTION B AND DIRECTION C AS SHOWN.

THE TUBE SHALL BE TAPPED IN SUCH A MANNER SO AS NOT TO EXCEED 15 g'S. THIS PROCEDURE SHALL BE PERFORMED ONLY ONCE FOR EACH TUBE.]

A. ELECTRICAL CHARACTERISTICS

1. PER TABLE II

2. MARKING: PARTS SHALL BE IDENTIFIED WITH NASA DRAWING NUMBER, LATEST REVISION, SERIAL NUMBER AND MANUFACTURER'S IDENTIFICATION PER ND 1002019.

B. MECHANICAL: DIMENSIONS AS SHOWN.

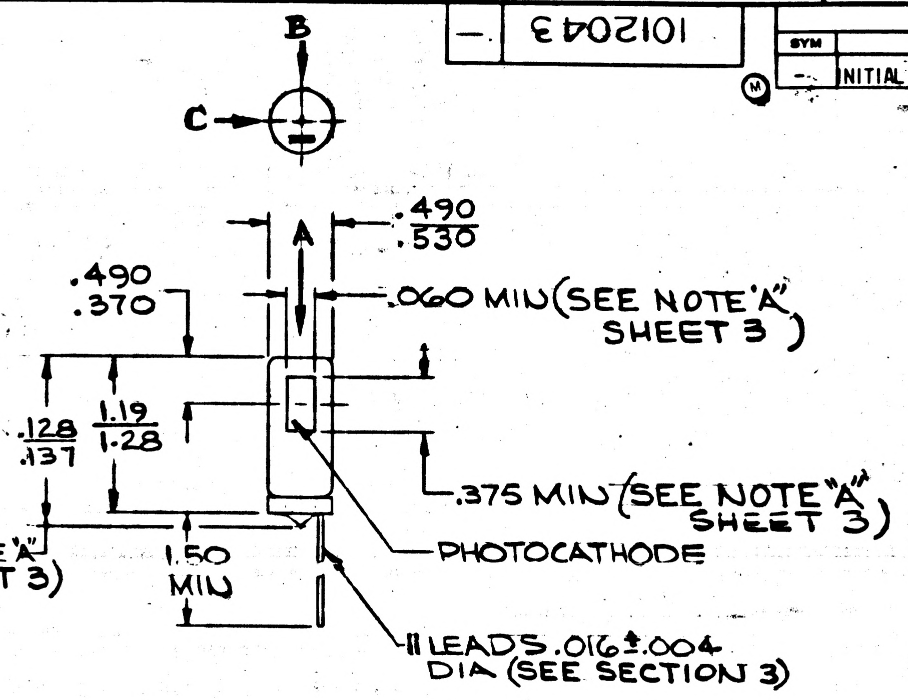
3. DESIGN REQUIREMENTS

A. STORAGE TEMPERATURE: -45°C TO + 75°C

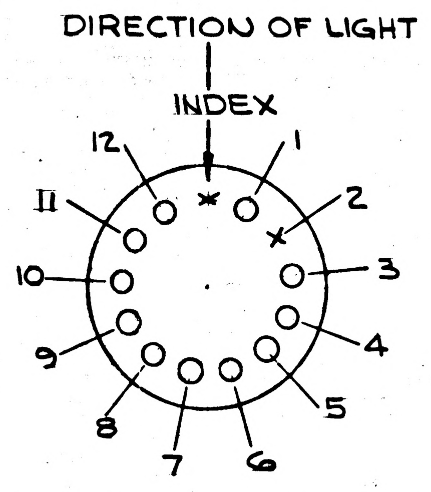
B. ELECTRICAL RATING: PER TABLE I

C. LEAD MATERIAL: KOVAR PER ND 1015402, GOLD PLATED

D. CURRENT AMPLIFICATION: 3×10^6


B
C
A
.490
.530
.490
.370
.060 MIN (SEE NOTE "A" SHEET 3)
.128
.137
1.19
1.28
.375 MIN (SEE NOTE "A" SHEET 3)
(SEE NOTE "A" SHEET 3)
1.50 MIN
PHOTOCATHODE
11 LEADS .016±.004 DIA (SEE SECTION 3)

LEAD DIAGRAM (BOTTOM VIEW)



INDEX: CUTOFF

LEAD NO. 1: ANODE
LEAD NO. 2: CUTOFF
LEAD NO. 3: DYNODE NO. 8
LEAD NO. 4: DYNODE NO. 7
LEAD NO. 5: DYNODE NO. 6
LEAD NO. 6: DYNODE NO. 5

INDEX: CUTOFF

LEAD NO. 7: DYNODE NO. 4
LEAD NO. 8: DYNODE NO. 3
LEAD NO. 9: DYNODE NO. 2
LEAD NO. 10: DYNODE NO. 1
LEAD NO. 11: PHOTOCATHODE
LEAD NO. 12: DYNODE NO. 9

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING.

MASTER

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MATERIAL	DRAWN H Lorenzo DATE 4-8-64 CHECKED J.E.Kelty 4-8-64 APPROVAL M Gostend 6-9-64 APPROVAL D A Koss 6-9-64	ELECTRON TUBE (PHOTO MULTIPLIER) SPECIFICATION CONTROL DWG	
HEAT TREATMENT	NASA APPROVAL	CODE IDENT NO.	SIZE C · NASA DRAWING NO. 1012043
FINAL FINISH	MIT APPROVAL 9 June 64	SCALE —	WT · SHEET 1 OF 5

NEXT ASSY	USED ON
APPLICATION	

INCHES
0 1 2
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—	1012043

REVISIONS			
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-	INITIAL RELEASE CLASS A PER TDRR 10061	6/9/64	

4. ENVIRONMENTAL DATA (THIS TUBE HAS BEEN DESIGNED TO WITHSTAND THE FOLLOWING):

A. SHOCK: THREE IMPACT SHOCKS IN BOTH DIRECTIONS OF THE X1-X2, Y1-Y2 AND Z1-Z2 AXES WITH EACH IMPACT SHOCK HAVING A PEAK ACCELERATION OF 30 G'S AND A TIME DURATION OF 11 ± 1 MILLISECONDS.

B. OPERATIONAL VIBRATION: VIBRATION HAVING SINUSOIDAL MOTION APPLIED IN EACH OF THE THREE ORTHOGONAL AXES ACCORDING TO THE FOLLOWING SCHEDULES: 5 TO 30 CYCLES PER SECOND WITH DOUBLE AMPLITUDE OF 0.45 INCHES AND 30 TO 2000 TO 30 CYCLES PER SECOND WITH AN ACCELERATION OF 20 G'S AT A SWEEP RATE OF 1 OCTAVE PER MINUTE HAVING A TOTAL TIME DURATION OF 30 MIN. PER AXIS.

C. LINEAR ACCELERATION: LINEAR ACCELERATION OF 15 G'S ALONG EACH OF THE TWO DIRECTIONS OF THE THREE AXES SHOWN IN FIGURE 6 FOR A DURATION OF 5 MINUTES IN EACH DIRECTION.

D. TEMPERATURE (NON OPERATING): THREE CYCLES FROM -45°C TO +75 TO -45°C WITH 8 HOURS BEING REQUIRED FOR EACH CYCLE.

TABLE I

GENERAL		
SPECTRAL RESPONSE	S-4	
WAVELENGTH OF MAXIMUM RESPONSE	4000± 500	ANGSTROMS
OPERATING POSITION	ANY	
WEIGHT (APPROX)	0.17	OZ
DYNODE MATERIAL	Cs_3Sb_2	
DIRECT INTERELECTRODE CAPACITANCES (APPROX.):		
ANODE TO DYNODE NO. 9	2.6	UUF
ANODE TO ALL OTHER ELECTRODES	2.8	UUF
MAXIMUM OVERALL LENGTH (EXCLUDING SEMI-FLEXIBLE LEADS)	1.37	INCHES
MAXIMUM RATINGS, ABSOLUTE-MAXIMUM VALUES: (B)		
SUPPLY VOLTAGE (DC)		
BETWEEN ANODE AND CATHODE (C)	1250 MAX.	VOLTS
BETWEEN DYNODE NO. 9 AND ANODE	250 MAX.	VOLTS
BETWEEN CONSECUTIVE DYNODES	250 MAX.	VOLTS
BETWEEN DYNODE NO. 1 AND CATHODE	250 MAX.	VOLTS
AVERAGE ANODE CURRENT (D)	20	UA
AMBIENT TEMPERATURE	75 MAX.	°C

MASTER

KIC NO	66604008001

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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APPROVAL M Gustin 6-9-64
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MIT APPROVAL

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ELECTRON TUBE
(PHOTO MULTIPLIER)
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1012043
SCALE —
WT
SHEET 2 OF 5

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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—	1012043

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 10061	6/9/64	wk

TABLE II

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN AT 25°±5°C
UNDER CONDITIONS WITH DC SUPPLY VOLTAGE (E)
ACROSS A VOLTAGE DIVIDER PROVIDING 1/10 OF E
BETWEEN CATHODE AND DYNODE NO. 1: 1/10 OF E
FOR EACH SUCCEEDING DYNODE STAGE: AND 1/10 OF E
BETWEEN DYNODE NO. 9 AND ANODE.
WITH E = 1000 VOLTS (EXCEPT AS NOTED)

	MIN.	TYPICAL	MAX.	
SENSITIVITY:				
RADIANT, AT 4000 ANGSTROMS	-	4.4×10^{4}		A/W
LUMINOUS				
AT 0 CPS (E)	100	[illegible]	260	AMP/L
CATHODE RADIANT, AT				
4000 ANGSTROMS	.029	[illegible]	-	AMP/WATT
CATHODE LUMINOUS (F)	2×10^{-5}	3×10^{-5}	4×10^{-5}	AMP/L
EQUIVALENT ANODE-DARK-CURRENT			2.5×10^{-9}	AMP/L
ANODE-PULSE RISE TIME (G)			1.5×10^{-9}	SEC
ELECTRON TRANSIT TIME (H) (J,H)	-	-	7.0×10^{-9}	SEC
ANODE-PULSE RISE TIME (J,M)	-	1.4×10^{-9}	-	SEC
ELECTRON TRANSIT TIME (K)	-	$6.?\times10^{-9}$	-	SEC
CURRENT AMPLIFICATION	-	$2\times10^{+6}$		
CURRENT AMPLIFICATION	-	$2\times10^{?}$		

NOTES

A. ON PLANE PERPENDICULAR TO THE INDICATED DIRECTION OF INCIDENT LIGHT AND PASSING THROUGH THE MAJOR AXIS OF TUBE.

B. [illegible] IN

B. ABSOLUTE-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS.

ABSOLUTE-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO ANY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS.

THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING NO RESPONSIBILITY FOR EQUIPMENT VARIATIONS, ENVIRONMENT VARIATIONS, AND THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS.

THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO ABSOLUTE-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH ANY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, ENVIRONMENTAL CONDITIONS, AND VARIATIONS IN DEVICE CHARACTERISTICS.

C. OPERATION WITH A SUPPLY VOLTAGE (E) OF LESS THAN 500 VOLTS DC IS NOT RECOMMENDED. IF SUCH A SUPPLY VOLTAGE IS USED, ILLUMINATION MUST BE LIMITED TO SUCH A VALUE THAT THE AVERAGE CATHODE PHOTOCURRENT DOES NOT EXCEED APPROXIMATELY 2×10^{-8} AMPERE. $2\times10^{-?}$ AMPERE.

D. AVERAGED OVER ANY INTERVAL OF 30 SECONDS MAXIMUM.

E. UNDER THE FOLLOWING CONDITIONS: THE LIGHT SOURCE IS A TUNGSTEN-FILAMENT IN A LIME GLASS ENVELOPE OPERATED AT A COLOR TEMPERATURE OF 2870°K. A LIGHT INPUT OF 1 MICROLUMEN IS USED.

F. UNDER THE FOLLOWING CONDITIONS: THE LIGHT SOURCE IS A TUNGSTEN-FILAMENT IN A LIME GLASS ENVELOPE OPERATED AT A COLOR TEMPERATURE OF 2870°K. THE VALUE OF LIGHT FLUX IS 1000 MICROLUMEN AND 100 VOLTS ARE APPLIED BETWEEN CATHODE AND ALL OTHER ELECTRODES CONNECTED TOGETHER AS ANODE.

G. MEASURED BETWEEN 10 PERCENT AND 90 PERCENT OF THE AGE (E) MAXIMUM ANODE-PULSE HEIGHT. THIS ANODE-PULSE RISE TIME IS PRIMARILY A FUNCTION OF TRANSIT-TIME VARIATION AND IS MEASURED UNDER CONDITIONS WITH THE INCIDENT LIGHT FULLY ILLUMINATING THE PHOTOCATHODE.

H. [illegible] THE FORM OF FOIL OF TAPE

H. THE ELECTRON TRANSIT TIME IS THE TIME INTERVAL BETWEEN THE ARRIVAL OF A DELTA FUNCTION LIGHT PULSE AT THE ALENT.

J. ENTRANCE WINDOW OF THE TUBE AND THE TIME AT WHICH THE OUTPUT PULSE AT THE ANODE TERMINAL REACHES PEAK AMPLITUDE. THE TRANSIT TIME IS MEASURED UNDER CONDITIONS WITH THE INCIDENT LIGHT FULLY ILLUMINATING THE PHOTOCATHODE. ILLUMINATING THE PHOTOCATHODE.

K. THE ELECTRON TRANSIT TIME IS THE TIME INTERVAL BETWEEN THE ARRIVAL OF A DELTA FUNCTION LIGHT PULSE AT THE ENTRANCE WINDOW OF THE TUBE AND THE TIME AT WHICH THE OUTPUT PULSE AT THE ANODE TERMINAL REACHES PEAK AMPLITUDE. THE TRANSIT TIME IS MEASURED UNDER CONDITIONS WITH THE INCIDENT LIGHT FULLY ILLUMINATING THE PHOTOCATHODE.

M. BECAUSE OF TEST EQUIPMENT LIMITATIONS, THE ACTUAL ANODE PULSE RISE TIME IS BELIEVED TO BE LESS THAN THE VALUE SHOWN.

N. AT 4000 ANGSTROMS.

MASTER

KIC NO 66604008001	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN U. Menzoerio DATE 4-8-64
CHECKED J.E. Kelly 4-8-64
APPROVAL M. Gostan 6-9-64
APPROVAL D.A. Koso 6-9-64
NASA APPROVAL
MIT APPROVAL 9 Jun 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ELECTRON TUBE
(PHOTO MULTIPLIER)
SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	NASA DRAWING NO.	
	C	1012043	
SCALE —	WT		SHEET 3 OF 5

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

— 1012043

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 10061	[illegible]	wk

SEMI-LOGARITHMIC PRESENTATION OF S-4 RESPONSE

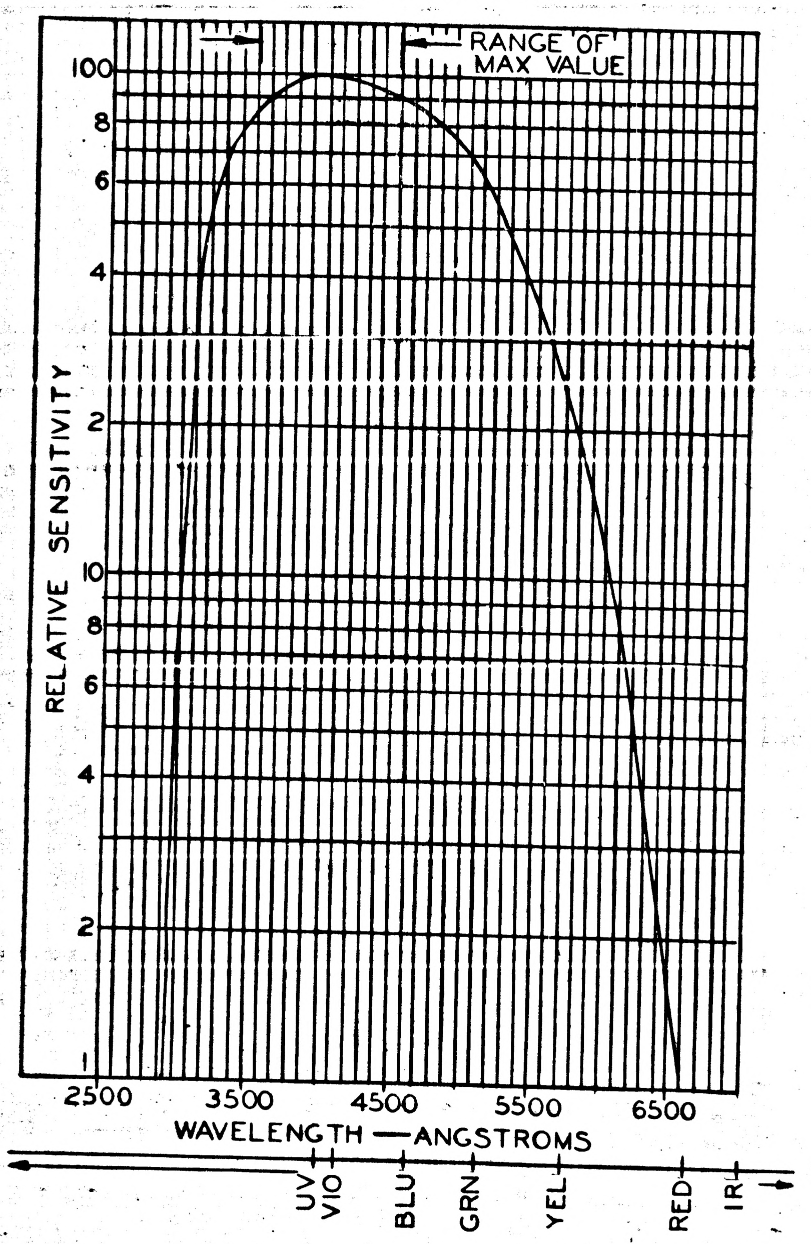

FIGURE I

MASTER

NEXT ASSY	USED ON
APPLICATION	

KIC NO 66604008001	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ±— DECIMALS ±— ANGLES ±— DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DWG. NO. CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS		
MATERIAL	DRAWN N Menzurio DATE 4-8-64 CHECKED J.E.Kelly 4-8-64 APPROVAL M. Gorton 6-9-64 APPROVAL DaKoss 6-9-64	ELECTRON TUBE (PHOTO MULTIPLIER) SPECIFICATION CONTROL DWG		
HEAT TREATMENT	NASA APPROVAL	CODE IDENT NO.	SIZE C	NASA DRAWING NO. 1012043
FINAL FINISH	MIT APPROVAL	SCALE —	WT	SHEET 4 OF 5

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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— 1012043

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
--	INITIAL RELEASE CLASS A PER TDRR 10061		Wil

TYPICAL ANODE CHARACTERISTICS

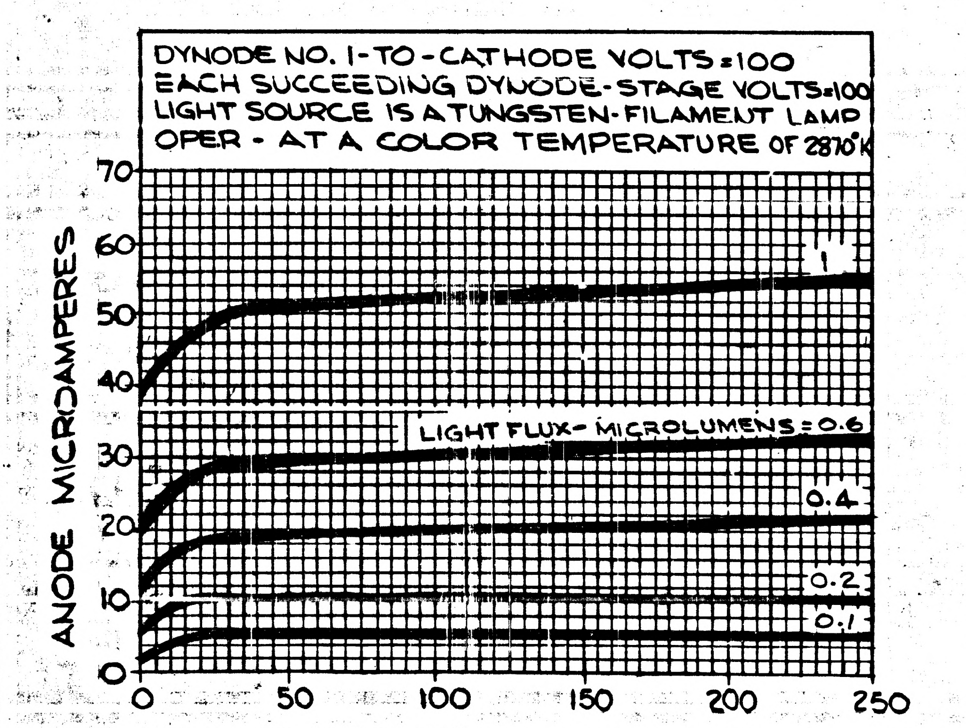


FIGURE II

TYPICAL TIME RESOLUTION CHARACTERISTICS

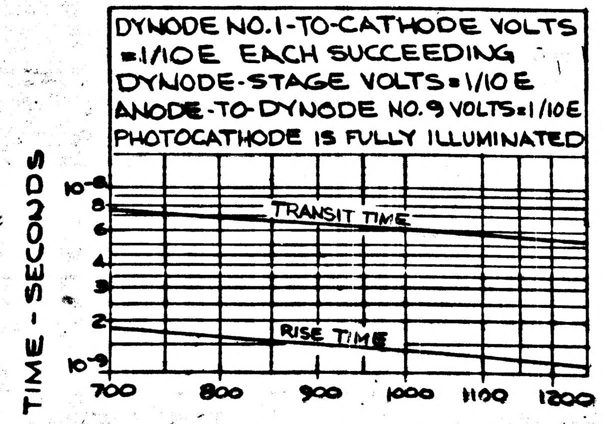


FIGURE III

MASTER

KIC NO 66604008001

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN M. Menzorio DATE 4-8-64
CHECKED J.E. Kelly 4-8-64
APPROVAL M. Gorstein 6-5-64
APPROVAL DU Koso 6-9-64
NASA APPROVAL
MIT APPROVAL 9 Jun 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ELECTRON TUBE
(PHOTO MULTIPLIER)
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1012043
SCALE ~
WT
SHEET 5 OF 5

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

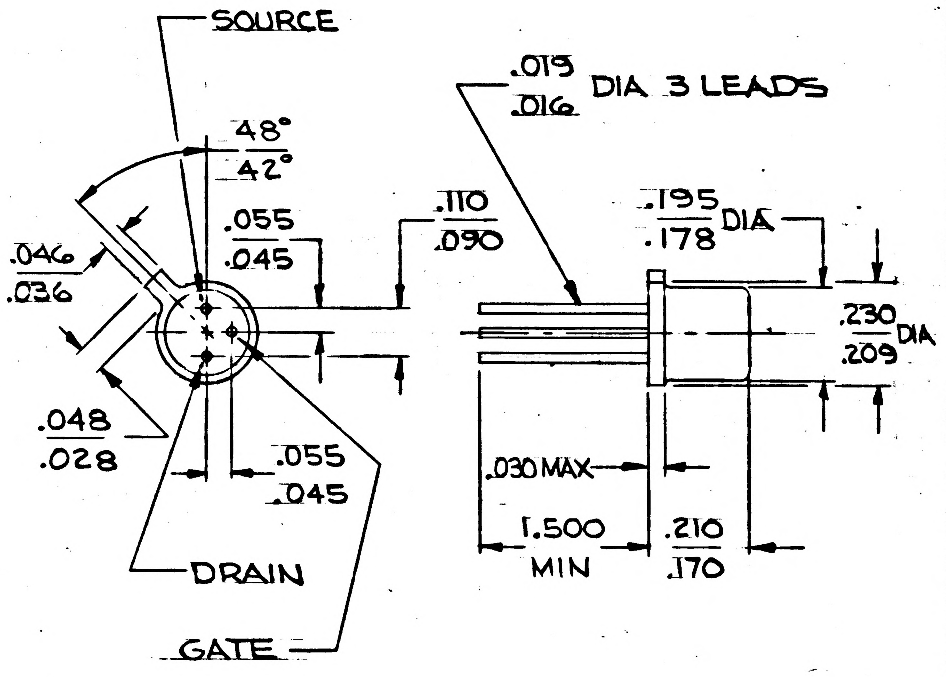
— 1012048

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 09831	6-2-64	

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIERS SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002051. LIFE TEST CONDITIONS SAME AS BURN-IN CONDITIONS.
   - D. PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH ND 1002129.

2. INSPECTION AND ACCEPTANCE:
   - A. ELECTRICAL CHARACTERISTICS: PER TABLE II.
   - B. MARKING: IDENTIFY PARTS WITH NASA DRAWING NUMBER, LATEST REVISION LETTER, MANUFACTURER'S PART NUMBER, SERIAL NUMBER AND DATE CODE PER ND 1002019.
   - C. DIMENSIONS: AS SHOWN



THE GATE IS IN ELECTRICAL CONTACT WITH THE CASE

3. DESIGN REQUIREMENTS:
   - A. STORAGE TEMPERATURE: -65°C TO 200°C
   - B. ELECTRICAL RATING: PER TABLE 1.
   - C. ELECTRICAL SPECIFICATIONS: PER TABLE II.
   - D. POWER DISSIPATION:
     AT 25°C AMBIENT TEMPERATURE: 300 MILLIWATTS
     DERATING: 2 MILLIWATTS/°C
   - E. LEAD DATA: KOVAR WITH GOLD PLATING PER ND 1015402. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

PROCURE FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

MASTER

KIC NO 68413010101

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN U. Menzorio DATE 4-8-64
CHECKED S. Zakaluk 4-8-64
APPROVAL DaKoss
APPROVAL
NASA APPROVAL W J Rhine 6-2-64
MIT APPROVAL L Hafel 6/2/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR, SILICON,
(FIELD EFFECT)
SPECIFICATION CONTROL DWG

CODE IDENT NO. | SIZE C | NASA DRAWING NO. 1012048
SCALE ~ | WT | SHEET 1 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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— | 1012048

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 09831	6-2-64	

4. SPECIAL CONDITIONING: (BY SUPPLIER)

A. BURN-IN SHALL BE FOR A PERIOD OF 240 HOURS UNDER THE FOLLOWING CONDITIONS:

1. AMBIENT TEMPERATURE: SHALL BE +70° ± 10°C.

2. APPLIED VOLTAGE STRESS:

V_{DS} = -20±1V
V_{GS} = 0 VOLTS
I_D - AS DETERMINED BY VOLTAGE BIAS CONDITIONS

B. PARAMETRIC STABILITY: DATA TO BE TAKEN AT 0, 120, 240 HOURS.

C. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:

(a) DRAIN CURRENT (I_{DSS})

THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE INITIAL TEST READING, THE FINAL READING, AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR HAVE CHANGED MORE THAN 2% IN I_{DSS} SHALL NOT BE ACCEPTABLE.

TABLE I

ABSOLUTE MAXIMUM RATINGS (25°C)	
GATE-DRAIN VOLTAGE	30 V
TOTAL DEVICE DISSIPATION AT (OR BELOW) 25°C FREE-AIR TEMPERATURE	300 MW
STORAGE TEMPERATURE RANGE	-65 TO +200°C

TABLE II

ELECTRICAL CHARACTERISTICS (25°C UNLESS OTHERWISE NOTED)			
I_{GSS}	GATE-SOURCE CUTOFF CURRENT AT:	V_{GS} = 30 V V_{DS} = 0	1 NA MAX
I_{GSS}	GATE-SOURCE CUTOFF CURRENT AT:	V_{GS} = 5 V V_{DS} = 0 T_A =150°C	1 UA MAX
BV_{GDS}	GATE-DRAIN BREAKDOWN VOLTAGE AT:	I_G = 1 UA V_{DS}= 0	30 V MIN
I_{DSS}	DRAIN CURRENT	V_{DS}= -5 V V_{GS}= 0	.15 MA ±5%
V_P	GATE-SOURCE PINCH-OFF VOLTAGE AT:	V_{DS}= -5 V I_D = -1 UA	4 V MAX
g_{fs}	SMALL-SIGNAL COMMON-SOURCE FORWARD TRANSCONDUCTANCE AT:	V_{DS}= -5 V V_{GS}= 0 f = 1 KC	110 UMHO MIN
C_{is}	COMMON-SOURCE SHORT-CIRCUIT INPUT CAPACITANCE AT:	V_{DS}= -5 V V_{GS}= 1 V f = 140 KC	6 pf MAX
NF	SPOT NOISE FIGURE AT:	V_{DS}= -5 V V_{GS}= 0 f_o = 1 KC BW = 16% R_{gen}= 10MΩ	3 DB MAX

MASTER

NEXT ASSY	USED ON
APPLICATION	

KIC NO 68413010101	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DWG. NO. CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
MATERIAL	DRAWN M MENZORIO DATE 4-8-64 CHECKED S Zakaluk 4-8-64 APPROVAL APPROVAL	TRANSISTOR, SILICON, (FIELD EFFECT) SPECIFICATION CONTROL DWG
HEAT TREATMENT	NASA APPROVAL W J Rhine 6-2-64	CODE IDENT NO. SIZE C NASA DRAWING NO. 1012048
FINAL FINISH	MIT APPROVAL 6/2/64	SCALE WT SHEET 2 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1012050 A

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 13466	10-14-64	AW
A	REVISED PER TDRR 19616	6/8/65	WK

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3 EXCEPT FOR PARA. 3.2.2 AND 3.2.8 WHICH SHALL NOT APPLY.
   - C. PACKAGING AND SHIPPING IN ACCORDANCE WITH ND 1002215, CLASS 1

2. INSPECTION AND ACCEPTANCE BY USER (100%)
   - A. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED PER ND 1002019 WITH NASA DRAWING NUMBER, LATEST REVISION LETTER, MANUFACTURER'S IDENTIFICATION, DATE OF MANUFACTURE AND DATE OF EXPIRATION.
   - B. POUR POINT: -100°F MAXIMUM
   - C. KINEMATIC VISCOSITY (TYPICAL): (PER ASTM D-445, APPENDIX A)

     3500 MAX CENTISTOKES AT -65°F

     50-60 CENTISTOKES AT 100°F

     15-19 CENTISTOKES AT 210°F

     NOTE: NO CHANGE IN VISCOSITY WITH SHEAR RATE.
   - D. WEIGHT LOSS-VACUUM: 0.34% WEIGHT LOSS TYP AFTER 114 HOURS AT 140° -160°F AND PRESSURES OF 10^{-5} TO 10^{-6} MM HG.

3. DESIGN REQUIREMENTS
   - A. THE PRODUCT SHALL BE AN ADDITIVE-FREE, COLORLESS METHYL CHLOROPHENYL SILICONE FLUID IN ACCORDANCE WITH MIL-S-81087.
   - B. TEMPERATURE RANGE: -100° TO +450°F
   - E. RADIATION RESISTANCE: 50 MEGAROENTGENS TO CEL (SEE FIGURE 1).
   - F. SHELF LIFE: FIVE YEARS

RADIATION DOSE, MEGAROENTGENS

DATA WAS MEASURED ON A [illegible] SAMPLE (? GRAMS OF FLUID, 1 MM. THICK, IN A STANDARD 2" DIAMETER IRRADIATION DISC) IRRADIATED BY A 1.5 MEV RESONANT TRANSFORMER: THE FLUID WAS 9" FROM THE TUBE WINDOW AT ROOM TEMPERATURE, AND THE DOSE RATE WAS 10 MEGAROENTGENS PER MINUTE.

SUPPLIER:
GENERAL ELECTRIC CO.
SILICONE PRODUCTS DEPT
WATERFORD, NEW YORK

PART NO. F-50

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

KIC NO 74471444001

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT

DRAWN M. Nevzorio DATE 3-10-64
CHECKED J.E. Kelly 9/8/64 RB
APPROVAL R C Morey 10/9/64
APPROVAL E. Olhong 10/8/64
NASA APPROVAL W J Rhine 10-14-64
MIT APPROVAL L Hazel 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LUBRICATING OIL,
SILICONE
SOURCE CONTROL DWG

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	C	1012050

SCALE ~
WT
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1012050

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 13466	10-14-64	AW

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKAGING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III.
2. INSPECTION AND ACCEPTANCE
   - A. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED PER ND 1002019 WITH NASA DRAWING NUMBER, LATEST REVISION LETTER, MANUFACTURER'S IDENTIFICATION, DATE OF MANUFACTUBE AND DATE OF EXPIRATION.
3. DESIGN REQUIREMENTS
   - A. THE PRODUCT SHALL BE AN ADDITIVE-FREE, COLORLESS METHYL CHLOROPHENYL SILICONE FLUID.
   - B. TEMPERATURE RANGE: -100° TO + 450°F
     - 1. POUR POINT: -100°F MAXIMUM
   - C. KINEMATIC VISCOSITY (TYPICAL): (PER ASTM D-445, APPENDIX A)

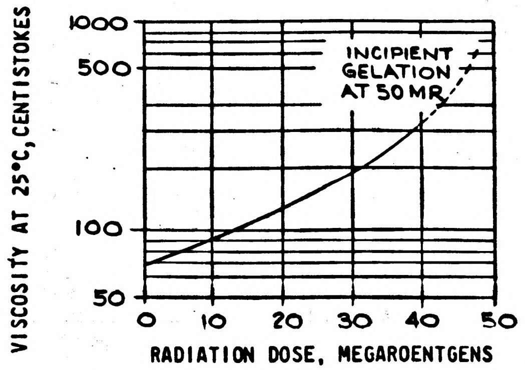
     2500 CENTISTOKES AT -65°F
     52 CENTISTOKES AT 100°F
     4.5 CENTISTOKES AT 400°F

     NOTE: NO CHANGE IN VISCOSITY WITH SHEAR RATE.
   - D. WEIGHT LOSS-VACUUM: 0.34% WEIGHT LOSS AFTER 114 HOURS AT 140° - 160°F AND PRESSURES OF 10^{-5} TO 10^{-6} MM HG.
   - E. RADIATION RESISTANCE: 50 MEGAROENTGENS TO GEL (SEE FIGURE I).
   - F. SHELF LIFE: THREE YEARS

SUPPLIER:
GENERAL ELECTRIC CO.
SILICONE PRODUCTS DEPT
WATERFORD, NEW YORK

PART NO. F-50

FIGURE I



DATA WAS MEASURED ON A TEST SAMPLE (2 GRAMS OF FLUID, 1 MM. THICK, IN A STANDARD 2" DIAMETER IRRADIATION DISC) IRRADIATED BY A 1.5 MEV RESONANT TRANSFORMER; THE FLUID WAS 9" FROM THE TUBE WINDOW AT ROOM TEMPERATURE, AND THE DOSE RATE WAS 10 MEGAROENTGENS PER MINUTE.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

KIC NO 74471444001

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN M. Nenzorio DATE 3-10-64
CHECKED J.E. Kelly 9/8/64 Rg
APPROVAL R C Morey 10/9/64
APPROVAL E. Thomp 10/8/64
NASA APPROVAL W J Rhi 10-14-64
MIT APPROVAL L Hafel 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LUBRICATING OIL,
SILICONE
SOURCE CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1012050
SCALE ~
WT
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1012051 A

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 13466	10-14-64	
A	REVISED PER TDRR 19615	6-2-65	WK

REQUIREMENTS

1. GENERAL

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3 EXCEPT FOR PARA 3.2.2 AND 3.2.8 WHICH SHALL NOT APPLY.

   C. PACKAGING AND SHIPPING IN ACCORDANCE WITH ND 1002215, CLASS I.

2. INSPECTION AND ACCEPTANCE BY USER (100%)

   A. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED PER ND 1002019 WITH NASA DRAWING NUMBER, LATEST REVISION LETTER, MANUFACTURER'S IDENTIFICATION, DATE OF MANUFACTURE AND DATE OF EXPIRATION.

   B. PENETRATION: 270 - 300 (WORKED 60 CYCLES PER ASTM D-271)

   C. WEIGHT LOSS-VACUUM: 3.0% WEIGHT LOSS AFTER 100 HOURS AT 150°F AND PRESSURE OF 10^{-5} MM HG

3. DESIGN REQUIREMENTS

   A. THE PRODUCT SHALL BE FORMULATED FROM A SILICONE FLUID (REFERENCE NASA DRAWING NO. 1012050) AND A LITHIUM SOAP BASE.

   B. TEMPERATURE RANGE: -100° TO +450°F

   C. SHELF LIFE: ONE YEAR.

   D. FUNCTIONAL LIFE AFTER USE: THREE YEARS

   E. RADIATION RESISTANCE: NO PENETRATION CHANGE OR DETERIORATION AFTER EXPOSURE TO RADIATION DOSES UP TO 10^6 RADS AT PRESSURES DOWN TO 10^{-5} MM HG

   F. SHELF LIFE: THREE YEARS

SUPPLIER:
GENERAL ELECTRIC CO.
SILICONE PRODUCTS DEPT
WATERFORD, NEW YORK

PART NO G-300

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

MASTER

K.I.C. NQ 74 471445001

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN V. Menzoni DATE 3-10-64
CHECKED J.E.Kelly 5/6/64
APPROVAL R C Morey 10/9/64
APPROVAL E. Oborup 10/8/64
NASA APPROVAL W J Rhine 10-14-64
MIT APPROVAL 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GREASE, SILICONE
SOURCE CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1012051
SCALE ~
WT
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1012051

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 13466	[illegible]	

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKAGING AND SHIPPING IN ACCORDANCE WITH MIL-P-116, METHOD III.
2. INSPECTION AND ACCEPTANCE
   - A. PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED PER ND 1002019 WITH NASA DRAWING NUMBER, LATEST REVISION LETTER, MANUFACTURER'S IDENTIFICATION, DATE OF MANUFACTURE AND DATE OF EXPIRATION.
3. DESIGN REQUIREMENTS
   - A. THE PRODUCT SHALL BE FORMULATED FROM A SILICONE FLUID (REFERENCE NASA DRAWING NO. 1012050) AND A LITHIUM SOAP BASE.
   - B. TEMPERATURE RANGE: -100° TO + 450°F
   - C. PENETRATION: 270 - 300 (WORKED 60 CYCLES PER ASTM D-217)
   - D. WEIGHT LOSS-VACUUM: 3.0% WEIGHT LOSS AFTER 100 HOURS AT 150°F AND PRESSURE OF 10^{-5} MM HG
   - E. RADIATION RESISTANCE: NO PENETRATION CHANGE OR DETERIORATION AFTER EXPOSURE TO RADIATION DOSES UP TO 10^6 RADS AT PRESSURES DOWN TO 10^{-5} MM HG
   - F. SHELF LIFE: THREE YEARS

SUPPLIER:
GENERAL ELECTRIC CO.
SILICONE PRODUCTS DEPT
WATERFORD, NEW YORK

PART NO G-300

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

MASTER

K.I.C. NO 74 471445001

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN V. Wenzoris DATE 3-10-64
CHECKED J.E. Kelly 5/6/64 B
APPROVAL R C Mo[illegible] 10/9/64
APPROVAL E. [illegible] 10/8/64
NASA APPROVAL W J R[illegible] 10-14-64
MIT APPROVAL R [illegible] 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GREASE, SILICONE
SOURCE CONTROL DWG

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	C	1012051
SCALE ~	WT	SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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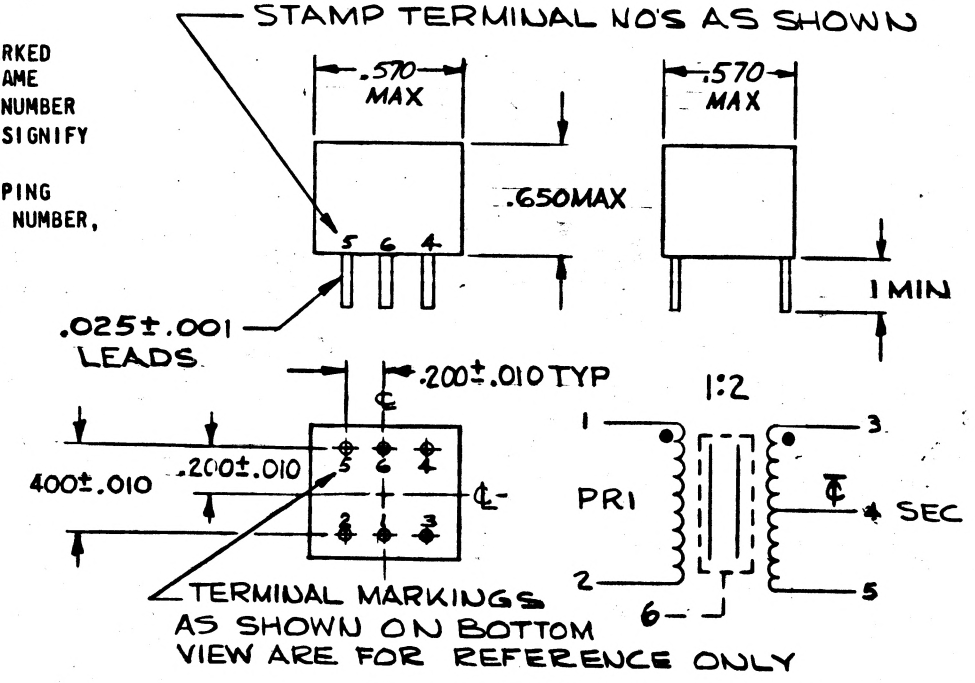
— 1012052

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	CLASS A RELEASE PER TDRR 10879		wk

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL MEET ALL REQUIREMENTS OF MIL-T-27 (QUAL. INSPECTION FOR BOTH MECH. DESIGN & CONST. & ELEC. CHAR.) GRADE 5, CLASS R
   - D. UNITS SHALL BE PACKAGED IN SUCH A MANNER AS TO INSURE THE FOLLOWING:
     - 1. EACH INDIVIDUAL PART SHALL BE SEPARATED FROM ALL OTHERS AND PACKED SECURELY TO PREVENT CONTACT DURING TRANSIT.
     - 2. LEADS SHALL BE SECURED AGAINST WHIPPING OR VIBRATION DURING TRANSIT.
   - E. UNITS SHALL MEET THE QUALIFICATION REQUIREMENTS OF ND 1002047.
2. INSPECTION AND ACCEPTANCE
   - A. DIMENSIONS AS SHOWN
   - B. ELECTRICAL REQUIREMENTS
     - 1. PER TABLE I
   - C. MARKING: UNITS SHALL BE PERMANENTLY AND LEGIBLY MARKED PER ND 1002019 WITH THE MANUFACTURER'S NAME AND/OR SYMBOL, NASA DRAWING NUMBER, DASH NUMBER AND REVISION LETTER AND SERIAL NUMBER TO SIGNIFY COMPLETION OF BURN-IN & IF SPACE PERMITS, MANUFACTURER'S PART NUMBER. EXTERIOR SHIPPING CONTAINERS SHALL INCLUDE THE NASA DRAWING NUMBER, DASH NUMBER AND REVISION LETTER.
   - D. LEAD MATERIAL: NICKEL, GOLD PLATED PER ND1015400.
     - (1) CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
3. DESIGN REQUIREMENTS
   - A. MAX AMBIENT TEMPERATURE: -55°C TO +85°C
   - B. AC VOLTAGE ACROSS PRIMARY: 2V RMS MAX
   - C. PRIMARY DC CURRENT: 3.5 ma MAX
   - D. MILITARY IDENTIFICATION: TF5RX09ZZ NO PER MIL-T-27
   - E. POWER LEVEL: 500 MW MAX

TABLE I	PERFORM TESTS, PER MIL-T-27
FREQUENCY RESPONSE:	WITH 2V RMS APPLIED TO TERM (1-2) AND THE CIRCUIT CONNECTED PER FIG 1, A FREQUENCY RESPONSE CHECK SHALL BE MADE FROM 100 CPS TO 1 KC WITH 2.5 ma DC IN THE PRIMARY. THE TEST SHALL THEN BE RE-RUN WITH 3.5 ma DC IN THE PRIMARY. THE MAX DIFFERENCE BETWEEN ANY TWO POINTS ON THE TWO TESTS SHALL BE LESS THAN 2DB.
~~DC RESISTANCE:~~	1 K OHM MAX (1-2); 3.5 K OHM MAX (3-5)
PHASE SHIFT:	WITH 2 VRMS APPLIED TO TERM. (1-2) AND THE CIRCUIT CONNECTED PER FIG 1 A PHASE SHIFT CHECK SHALL BE MADE WITH FIRST 2.5 ma DC IN THE PRIMARY AND THE FREQUENCY VARIED FROM 3.25 CPS TO 475 CPS AND THEN WITH 3.5 ma DC IN THE PRIMARY AND THE FREQUENCY VARIED THROUGH THE SAME VALUES. AT NO TIME SHALL THE PHASE SHIFT E_g TO E_L EXCEED 2°.
POLARITY:	1-3
DIELECTRIC STRENGTH:	100 V RMS, 5 SEC, 1-3, 1-6, 3-6
INSULATION RESISTANCE:	500 VDC, 1 K MEGOHMS MIN.
TURNS RATIO:	$\frac{E(1-2)}{E(3-4)} = 1 \pm 5\%$: $\frac{E(1-2)}{E(4-5)} = 1 \pm 5\%$ $\frac{E(3-4)}{E(4-5)} = 1 \pm 5\%$



PURCHASE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING

MASTER

KIC NO 68400023701

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
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DWG. NO. CONTRACT
DRAWN H Uenzo DATE 4-9-64
CHECKED S. Zakalik 4-9-64
APPROVAL D.A. Koso 6-23-64
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSFORMER AUDIO FREQUENCY
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1012052
SCALE ~
WT
SHEET 1 OF 2

INCHES

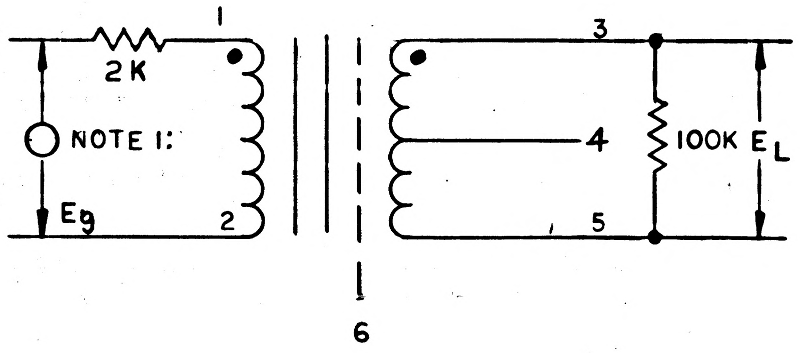
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

— 1012052

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
—	CLASS-A-RELEASE PER TDRR 10879		wl

FIG. I



4. SPECIAL CONDITIONING (BY MANUFACTURER)

TRANSFORMER SHALL BE TEMPERATURE CYCLED FOR 5 CYCLES PER MIL-STD-202, METHOD 102A EXCEPT THAT THE TEMPERATURES SHALL BE -55°C, +25°C AND +105°C AND EXPOSURE TIME SHALL BE 15 MINUTES AT EACH TEMPERATURE. DURING THE LAST CYCLE THE UNIT SHALL BE TESTED FOR CONTINUITY AT EACH OF THE AMBIENT CONDITIONS. AFTER STABILIZATION AT ROOM TEMPERATURE, UNIT SHALL PASS NORMAL INSPECTION TESTS.

NOTE I: EG SHALL BE CAPABLE OF GENERATING AC + DC VOLTAGE

K.I.C. NO. 6840023710

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
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INSTRUMENTATION LAB
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DRAWN M. MENZORIO DATE 4-9-64
CHECKED 4-9-64
APPROVAL 6-23-64
APPROVAL
NASA APPROVAL
MIT APPROVAL

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TRANSFORMER AUDIO FREQUENCY

SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1012052
SCALE ~
WT
SHEET 2 OF 2

MASTER

INCHES
0 1 2

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1012053 A

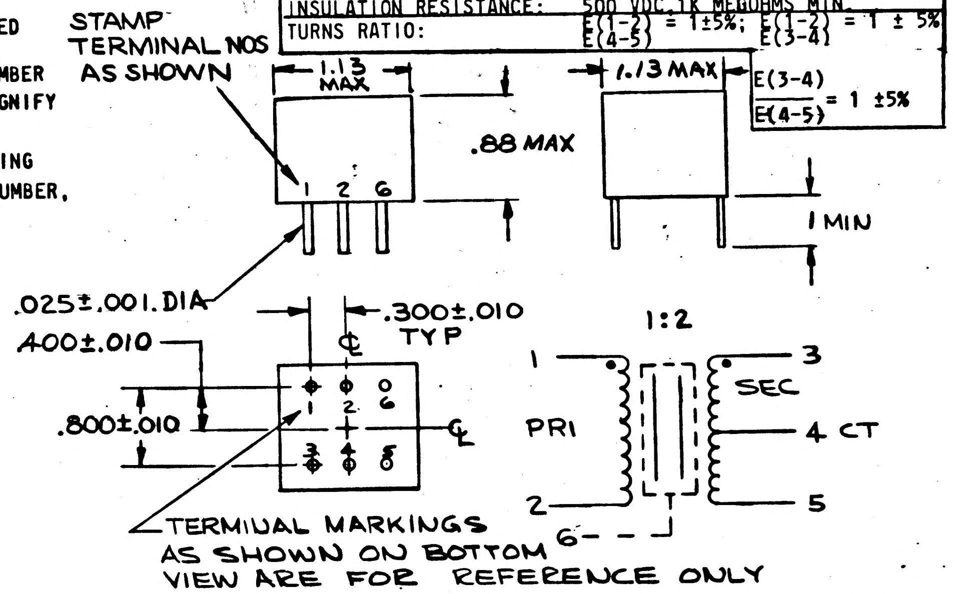
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 10879	8 July 64	WK
A	REVISED PER TDRR 11522	8/18/64	WK

REQUIREMENTS

1. GENERAL
    - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
    - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
    - C. UNITS SHALL MEET ALL REQUIREMENTS OF MIL-T-27 (QUAL. INSPECTION FOR BOTH MECH DESIGN & CONSTR & ELEC CHARACTERISTICS) GRADE 5, CLASS R
    - D. UNITS SHALL BE PACKAGED IN SUCH A MANNER AS TO INSURE THE FOLLOWING:
        1. EACH INDIVIDUAL PART SHALL BE SEPARATED FROM ALL OTHERS AND PACKED SECURELY TO PREVENT CONTACT DURING TRANSIT.
        2. LEADS SHALL BE SECURED AGAINST WHIPPING OR VIBRATION DURING TRANSIT.
    - E. UNITS SHALL MEET THE QUALIFICATIONS REQUIREMENTS OF ND 1002047
2. INSPECTION AND ACCEPTANCE
    - A. DIMENSIONS AS SHOWN
    - B. ELECTRICAL REQUIREMENTS
        1. PER TABLE I
    - C. MARKING: UNITS SHALL BE PERMANENTLY AND LEGIBLY MARKED PER ND 1002047 WITH THE MANUFACTURER'S NAME AND/OR SYMBOL, NASA DRAWING NUMBER, DASH NUMBER AND REVISION LETTER AND SERIAL NUMBER TO SIGNIFY COMPLETION OF BURN-IN & IF SPACE PERMITS, MANUFACTURER'S PART NUMBER. EXTERIOR SHIPPING CONTAINERS SHALL INCLUDE THE NASA DRAWING NUMBER, DASH NUMBER AND REVISION LETTER.
    - D. LEAD MATERIAL: NICKEL, PER ND1015400.
        - (1) CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
3. DESIGN REQUIREMENTS
    - A. MAX AMBIENT TEMPERATURE: -55°C TO +85°C
    - B. PRIMARY DC CURRENT: 2.0 MA MAX
    - C. MILITARY IDENTIFICATION: TF5RX09ZZ NO. PER MIL-T-27
    - D. POWER LEVEL: 500 MW MAX

TABLE 1

PERFORM TEST PER MIL-T-27	
FREQUENCY RESPONSE:	WITH 3.5 VRMS APPLIED TO TERM (1-2) AND CIRCUIT CONNECTED PER FIG 1 A FREQUENCY RESPONSE CHECK SHALL BE MADE FROM 200CPS TO 1KC WITH .75 MADCIN THE PRIMARY. THE TEST SHALL THEN BE RE-RUN WITH 2 MADCIN THE PRIMARY. THE MAX DIFFERENCE BETWEEN ANY TWO POINTS ON THE TWO TESTS SHALL BE 1 DB.
DC RESISTANCE:	800 OHMS MAX (1-2):4.5K OHMS MAX. (3-5)
PHASE SHIFT:	WITH 3.5 VRMS APPLIED TO TERM (1-2) AND CIRCUIT CONNECTED PER FIG 1, A PHASE SHIFT CHECK SHALL BE MADE, AS THE CURRENT VARIES BETWEEN 0.75 MADC & 2 MADC IN THE PRIMARY, AT ANY SINGLE FREQUENCY BETWEEN 325 CPS TO 475 CPS AT NO TIME SHALL THE CHANGE IN PHASE SHIFT, E_G TO E_L EXCEED 2°.
POLARITY:	1-3
DIELECTRIC STRENGTH:	100 V RMS, 5 SEC, 1-3,1-6,3-6
INSULATION RESISTANCE:	500 VDC, 1K MEGOHMS MIN.
TURNS RATIO:	$\frac{E(1-2)}{E(4-5)} = 1 \pm 5\%$; $\frac{E(1-2)}{E(3-4)} = 1 \pm 5\%$ $\frac{E(3-4)}{E(4-5)} = 1 \pm 5\%$



TERMINAL MARKINGS AS SHOWN ON BOTTOM VIEW ARE FOR REFERENCE ONLY

PURCHASE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING

MASTER

KIC NO	68400023801

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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INSTRUMENTATION LAB
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DWG. NO. CONTRACT

DRAWN U Menzorio DATE 4-9-64
CHECKED Szlaluk RS 4-9-64
APPROVAL DA Koss 6-23-64
APPROVAL
NASA APPROVAL
MIT APPROVAL WKupfer 8 July 64

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TRANSFORMER,
AUDIO FREQUENCY
SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	C	1012053

SCALE ~ WT SHEET 1 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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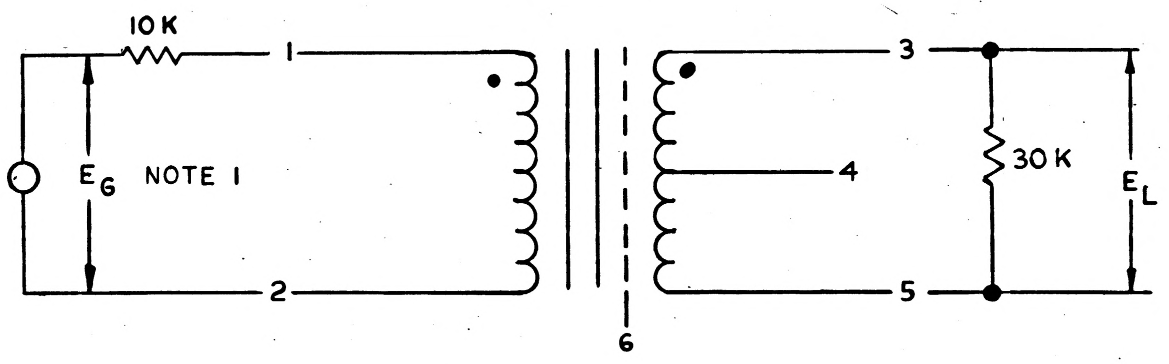
1012053 A

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 10879	8/[illegible]/64	WR
A	REVISED PER TDRR 11522	8/18/64	WR

FIG I



4. SPECIAL CONDITIONING (BY MANUFACTURER)

TRANSFORMER SHALL BE TEMPERATURE CYCLED FOR 5 CYCLES PER MIL-STD-202, METHOD 102A EXCEPT THAT THE TEMPERATURES SHALL BE -55°C, +25°C AND 105°C AND EXPOSURE TIME SHALL BE 15 MINUTES AT EACH TEMPERATURE. DURING THE LAST CYCLE, THE UNIT SHALL BE TESTED FOR CONTINUITY AT EACH OF THE AMBIENT CONDITIONS. AFTER STABILIZATION AT ROOM TEMPERATURE, UNIT SHALL PASS NORMAL INSPECTION TESTS.

NOTE 1: E_G SHALL BE CAPABLE OF GENERATING AC AND DC VOLTAGE

MASTER

KIC NO. 6840023801

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN M MENZORIO DATE 4-9-64
CHECKED S. Zabaluk RZ 4-9-64
APPROVAL DA Koso 6-23-64
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSFORMER, AUDIO FREQUENCY

SPECIFICATION CONTROL DWG.

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1012053
SCALE ~
WT
SHEET 2 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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1012053	B

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 10879	8 July 64	WK
A	REVISED PER TDRR 11522	8/18/64	WK
B	REVISED PER TDRR 17820	6 Apr 65	WK

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED. BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL MEET ALL REQUIREMENTS OF MIL-T-27 FOR GRADE 5, CLASS R, LIFE EXPECTANCY X IN AN AMBIENT TEMPERATURE OF 85°C.
   - D. PRESERVATION, PACKAGING AND PACKING: PER ND 1002215, CLASS 1, CODE 1.
   - E. UNITS SHALL BE DESIGNED TO MEET THE QUALIFICATION REQUIREMENTS OF ND 1002047.

2. INSPECTION AND ACCEPTANCE
   - A. DIMENSIONS AS SHOWN
   - B. ELECTRICAL REQUIREMENTS
     - 1. PER TABLE I
   - C. MARKING: UNITS SHALL BE PERMANENTLY AND LEGIBLY MARKED PER ND 1002047 WITH THE MANUFACTURER'S NAME AND/OR SYMBOL, NASA DRAWING NUMBER, DASH NUMBER AND REVISION LETTER AND SERIAL NUMBER TO SIGNIFY COMPLETION OF BURN-IN & IF SPACE PERMITS, MANUFACTURER'S PART NUMBER. EXTERIOR SHIPPING CONTAINERS SHALL INCLUDE THE NASA DRAWING NUMBER, DASH NUMBER AND REVISION LETTER.
   - D. LEAD MATERIAL: NICKEL, PER ND1015400.
     - (1) CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

3. DESIGN REQUIREMENTS
   - A. AMBIENT OPERATING TEMPERATURE: -18°C TO +71°C
   - B. PRIMARY DC CURRENT: 2.0 MA MAX
   - C. TYPE DESIGNATION: TF5RX09ZZ NO. PER MIL-T-27
   - D. POWER LEVEL: 500 MW MAX

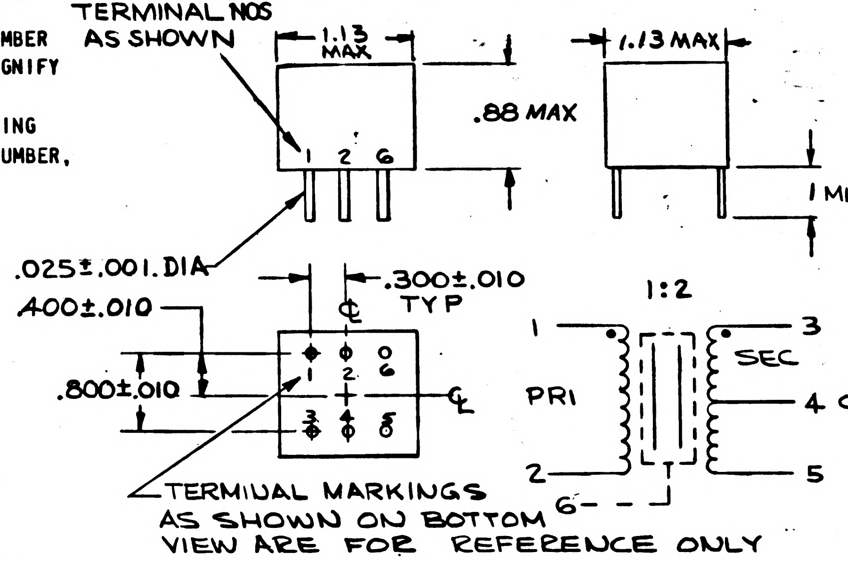
TABLE 1

PERFORM TEST PER MIL-T-27	
FREQUENCY RESPONSE:	WITH 3.5 VRMS APPLIED TO TERM (1-2) AND CIRCUIT CONNECTED PER FIG 1 A FREQUENCY RESPONSE CHECK SHALL BE MADE FROM 200CPS TO 1KC WITH .75 MADC IN THE PRIMARY. THE TEST SHALL THEN BE RE-RUN WITH 2 MADC IN THE PRIMARY. THE MAX DIFFERENCE BETWEEN ANY TWO POINTS ON THE TWO TESTS SHALL BE 1 DB.
DC RESISTANCE:	800 OHMS MAX (1-2):4.5K OHMS MAX. (3-5)
PHASE SHIFT:	WITH 3.5 VRMS APPLIED TO TERM (1-2) AND CIRCUIT CONNECTED PER FIG 1, A PHASE SHIFT CHECK SHALL BE MADE, AS THE CURRENT VARIES BETWEEN 0.75 MADC & 2 MADC IN THE PRIMARY, AT ANY SINGLE FREQUENCY BETWEEN 325 CPS TO 475 CPS AT NO TIME SHALL THE PHASE SHIFT OF VOLTAGE (3-5) WITH RESPECT TO VOLTAGE (1-2) EXCEED 2°.
POLARITY:	1-3
DIELECTRIC STRENGTH:	100 V RMS, 5 SEC, 1-3,1-6,3-6
INSULATION RESISTANCE:	500 VDC, 1K MEGOHMS MIN.

TABLE 1 CON'D

TURNS RATIO: WITH AN INPUT OF 3.5 VOLTS, 400 CPS (1-2), A RESISTIVE LOAD (3-5) OF 30K, THE FULL LOAD VOLTAGE RATIOS SHALL BE:

$$\frac{V(1-2)}{V(3-5)} = 1:2 \pm 5\%; \quad \frac{V(3-4)}{V(4-5)} = 1:1 \pm 5\%$$



PURCHASE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING

MASTER

KIC NO 68400023801	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT
DRAWN U Menzorio DATE 4-9-64
CHECKED Szekeluk R 4-9-64
APPROVAL Da Koso 6-23-64
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NASA APPROVAL
MIT APPROVAL WK 8 July 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSFORMER,
AUDIO FREQUENCY
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1012053
SCALE ~
WT
SHEET 1 OF 2

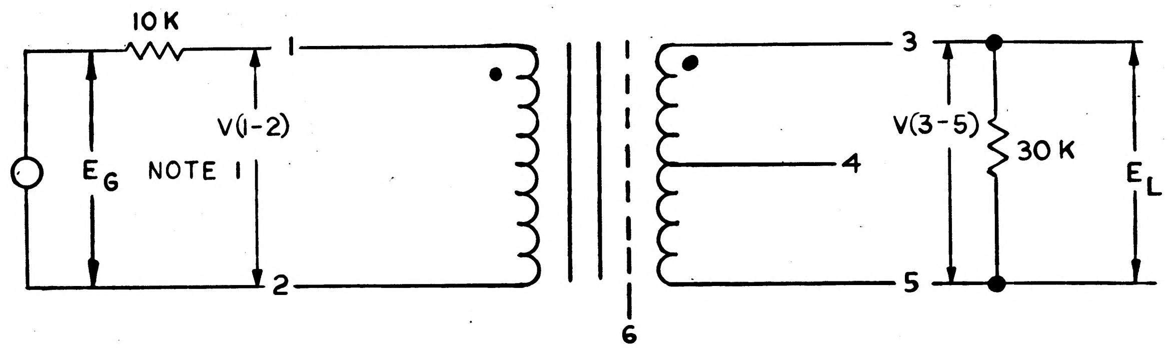
4 3 2 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1012053 B

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDPR 10879	[illegible]	WK
A	REVISED PER TDRR 11522	8/18/64	WK
B	REVISED PER TDRR 17820	[illegible]	WK

FIG I



4. SPECIAL CONDITIONING (BY MANUFACTURER)

TRANSFORMER SHALL BE TEMPERATURE CYCLED FOR 5 CYCLES PER MIL-STD-202, METHOD 102A EXCEPT THAT THE TEMPERATURES SHALL BE -55°C, +25°C AND 105°C AND EXPOSURE TIME SHALL BE 15 MINUTES AT EACH TEMPERATURE. DURING THE LAST CYCLE, THE UNIT SHALL BE TESTED FOR CONTINUITY AT EACH OF THE AMBIENT CONDITIONS. AFTER STABILIZATION AT ROOM TEMPERATURE, UNIT SHALL PASS NORMAL INSPECTION TESTS.

NOTE 1: E_G SHALL BE CAPABLE OF GENERATING AC AND DC VOLTAGE

MASTER

KIC NO. 6840023801	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

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APPLICATION		

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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DWG. NO. CONTRACT
DRAWN M. MENZORIO DATE 4-9-64
CHECKED S. Zakaluk RZ 4-9-64
APPROVAL DA Koso 6-23-64
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NASA APPROVAL
MIT APPROVAL

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TRANSFORMER, AUDIO FREQUENCY
SPECIFICATION CONTROL DWG.

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1012053
SCALE ~
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SHEET 2 OF 2

4 3 2 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

— | 1012053

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 10879	8 July 64	wk

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL MEET ALL REQUIREMENTS OF MIL-T-27 (QUAL. INSPECTION FOR BOTH MECH DESIGN & CONSTR & ELEC CHARACTERISTICS) GRADE 5, CLASS R
   - D. UNITS SHALL BE PACKAGED IN SUCH A MANNER AS TO INSURE THE FOLLOWING:
     1. EACH INDIVIDUAL PART SHALL BE SEPARATED FROM ALL OTHERS AND PACKED SECURELY TO PREVENT CONTACT DURING TRANSIT.
     2. LEADS SHALL BE SECURED AGAINST WHIPPING OR VIBRATION DURING TRANSIT.
   - E. UNITS SHALL MEET THE QUALIFICATIONS REQUIREMENTS OF ND 1002047

2. INSPECTION AND ACCEPTANCE
   - A. DIMENSIONS AS SHOWN
   - B. ELECTRICAL REQUIREMENTS
     1. PER TABLE I
   - C. MARKING: UNITS SHALL BE PERMANENTLY AND LEGIBLY MARKED PER ND 1002047 WITH THE MANUFACTURER'S NAME AND/OR SYMBOL, NASA DRAWING NUMBER, DASH NUMBER AND REVISION LETTER AND SERIAL NUMBER TO SIGNIFY COMPLETION OF BURN-IN ₵ IF SPACE PERMITS, MANUFACTURER'S PART NUMBER. EXTERIOR SHIPPING CONTAINERS SHALL INCLUDE THE NASA DRAWING NUMBER, DASH NUMBER AND REVISION LETTER.
   - D. LEAD MATERIAL: NICKEL, GOLD PLATED PER ND1015400.
     (1) CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

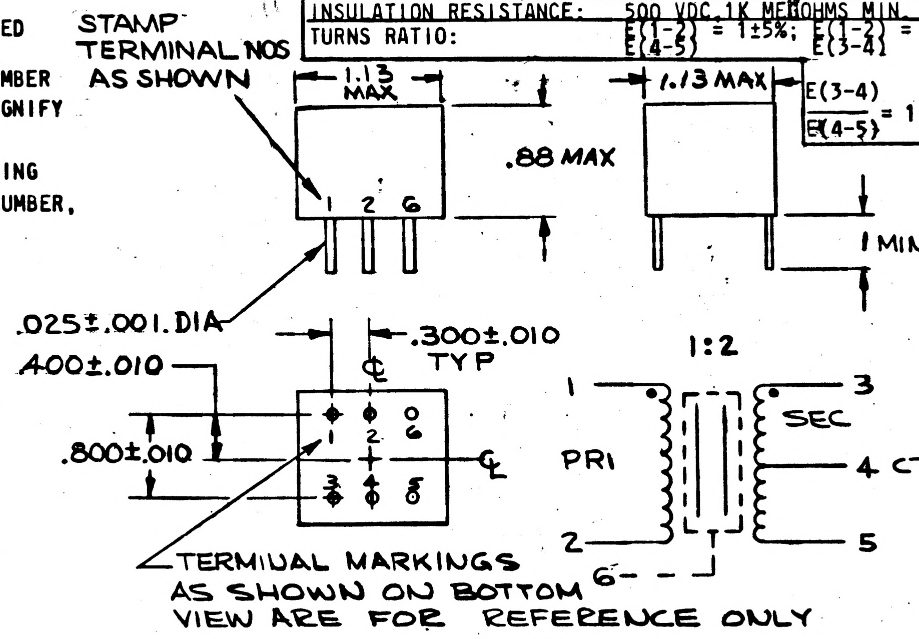
3. DESIGN REQUIREMENTS
   - A. MAX AMBIENT TEMPERATURE: -55°C TO +85°C
   - B. PRIMARY DC CURRENT: 2.0 MA MAX
   - C. MILITARY IDENTIFICATION: TF5RX09ZZ NO. PER MIL-T-27
   - D. POWER LEVEL: 500 MW MAX

PURCHASE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING

MASTER

TABLE 1

PERFORM TEST PER MIL-T-27	
FREQUENCY RESPONSE:	WITH 3.5 VRMS APPLIED TO TERM (1-2) AND CIRCUIT CONNECTED PER FIG 1 A FREQUENCY RESPONSE CHECK SHALL BE MADE FROM 200CPS TO 1KC WITH .75 MADC IN THE PRIMARY. THE TEST SHALL THEN BE RE-RUN WITH 2 MADC IN THE PRIMARY. THE MAX DIFFERENCE BETWEEN ANY TWO POINTS ON THE TWO TESTS SHALL BE 1 DB.
DC RESISTANCE:	800 OHMS MAX (1-2): 4.5K OHMS MAX. (3-5)
PHASE SHIFT:	WITH 3.5 VRMS APPLIED TO TERM (1-2) AND CIRCUIT CONNECTED PER FIG 1 A PHASE SHIFT CHECK SHALL BE MADE WITH FIRST .75 MADC IN THE PRIMARY AND THE FREQUENCY VARIED FROM 325CPS TO 475CPS AND THEN WITH 2MADC IN THE PRIMARY AND THE FREQUENCY VARIED THROUGH THE SAME VALUES. AT NO TIME SHALL THE PHASE SHIFT E_g TO E_L EXCEED 2°.
POLARITY:	1-3
DIELECTRIC STRENGTH:	100 V RMS, 5 SEC, 1-3, 1-6, 3-6
INSULATION RESISTANCE:	500 VDC, 1K MEGOHMS MIN.
TURNS RATIO:	$\frac{E(1-2)}{E(4-5)} = 1 \pm 5\%$; $\frac{E(1-2)}{E(3-4)} = 1 \pm 5\%$ $\frac{E(3-4)}{E(4-5)} = 1 \pm 5\%$



KIC NO 68400023801	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
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CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN U Menzorio DATE 4-9-64
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NASA APPROVAL
MIT APPROVAL 8 July 64

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TRANSFORMER, AUDIO FREQUENCY
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1012053
SCALE ~
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SHEET 1 OF 2

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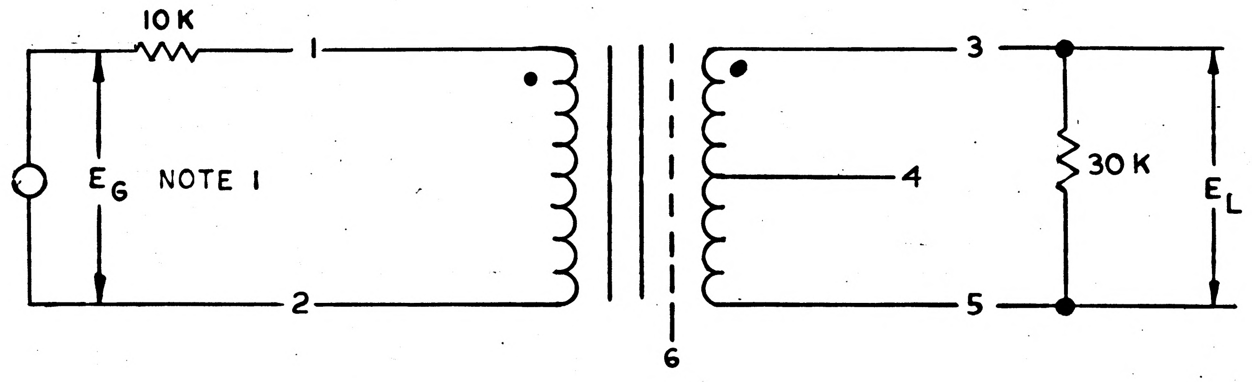
REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 10879	8 July 64	WK

FIG I



4. SPECIAL CONDITIONING (BY MANUFACTURER)

TRANSFORMER SHALL BE TEMPERATURE CYCLED FOR 5 CYCLES PER MIL-STD-202, METHOD 102A EXCEPT THAT THE TEMPERATURES SHALL BE -55°C, +25°C AND 105°C AND EXPOSURE TIME SHALL BE 15 MINUTES AT EACH TEMPERATURE. DURING THE LAST CYCLE, THE UNIT SHALL BE TESTED FOR CONTINUITY AT EACH OF THE AMBIENT CONDITIONS. AFTER STABILIZATION AT ROOM TEMPERATURE, UNIT SHALL PASS NORMAL INSPECTION TESTS.

NOTE 1: E_G SHALL BE CAPABLE OF GENERATING AC AND DC VOLTAGE

MASTER

NEXT ASSY	USED ON
APPLICATION	

KIC NO. 6840023801

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
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TRANSFORMER,
AUDIO FREQUENCY
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CODE IDENT NO.
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NASA DRAWING NO. 1012053
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SHEET 2 OF 2

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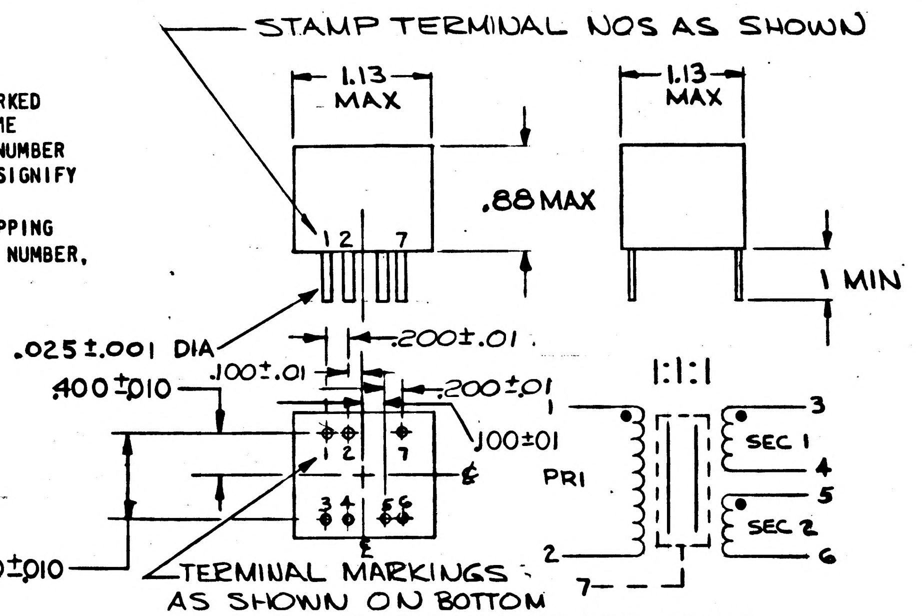
1012054 A

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL REALEASE CLASS A PER TDRR 10879	6/6/64	WK
A	REVISED PER TDRR 11227	10/1/64	WK

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL MEET ALL REQUIREMENTS OF MIL-T-27 (QUAL. INSPECTION FOR BOTH MECH. DESIGN & CONSTR & ELEC CHARACTERISTICS) GRADE 5, CLASS R
   - D. UNITS SHALL BE PACKAGED IN SUCH A MANNER AS TO INSURE THE FOLLOWING:
     - 1. EACH INDIVIDUAL PART SHALL BE SEPARATED FROM ALL OTHERS AND PACKED SECURELY TO PREVENT CONTACT DURING TRANSIT.
     - 2. LEADS SHALL BE SECURED AGAINST WHIPPING OR VIBRATION DURING TRANSIT.
   - E. UNITS SHALL MEET THE QUALIFICATION REQUIREMENTS OF ND 1002047.
2. INSPECTION AND ACCEPTANCE
   - A. DIMENSIONS AS SHOWN
   - B. ELECTRICAL REQUIREMENTS
     - 1. PER TABLE I
   - C. MARKING: UNITS SHALL BE PERMANFNTLY AND LEGIBLY MARKED PER ND 1002019 ~~WITH~~ THE MANUFACTURER'S NAME AND/OR SYMBOL, NASA DRAWING NUMBER, DASH NUMBER AND REVISION LETTER AND SERIAL NUMBER TO SIGNIFY COMPLETION OF BURN-IN & IF SPACE PERMITS, MANUFACTURER'S PART NUMBER. EXTERIOR SHIPPING CONTAINERS SHALL INCLUDE THE NASA DRAWING NUMBER, DASH NUMBER AND REVISION LETTER.
   - D. LEAD MATERIAL: NICKEL, GOLD PLATED PER ND1015400.
     - (1) CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
3. DESIGN REQUIREMENTS
   - A. MAX AMBIENT TEMPERATURE: -55°C TO +85°C
   - B. AC VOLTAGE ACROSS PRIMARY: 10V RMS MAX
   - C. PRIMARY DC CURRENT: 4 ma MAX
   - D. MILITARY IDENTIFICATION: TF5RX09ZZ NO. PER MIL-T-27
   - E. POWER LEVEL: 500 MW MAX

TABLE I	PERFORM TESTS PER MIL-T-27
FREQUENCY RESPONSE:	WITH 3.5V RMS APPLIED TO TERM (1-2), AND THE CIRCUIT CONNECTED PER FIG 1 A FREQUENCY RESPONSE CHECK SHALL BE MADE FROM 200 CPS TO 1 KC WITH 3 madc IN THE PRIMARY. THE TEST SHALL THEN BE RE-RUN WITH 4 madc IN THE PRIMARY THE MAX DIFFERENCE BETWEEN ANY TWO POINTS ON THE TWO TESTS SHALL BE 1DB
DC RESISTANCE:	200 OHMS MAX (1-2), 350 OHMS MAX (3-4), 400 OHMS MAX (5-6)
PHASE SHIFT:	WITH 3.5V RMS APPLIED TO TERM (1-2) AND CIRCUIT CONNECTED PER FIG 1 A PHASE SHIFT CHECK SHALL BE MADE WITH FIRST 3 madc IN THE PRIMARY AND THE FREQUENCY VARIED FROM 325 CPS TO 475 CPS AND THEN WITH 4 madc IN THE PRIMARY AND THE FREQUENCY VARIED THROUGH THE SAME VALUES. AT NO TIME FOR EITHER SECONDARY SHALL THE PHASE SHIFT E_g TO E_L EXCEED BE [illegible]
POLARITY:	1 - 3 - 5
DIELECTRIC STRENGTH:	100V RMS, 5 SEC, 1-3, 1-5, 1-7, 3-5, 5-7
INSULATION RESISTANCE:	500 VDC, 1 K MEGOHMS MIN
TURNS RATIO:	1 : 1 : 1 ± 5%



PURCHASE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING

MASTER

KIC NO 68400023901

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
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CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN H. Menzorio DATE 4-9-64
CHECKED S. [illegible] 4-9-64
APPROVAL [illegible] Kosmo 6-23-64
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer 8 July 64

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TRANSFORMER, AUDIO FREQUENCY
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1012054
SCALE ~
WT
SHEET 1 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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1012054	A

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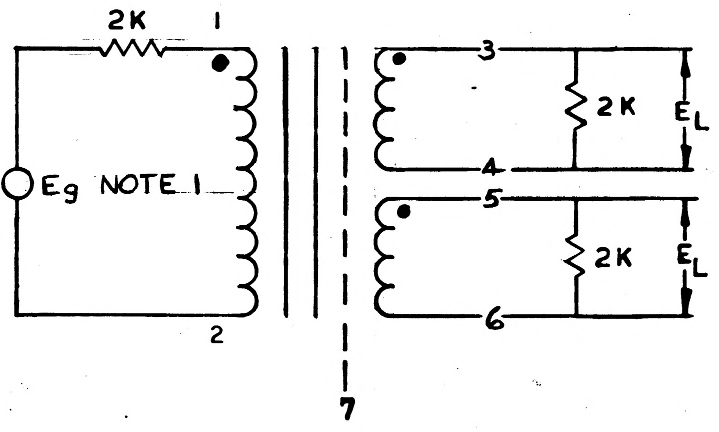
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL REALEASE CLASS A PER TDRR 10879	8 July 64	wk
A	REVISED PER TDRR 11227		wk

FIG I



4. SPECIAL CONDITIONING (BY MANUFACTURER)

TRANSFORMER SHALL BE TEMPERATURE CYCLED FOR 5 CYCLES PER MIL-STD-202, METHOD 102A EXCEPT THAT THE TEMPERATURES SHALL BE -55°C, +25°C AND +105°C AND EXPOSURE TIME SHALL BE 15 MINUTES AT EACH TEMPERATURE. DURING THE LAST CYCLE, THE UNIT SHALL BE TESTED FOR CONTINUITY AT EACH OF THE AMBIENT CONDITIONS. AFTER STABILIZATION AT ROOM TEMPERATURE, UNIT SHALL PASS NORMAL INSPECTION TESTS.

NOTE I: E_g SHALL BE CAPABLE OF DEGENERATING DC + AC VOLTAGES

MASTER

K.I.C. NO. 68400023901	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
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FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN M.MENZORIO DATE 4-9-64
CHECKED S Zabaluk 4-9-64
APPROVAL D.H.Koss 6-23-64
APPROVAL
NASA APPROVAL
MIT APPROVAL 8 July 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSFORMER,
AUDIO FREQUENCY

SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	C	1012054
SCALE ~	WT	SHEET 2 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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1012054 B

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 10879	6/1/64	WK
A	REVISED PER TDRR 11227	28/7/64	WK
B	REVISED PER TDRR 11523	8/8/64	WK

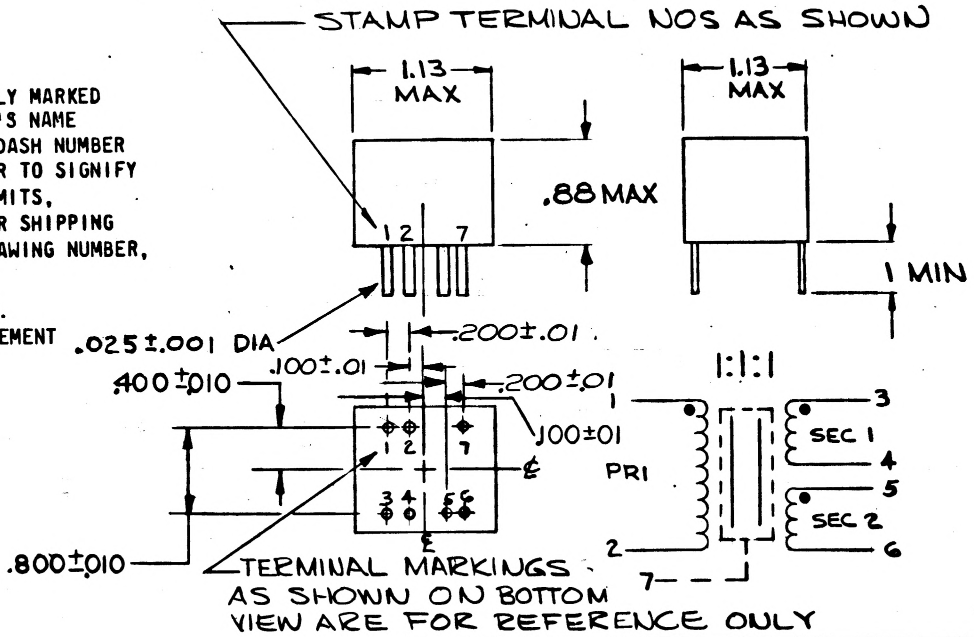
REQUIREMENTS

1. GENERAL
    - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
    - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
    - C. UNITS SHALL MEET ALL REQUIREMENTS OF MIL-T-27 (QUAL. INSPECTION FOR BOTH MECH. DESIGN & CONSTR & ELEC CHARACTERISTICS) GRADE 5, CLASS R
    - D. UNITS SHALL BE PACKAGED IN SUCH A MANNER AS TO INSURE THE FOLLOWING:
        1. EACH INDIVIDUAL PART SHALL BE SEPARATED FROM ALL OTHERS AND PACKED SECURELY TO PREVENT CONTACT DURING TRANSIT.
        2. LEADS SHALL BE SECURED AGAINST WHIPPING OR VIBRATION DURING TRANSIT.
    - E. UNITS SHALL MEET THE QUALIFICATION REQUIREMENTS OF ND 1002047.

2. INSPECTION AND ACCEPTANCE
    - A. DIMENSIONS AS SHOWN
    - B. ELECTRICAL REQUIREMENTS
        1. PER TABLE I
    - C. MARKING: UNITS SHALL BE PERMANENTLY AND LEGIBLY MARKED PER ND 1002019 ~~WITH~~ THE MANUFACTURER'S NAME AND/OR SYMBOL, NASA DRAWING NUMBER, DASH NUMBER AND REVISION LETTER AND SERIAL NUMBER TO SIGNIFY COMPLETION OF BURN-IN & IF SPACE PERMITS, MANUFACTURER'S PART NUMBER. EXTERIOR SHIPPING CONTAINERS SHALL INCLUDE THE NASA DRAWING NUMBER, DASH NUMBER AND REVISION LETTER.
    - D. LEAD MATERIAL: NICKEL, PER ND1015400.
        (1) CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

3. DESIGN REQUIREMENTS
    - A. MAX AMBIENT TEMPERATURE: -55°C TO +85°C
    - B. AC VOLTAGE ACROSS PRIMARY: 10V RMS MAX
    - C. PRIMARY DC CURRENT: 4 ma MAX.
    - D. MILITARY IDENTIFICATION: TF5RX09ZZ NO. PER MIL-T-27
    - E. POWER LEVEL: 500 MW MAX

TABLE I	PERFORM TESTS PER MIL-T-27
FREQUENCY RESPONSE:	WITH 3.5V RMS APPLIED TO TERM (1-2), AND THE CIRCUIT CONNECTED PER FIG 1 A FREQUENCY RESPONSE CHECK SHALL BE MADE FROM 200 CPS TO 1 KC WITH 3madc IN THE PRIMARY. THE TEST SHALL THEN BE RE-RUN WITH 4madc IN THE PRIMARY THE MAX DIFFERENCE BETWEEN ANY TWO POINTS ON THE TWO TESTS SHALL BE 1DB
DC RESISTANCE:	200 OHMS MAX(1-2), 350 OHMS MAX (3-4), 400 OHMS MAX (5-6)
PHASE SHIFT:	WITH 3.4V RMS APPLIED TO TERM (1-2) AND CIRCUIT CONNECTED PER FIG 1 A PHASE SHIFT CHECK SHALL BE MADE. AS THE CURRENT VARIES BETWEEN 3 MADC & 4 MADC IN THE PRIMARY, AT ANY SINGLE FREQUENCY BETWEEN 325 CPS & 475 CPS, AT NO TIME SHALL THE CHANGE IN PHASE SHIFT E_G TO E_L EXCEED 2°.
POLARITY:	1 - 3 - 5
DIELECTRIC STRENGTH:	100V RMS, 5 SEC, 1-3, 1-5, 1-7, 3-5, 5-7
INSULATION RESISTANCE:	500 VDC, 1 K MEGOHMS MIN
TURNS RATIO:	1 : 1 : 1 ± 5%



TERMINAL MARKINGS AS SHOWN ON BOTTOM VIEW ARE FOR REFERENCE ONLY

PURCHASE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING

MASTER

KIC NO 68400023901	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

NEXT ASSY	USED ON	
APPLICATION		

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± — DECIMALS ± — ANGLES ± —	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DWG. NO. CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN M. Menzorio DATE 4-9-64 CHECKED S. Zefalide 4-9-64 APPROVAL A. Kosmo 6-23-64 APPROVAL	TRANSFORMER, AUDIO FREQUENCY SPECIFICATION CONTROL DWG
MATERIAL		
HEAT TREATMENT	NASA APPROVAL	CODE IDENT NO. · SIZE C · NASA DRAWING NO. 1012054
FINAL FINISH	MIT APPROVAL W Kupfer 9 July 64	SCALE ~ · WT · SHEET 1 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

4 | 3 | 2 | 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1012054 | B

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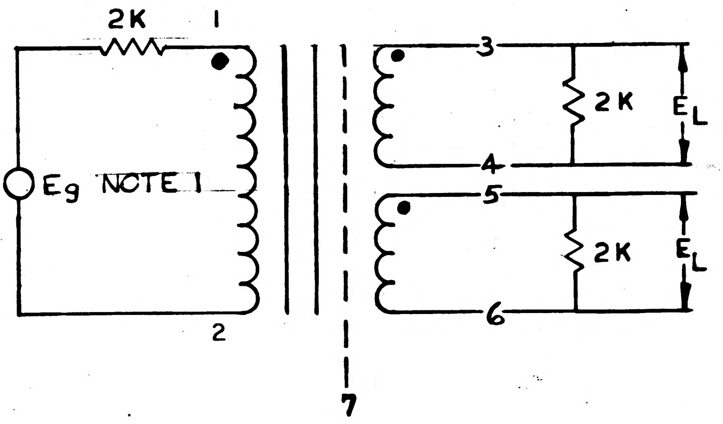
REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 10879	8 July 64	wk
A	REVISED PER TDRR 11227	[illegible]	wk
B	REVISED PER TDRR 11523	8/18/64	wk

FIG I



4. SPECIAL CONDITIONING (BY MANUFACTURER)

TRANSFORMER SHALL BE TEMPERATURE CYCLED FOR 5 CYCLES PER MIL-STD-202, METHOD 102A EXCEPT THAT THE TEMPERATURES SHALL BE -55°C, +25°C AND +105°C AND EXPOSURE TIME SHALL BE 15 MINUTES AT EACH TEMPERATURE. DURING THE LAST CYCLE, THE UNIT SHALL BE TESTED FOR CONTINUITY AT EACH OF THE AMBIENT CONDITIONS. AFTER STABILIZATION AT ROOM TEMPERATURE, UNIT SHALL PASS NORMAL INSPECTION TESTS.

NOTE I: E_g SHALL BE CAPABLE OF DEGENERATING DC + AC VOLTAGES

MASTER

K.I.C. NO. 68400023901

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN M MENZORIO DATE 4-9-64
CHECKED S Zabiluk 4-9-64
APPROVAL 6-23-64
APPROVAL
NASA APPROVAL
MIT APPROVAL 8 July 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSFORMER,
AUDIO FREQUENCY

SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	C	1012054

SCALE ~ | WT | SHEET 2 OF 2

4 | 3 | 2 | 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1012054 C

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 10879	[illegible]	WK
A	REVISED PER TDRR 11227	[illegible]	WK
B	REVISED PER TDRR 11523	8/18/64	WK
C	REVISED PER TDRR 17821	[illegible]	WK

REQUIREMENTS

1. GENERAL
    - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
    - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
    - C. UNIT SHALL MEET ALL REQUIREMENTS OF MIL-T-27 FOR GRADE 5, CLASS R LIFE EXPECTANCY X, IN AN AMBIENT TEMPERATURE OF 85°C.
    - D. PRESERVATION, PACKAGING AND PACKING: PER ND1002215 CLASS 1, CODE 1.
    - E. UNITS SHALL BE DESIGNED TO MEET THE QUALIFICATION REQUIREMENTS OF ND 1002047.

TABLE I	PERFORM TESTS PER MIL-T-27
FREQUENCY RESPONSE:	WITH 3.5V RMS APPLIED TO TERM (1-2), AND THE CIRCUIT CONNECTED PER FIG 1 A FREQUENCY RESPONSE CHECK SHALL BE MADE FROM 200 CPS TO 1 KC WITH 3Madc IN THE PRIMARY. THE TEST SHALL THEN BE RE-RUN WITH 4madc IN THE PRIMARY THE MAX DIFFERENCE BETWEEN ANY TWO POINTS ON THE TWO TESTS SHALL BE 1DB
DC RESISTANCE:	200 OHMS MAX(1-2), 350 OHMS MAX (3-4), 400 OHMS MAX (5-6)
PHASE SHIFT:	WITH 3.4V RMS APPLIED TO TERM (1-2) AND CIRCUIT CONNECTED PER FIG 1 A PHASE SHIFT CHECK SHALL BE MADE. AS THE CURRENT VARIES BETWEEN 3 MADC & 4 MADC IN THE PRIMARY, AT ANY SINGLE FREQUENCY BETWEEN 325 CPS & 475 CPS, AT NO TIME FOR EITHER SECONDARY SHALL THE PHASE SHIFT OF VOLTAGE (3-4) AND (5-6) WITH RESPECT TO INPUT VOLTAGE (1-2) EXCEED 2° EACH.
POLARITY:	1 - 3 - 5
DIELECTRIC STRENGTH:	100V RMS, 5 SEC, 1-3, 1-5, 1-7, 3-5, 5-7, 3-7
INSULATION RESISTANCE:	500 VDC, 1 K MEGOHMS MIN

TABLE 1 CON'D

RATED LOAD: WITH AN INPUT (1-2) OF 10 VOLTS, 400 CPS, THE FULL LOAD VOLTAGE SHALL BE:

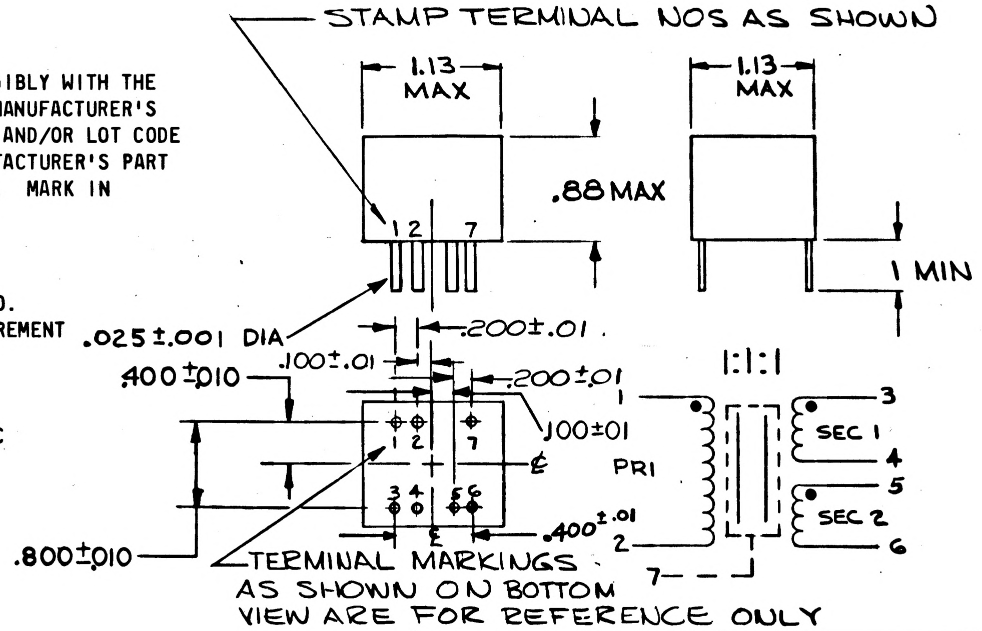
A. $\frac{V(1-2)}{V(3-4)} = 1:1 \pm 5\%$ WITH A 2K LOAD (3-4)

B. $\frac{V(1-2)}{V(5-6)} = 1:1 \pm 5\%$ WITH A 2K LOAD (5-6)

C. $\frac{\text{VOLTAGE RATIO OBTAINED IN TEST a}}{\text{VOLTAGE RATIO OBTAINED IN TEST b}} = 1:1 \pm 5\%$

LOADS ARE SIMULTANEOUS

2. INSPECTION AND ACCEPTANCE
    - A. DIMENSIONS AS SHOWN
    - B. ELECTRICAL REQUIREMENTS
        - 1. PER TABLE I
    - C. MINIMUM MARKING: MARK PERMANENTLY AND LEGIBLY WITH THE NASA DRAWING NUMBER AND REVISION LETTER, MANUFACTURER'S NAME AND/OR SYMBOL, MANUFACTURER'S SERIAL AND/OR LOT CODE NUMBER AND LEAD IDENTIFICATION. THE MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART AND PACKAGE. MARK IN ACCORDANCE WITH ND 1002019.
    - D. LEAD MATERIAL: NICKEL, PER ND1015400.
        - (1) CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
3. DESIGN REQUIREMENTS
    - A. AMBIENT OPERATING TEMPERATURE: -18°C TO +71°C
    - B. AC VOLTAGE ACROSS PRIMARY: 10V RMS MAX
    - C. PRIMARY DC CURRENT: 4 ma MAX.
    - D. TYPE DESIGNATION: TF5RX09ZZ NO. PER MIL-T-27
    - E. POWER LEVEL: 500 MW MAX



PURCHASE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING

MASTER

KIC NO 68400023901	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

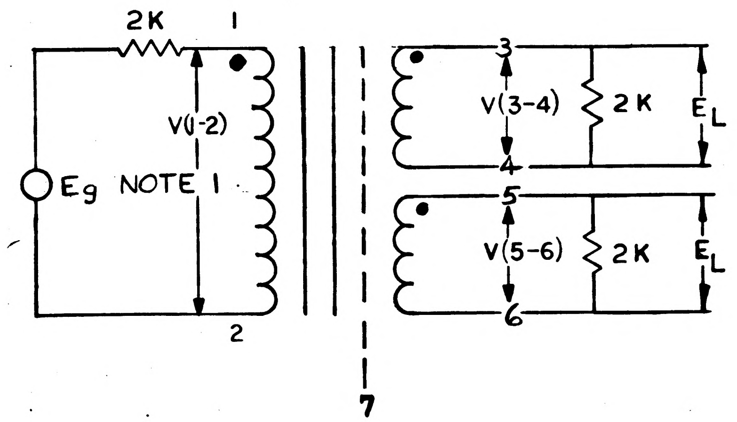
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± — DECIMALS ± — ANGLES ± — DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DWG. NO. CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
MATERIAL	DRAWN H. Menzorio DATE 4-9-64 CHECKED S. [illegible] 4-9-64 APPROVAL [illegible] 6-23-64 APPROVAL	TRANSFORMER, AUDIO FREQUENCY SPECIFICATION CONTROL DWG
HEAT TREATMENT	NASA APPROVAL	CODE IDENT NO. — SIZE C — NASA DRAWING NO. 1012054
FINAL FINISH	MIT APPROVAL [illegible] July 64	SCALE ~ — WT — SHEET 1 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1012054 C

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 10879	8 July 64	wk
A	REVISED PER TDRR 11227	28 Aug 64	wk
B	REVISED PER TDRR 11523	5/18/64	wk
C	REVISED PER TDRR 17821	6 Jan 65	wk

FIG I



4. SPECIAL CONDITIONING (BY MANUFACTURER)

TRANSFORMER SHALL BE TEMPERATURE CYCLED FOR 5 CYCLES PER MIL-STD-202, METHOD 102A EXCEPT THAT THE TEMPERATURES SHALL BE -55°C, +25°C AND +105°C AND EXPOSURE TIME SHALL BE 15 MINUTES AT EACH TEMPERATURE. DURING THE LAST CYCLE, THE UNIT SHALL BE TESTED FOR CONTINUITY AT EACH OF THE AMBIENT CONDITIONS. AFTER STABILIZATION AT ROOM TEMPERATURE, UNIT SHALL PASS NORMAL INSPECTION TESTS.

NOTE I: E_g SHALL BE CAPABLE OF DEGENERATING DC + AC VOLTAGES

MASTER

K.I.C. NO. 68400023901	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN M MENZORIO DATE 4-9-64
CHECKED S Zglobik R 4-9-64
APPROVAL D H Koso 6-23-64
APPROVAL
NASA APPROVAL
MIT APPROVAL 8 July 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSFORMER,
AUDIO FREQUENCY

SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1012054
SCALE ~
WT
SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

—	1012054

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL REALEASE CLASS A PER TDRR 10879	8 Jul 64	WK

REQUIREMENTS

1. GENERAL

   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

   C. UNITS SHALL MEET ALL REQUIREMENTS OF MIL-T-27 (QUAL. INSPECTION FOR BOTH MECH. DESIGN & CONSTR & ELEC CHARACTERISTICS) GRADE 5, CLASS R

   D. UNITS SHALL BE PACKAGED IN SUCH A MANNER AS TO INSURE THE FOLLOWING:

      1. EACH INDIVIDUAL PART SHALL BE SEPARATED FROM ALL OTHERS AND PACKED SECURELY TO PREVENT CONTACT DURING TRANSIT.

      2. LEADS SHALL BE SECURED AGAINST WHIPPING OR VIBRATION DURING TRANSIT.

   E. UNITS SHALL MEET THE QUALIFICATION REQUIREMENTS OF ND 1002047.

2. INSPECTION AND ACCEPTANCE

   A. DIMENSIONS AS SHOWN

   B. ELECTRICAL REQUIREMENTS

      1. PER TABLE I

   C. MARKING: UNITS SHALL BE PERMANENTLY AND LEGIBLY MARKED PER ND 1002019 ~~WITH~~ THE MANUFACTURER'S NAME AND/OR SYMBOL, NASA DRAWING NUMBER, DASH NUMBER AND REVISION LETTER AND SERIAL NUMBER TO SIGNIFY COMPLETION OF BURN-IN & IF SPACE PERMITS, MANUFACTURER'S PART NUMBER. EXTERIOR SHIPPING CONTAINERS SHALL INCLUDE THE NASA DRAWING NUMBER, DASH NUMBER AND REVISION LETTER.

   D. LEAD MATERIAL: NICKEL, GOLD PLATED PER ND1015400.

      (1) CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

3. DESIGN REQUIREMENTS

   A. MAX AMBIENT TEMPERATURE: -55°C TO +85°C

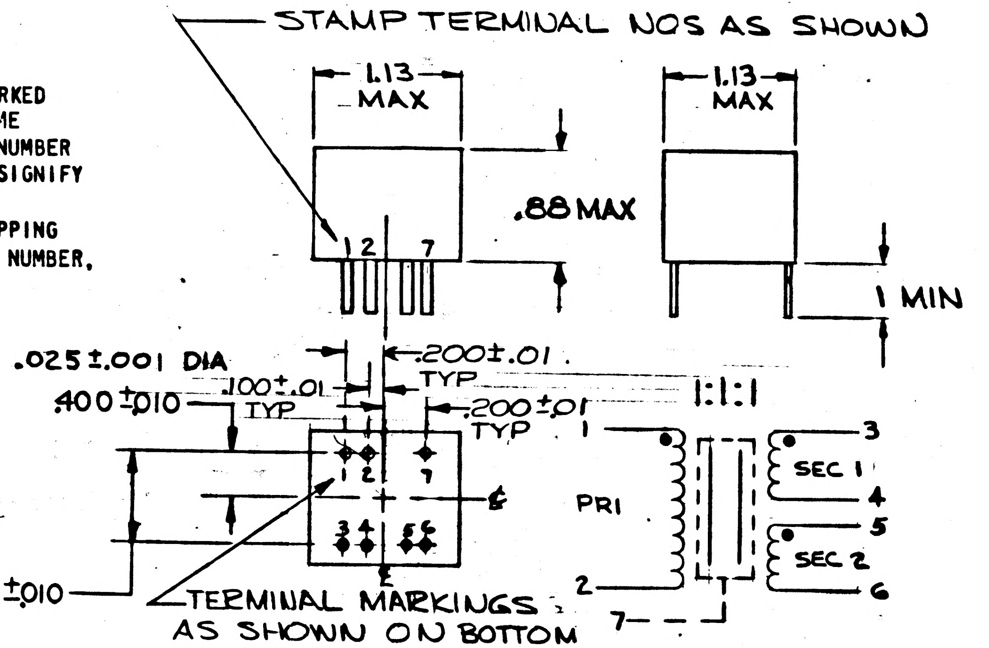
   B. AC VOLTAGE ACROSS PRIMARY: 10V RMS MAX

   C. PRIMARY DC CURRENT: 4 ma MAX.

   D. MILITARY IDENTIFICATION: TF5RX09ZZ NO. PER MIL-T-27

   E. POWER LEVEL: 500 MW MAX

TABLE I	PERFORM TESTS PER MIL-T-27
FREQUENCY RESPONSE:	WITH 3.5V RMS APPLIED TO TERM (1-2), AND THE CIRCUIT CONNECTED PER FIG 1 A FREQUENCY RESPONSE CHECK SHALL BE MADE FROM 200 CPS TO 1 KC WITH 3Madc IN THE PRIMARY. THE TEST SHALL THEN BE RE-RUN WITH 4madc IN THE PRIMARY THE MAX DIFFERENCE BETWEEN ANY TWO POINTS ON THE TWO TESTS SHALL BE 1DB
DC RESISTANCE:	200 OHMS MAX(1-2), 350 OHMS MAX (3-4), 400 OHMS MAX (5-6)
PHASE SHIFT:	WITH 3.5V RMS APPLIED TO TERM (1-2) AND CIRCUIT CONNECTED PER FIG 1 A PHASE SHIFT CHECK SHALL BE MADE WITH FIRST 3 Madc IN THE PRIMARY AND THE FREQUENCY VARIED FROM 325 CPS TO 475 CPS AND THEN WITH 4 Madc IN THE PRIMARY AND THE FREQUENCY VARIED THROUGH THE SAME VALUES. AT NO TIME FOR EITHER SECONDARY SHALL THE PHASE SHIFT E_g TO E_L EXCEED BE [illegible]
POLARITY:	1 - 3 - 5
DIELECTRIC STRENGTH:	100V RMS, 5 SEC, 1-3, 1-5, 1-7, 3-5, 5-7
INSULATION RESISTANCE:	500 VDC, 1 K MEGOHMS MIN
TURNS RATIO:	1 : 1 : 1 ± 5%



PURCHASE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING

MASTER

KIC NO 68400023901	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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DWG. NO. CONTRACT

DRAWN M. Menzorio DATE 4-9-64
CHECKED S. Zefalek R 4-9-64
APPROVAL D.A. Koso 6-23-64
APPROVAL
NASA APPROVAL
MIT APPROVAL W. Koffer 8 July 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSFORMER,
AUDIO FREQUENCY
SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	C	1012054
SCALE ~	WT	SHEET 1 OF 2

INCHES

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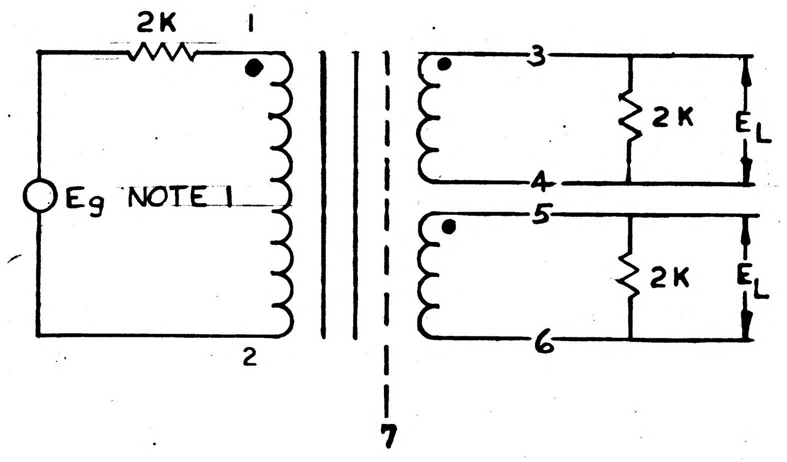
REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL REALEASE CLASS A PER TDRR 10879	8 July 64	wt

FIG I



4. SPECIAL CONDITIONING (BY MANUFACTURER)

TRANSFORMER SHALL BE TEMPERATURE CYCLED FOR 5 CYCLES PER MIL-STD-202, METHOD 102A EXCEPT THAT THE TEMPERATURES SHALL BE -55°C, +25°C AND +105°C AND EXPOSURE TIME SHALL BE 15 MINUTES AT EACH TEMPERATURE. DURING THE LAST CYCLE, THE UNIT SHALL BE TESTED FOR CONTINUITY AT EACH OF THE AMBIENT CONDITIONS. AFTER STABILIZATION AT ROOM TEMPERATURE, UNIT SHALL PASS NORMAL INSPECTION TESTS.

NOTE I: E_g SHALL BE CAPABLE OF DEGENERATING DC + AC VOLTAGES

MASTER

K.I.C. NO. 68400023901

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN M.MENZORIO DATE 4-9-64
CHECKED S.Zglobik [illegible] 4-9-64
APPROVAL [illegible] 6-23-64
APPROVAL
NASA APPROVAL
MIT APPROVAL [illegible] 8 July 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSFORMER, AUDIO FREQUENCY

SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1012054
SCALE ~
WT
SHEET 2 OF 2

INCHES
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1012056 - A

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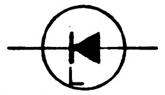
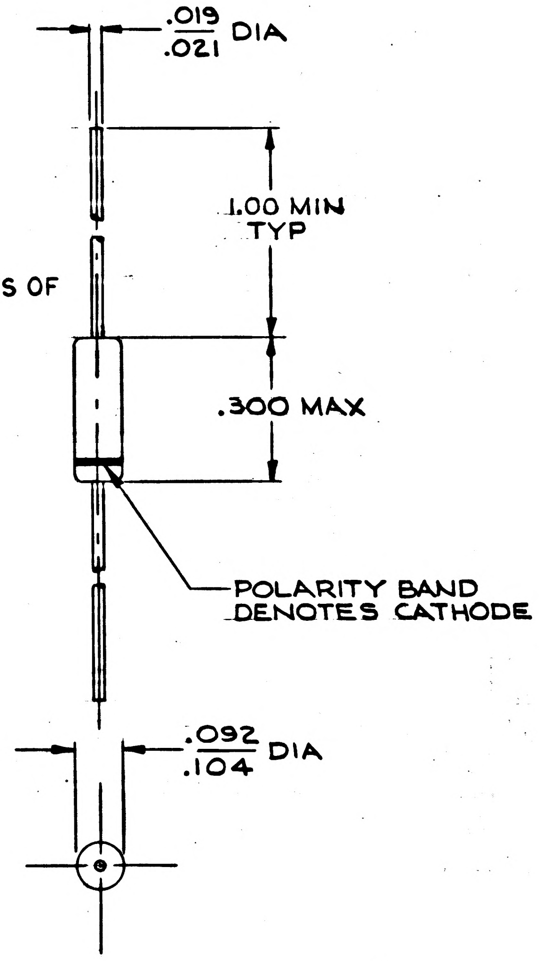
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 08924	5/26/64	
A	REVISED PER TDRR 19242	5/26/65	W

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIERS SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002054, LIFE TEST CONDITIONS SHALL BE THE SAME AS BURN IN CONDITIONS.
   - D. PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH ND 1002215 CLASS I CODE II
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - 1. DIMENSIONS AS SHOWN.
   - B. ELECTRICAL CHARACTERISTICS: PER TABLE I
     - 1. ZENER VOLTAGE (V_Z AT I_{ZT})
     - 2. ZENER IMPEDANCE (Z_{ZT})
     - 3. REVERSE CURRENT (I_R) AT 25°C
   - C. MARKING: THE MANUFACTURER'S TRADEMARK OR CODE; DATE CODE; LAST FOUR DIGITS OF NASA P/N AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED PER ND 1002019
   - D. VISUAL INSPECTION BY SUPPLIER PER ND 1002220
3. DESIGN REQUIREMENTS:
   - A. ELECTRICAL SPECIFICATIONS: PER TABLE I
   - B. MAXIMUM RATINGS: PER TABLE I
   - C. STORAGE TEMPERATURE: −65°C TO +200°C
   - D. SURGE CURRENT: 5 X I_{ZM} (TABLE I), 5 SURGES AT 1 MINUTE INTERVALS OF 8.3 M SEC DURATION SUPERIMPOSED ON I_{ZT}
   - E. POWER DISSIPATION: 250 MW MAX., DERATE 1.43 MW/°C ABOVE 25°C AMBIENT.
   - F. LEAD DATA: THE LEAD MATERIAL FOR THIS PART IS DUMET, PER ND 1015401, GOLD PLATED.
     A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.



GRAPHICAL SYMBOL



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K.I.C. NO. 68415009601 THRU 9637	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

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CHECKED S. Zelnick 4-6-64
APPROVAL D. Akorro 5-26-64
APPROVAL
NASA APPROVAL
MIT APPROVAL 5/26/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SEMICONDUCTOR DEVICE,
DIODE(VOLTAGE REGULATOR,
SILICON, AXIAL LEAD)
SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1012056

SCALE ~ WT SHEET 1 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1012056 A

SYM	DESCRIPTION	DATE	APPROVAL
REVISIONS			
—	INITIAL RELEASE CLASS A PER TDRR 08924	5/26/64	
A	REVISED PER TDRR 19242	5/26/65	wk

4. SPECIAL CONDITIONING: (BY SUPPLIER)

   A. BURN-IN SHALL BE FOR A PERIOD OF 240 HOURS UNDER THE FOLLOWING CONDITIONS:

      1. AMBIENT TEMPERATURE: SHALL BE +25° ± 10°C.
      2. POWER DISSIPATION: SHALL BE 115 MILLIWATTS

   B. PARAMETRIC STABILITY: DATA TAKEN AT 0, 120 AND 240 HOURS.

      1. ACCEPTANCE LIMITS

         (a) ZENER VOLTAGE: 1% OF INITIAL VALUE.
         (b) DYNAMIC IMPEDANCE: 5% OF INITIAL VALUE.

   C. THIS DATA SHALL BE RECORDED FOR EACH UNIT AND SUBMITTED WITH SHIPMENT IN ADDITION TO THE INSPECTION AND ACCEPTANCE DATA TO BE FURNISHED IN ACCORDANCE WITH ND 1015404.

TABLE I

ELECTRICAL CHARACTERISTICS
(AT 25°C AMBIENT TEMPERATURE UNLESS OTHERWISE SPECIFIED) V_F=1.0V MAX AT I_F=200 mA ON ALL TYPES AT I_{ZT}=250μAMPS

NASA DASH NUMBER	JEDEC TYPE NUMBER (REF. ONLY)	NOMINAL ZENER VOLTAGE V_Z (VOLTS)±5%	MAX. ZENER IMPEDANCE Z_{ZT} (NOTE 2) (OHMS)	MAX. REVERSE CURRENT I_R (μA)	TEST VOLTAGE V_R (VOLTS)	MAX. ZENER CURRENT I_{ZM} (mA)
1	IN4099	6.8	200	10	5.17	35.0
2	IN4100	7.5	200	10	5.70	31.8
3	IN4101	8.2	200	1.0	6.24	29.0
4	IN4102	8.7	200	1.0	6.61	27.4
5	IN4103	9.1	200	1.0	6.92	26.2
6	IN4104	10	200	1.0	7.60	24.8
7	IN4105	11	200	.05	8.44	21.6
8	IN4106	12	200	.05	9.12	20.4
9	IN4107	13	200	.05	9.87	19.0
10	IN4108	14	200	.05	10.65	17.5
11	IN4109	15	100	.05	11.40	16.3
12	IN4110	16	100	.05	12.15	15.4
13	IN4111	17	100	.05	12.92	14.5
14	IN4112	18	100	.05	13.67	13.2
15	IN4113	19	150	.05	14.44	12.5
16	IN4114	20	150	.01	15.20	11.9
17	IN4115	22	150	.01	16.72	10.8
18	IN4116	24	150	.01	18.25	9.9
19	IN4117	25	150	.01	19.00	9.5
20	IN4118	27	150	.01	20.46	8.8
21	IN4119	28	200	.01	21.28	8.5
22	IN4120	30	200	.01	22.80	7.9
23	IN4121	33	200	.01	25.08	7.2
24	IN4122	36	200	.01	27.38	6.6
25	IN4123	39	200	.01	29.65	6.1
26	IN4124	43	250	.01	32.65	5.5
27	IN4125	47	250	.01	35.75	5.1
28	IN4126	51	300	.01	38.76	4.6
29	IN4127	56	300	.01	42.60	4.2
30	IN4128	60	400	.01	45.60	4.0
31	IN4129	62	500	.01	47.10	3.8
32	IN4130	68	700	.01	51.68	3.5
33	IN4131	75	700	.01	57.00	3.1
34	IN4132	82	800	.01	62.32	2.9
35	IN4133	87	1000	.01	66.12	2.7
36	IN4134	91	1200	.01	69.16	2.6
37	IN4135	100	1500	.01	76.00	2.3

MAX. NOISE DENSITY AT I_{ZT}=250μA N_D (FIG 1) = 40 (MICRO VOLTS PER SQUARE ROOT CYCLE)

NOTES FOR TABLE I:

1. ALL SPECIFICATIONS (EXCEPT FORWARD VOLTAGE DROP) ARE BASED ON A DC CURRENT FLOW THRU THE DIODE IN SUCH A DIRECTION THAT THE CATHODE IS POSITIVE WITH RESPECT TO THE ANODE.

2. ZENER IMPEDANCE IS MEASURED BY SUPERIMPOSING A 60 CYCLE AC CURRENT ON THE DC TEST CURRENT. THE MAGNITUDE OF THE AC CURRENT SHALL BE 10% OF THE DC LEVEL.

$$\left(Z_Z = \frac{E(AC)}{I(AC)}\right)$$

3. VOLTAGE REGULATION IS DETERMINED BY NOTING THE VALUE OF BREAKDOWN VOLTAGE AT 10% I_{ZM}, THEN INCREASING CURRENT TO 50% I_{ZM} AND NOTING VALUE OF BREADOWN VOLTAGE AFTER 90 SECONDS (MINIMUM). THE DIFFERENCE IN MEASURED VOLTAGE IS ΔV_Z. DURING THIS TEST THE DIODE SHALL BE SUSPENDED BY ITS LEADS A MINIMUM OF 1/2 INCH FROM THE BODY OF THE DIODE IN A STILL AIR AMBIENT OF 25°C.

REFERENCE

KIC DASH NO.	NASA DASH NO.	KIC DASH NO.	NASA DASH NO.	KIC DASH NO.	NASA DASH NO.	KIC DASH NO.	NASA DASH NO.	KIC DASH NO.	NASA DASH NO.	KIC DASH NO.	NASA DASH NO.
9601	1	9607	7	9613	13	9619	19	9625	25	9631	31
9602	2	9608	8	9614	14	9620	20	9626	26	9632	32
9603	3	9609	9	9615	15	9621	21	9627	27	9633	33
9604	4	9610	10	9616	16	9622	22	9628	28	9634	34
9605	5	9611	11	9617	17	9623	23	9629	29	9635	35
9606	6	9612	12	9618	18	9624	24	9630	30	9636	36
										9637	37

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K.I.C. NO. 68415009601 THRU 9637

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MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SEMICONDUCTOR DEVICE, DIODE
(VOLTAGE REGULATOR, SILICON,
AXIAL LEAD)
SPECIFICATION CONTROL DWG

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1012056
SCALE ~ WT SHEET 2 OF 3

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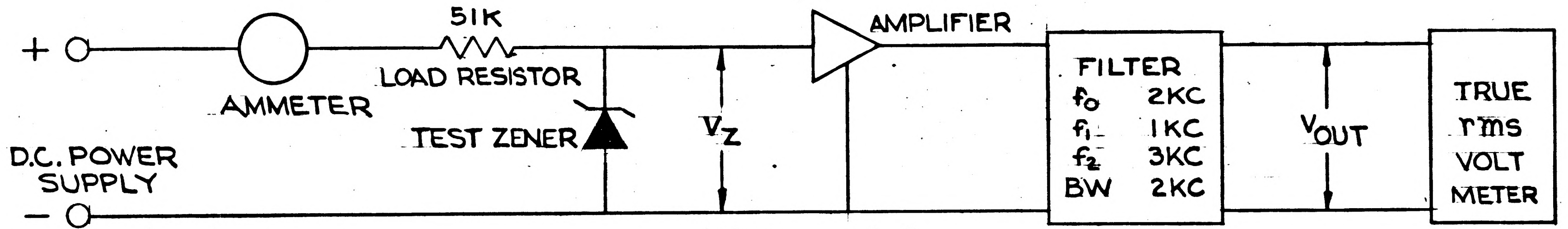
1012056 A

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 08924	5/26/64	
A.	REVISED PER TDRR 19242	5/26/65	

NOISE DENSITY MEASUREMENT METHOD



$$\text{NOISE DENSITY (VOLTS PER SQUARE ROOT CYCLE)} = \frac{V_{OUT}}{\text{OVERALL GAIN}\ \sqrt{BW}}$$

WHERE: BW = FILTER BANDWIDTH (CYCLES)
V_{OUT} = OUTPUT NOISE (VOLTS RMS)

FIGURE I

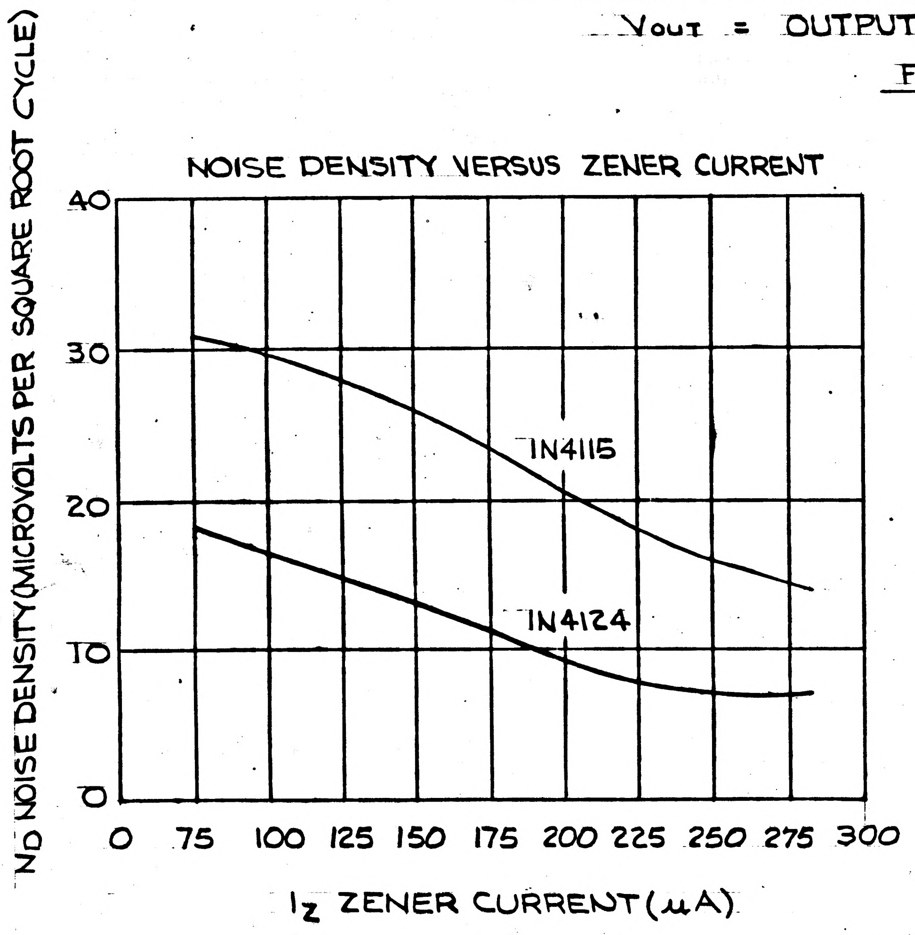


FIGURE II

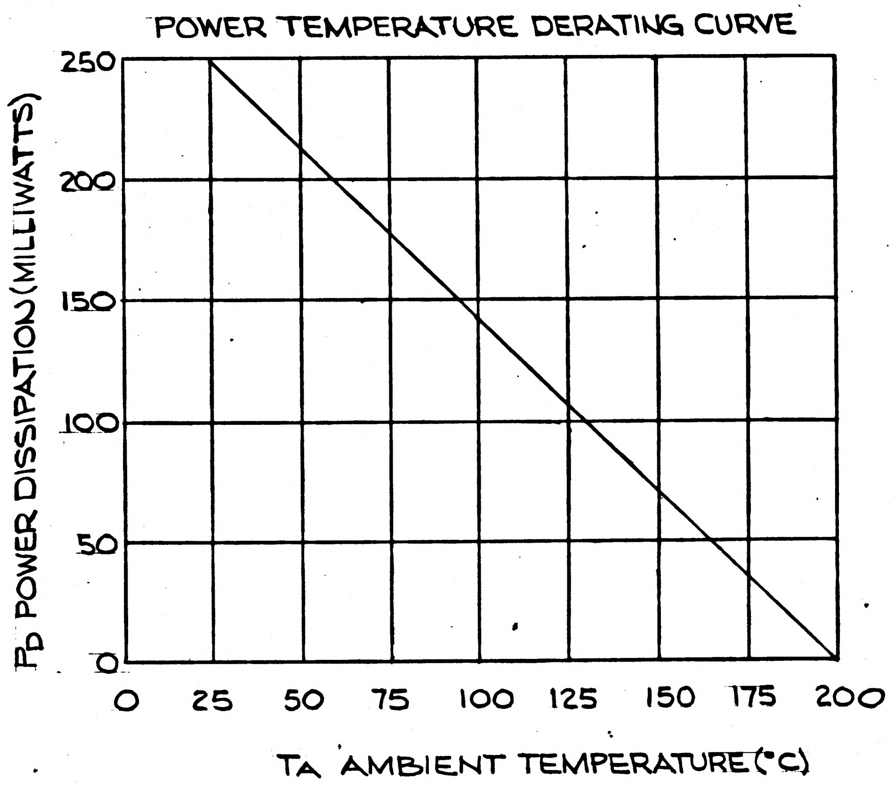


FIGURE III

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MATERIAL	DRAWN M.Menzoreli DATE 4-2-64 CHECKED S. Zaleski 6-6-64 APPROVAL D.A.Koso 5-26-64 APPROVAL	SEMICONDUCTOR DEVICE, DIODE (VOLTAGE REGULATOR, SILICON, AXIAL LEAD) SPECIFICATION CONTROL DWG	
HEAT TREATMENT	NASA APPROVAL	CODE IDENT NO. 80230	SIZE C
FINAL FINISH	MIT APPROVAL 5/26/64	NASA DRAWING NO. 1012056	SCALE / WT / SHEET 3 OF 3

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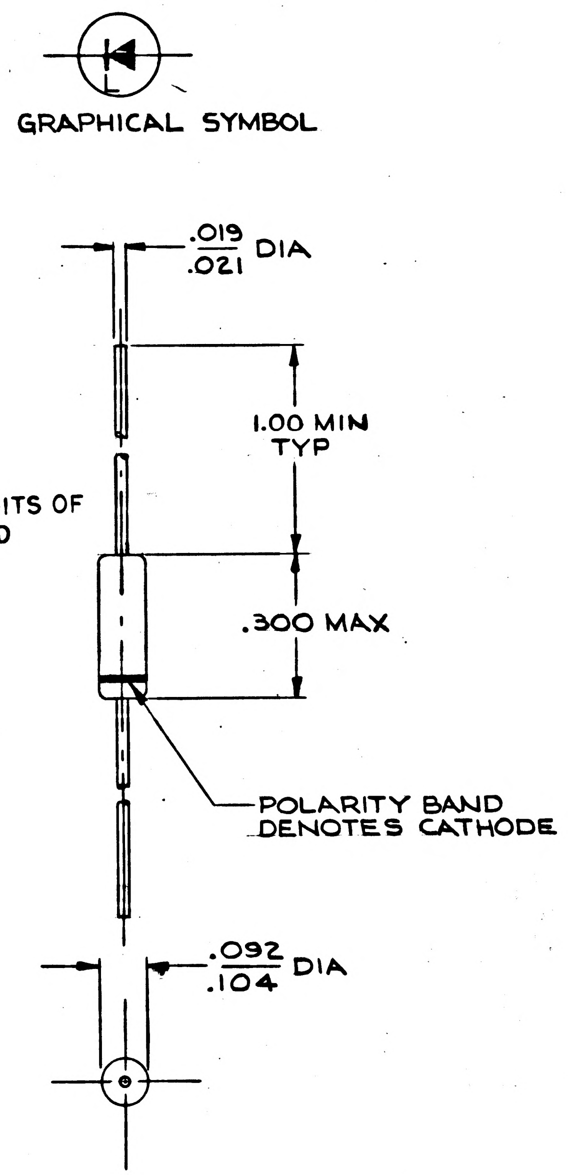
1012056 - B

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 08924	5/26/64	
A	REVISED PER TDRR 19242	5/26/65	WK
B	REVISED PER TDRR 19805	6/22/65	WK

Ⓜ

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIERS SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002054, LIFE TEST CONDITIONS SHALL BE THE SAME AS BURN IN CONDITIONS.
   - D. PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH ND 1002215 CLASS I CODE II
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - 1. DIMENSIONS AS SHOWN.
   - B. ELECTRICAL CHARACTERISTICS: PER TABLE I
     - 1. ZENER VOLTAGE (V_Z AT I_{ZT})
     - 2. ZENER IMPEDANCE (Z_{ZT})
     - 3. REVERSE CURRENT (I_R) AT 25°C
   - C. MARKING: THE MANUFACTURER'S TRADEMARK OR CODE; DATE CODE; LAST FOUR DIGITS OF NASA P/N AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED PER ND 1002019
   - D. VISUAL INSPECTION BY SUPPLIER PER ND 1002220
3. DESIGN REQUIREMENTS:
   - A. ELECTRICAL SPECIFICATIONS: PER TABLE I
   - B. MAXIMUM RATINGS: PER TABLE I
   - C. STORAGE TEMPERATURE: -65°C TO +200°C
   - D. SURGE CURRENT: 5 X I_{ZM} (TABLE I), 5 SURGES AT 1 MINUTE INTERVALS OF 8.3 M SEC DURATION SUPERIMPOSED ON I_{ZT}
   - E. POWER DISSIPATION: 250 MW MAX., DERATE 1.43 MW/°C ABOVE 25°C AMBIENT.
   - F. LEAD DATA: THE LEAD MATERIAL FOR THIS PART IS DUMET, PER ND 1015401, GOLD PLATED. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.



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SEMICONDUCTOR DEVICE, DIODE (VOLTAGE REGULATOR, SILICON, AXIAL LEAD) SPECIFICATION CONTROL DWG

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1012056
SCALE ~
WT
SHEET 1 OF 3

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1012056 B

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 08924	5/26/64	
A	REVISED PER TDRR 19242	3/26/65	wR
B	REVISED PER TDRR 19805	6/22/65	wR.

4. SPECIAL CONDITIONING: (BY SUPPLIER)

A. BURN-IN SHALL BE FOR A PERIOD OF 240 HOURS UNDER THE FOLLOWING CONDITIONS:

1. AMBIENT TEMPERATURE: SHALL BE +25° ± 10°C.
2. POWER DISSIPATION: SHALL BE 115 MILLIWATTS

B. PARAMETRIC STABILITY: DATA TAKEN AT 0, 120 AND 240 HOURS.

1. ACCEPTANCE LIMITS

(a) ZENER VOLTAGE: 1% OF INITIAL VALUE.

(b) DYNAMIC IMPEDANCE: 5% OF INITIAL VALUE OR 10 OHMS WHICH EVER IS GREATER.

C. THIS DATA SHALL BE RECORDED FOR EACH UNIT AND SUBMITTED WITH SHIPMENT IN ADDITION TO THE INSPECTION AND ACCEPTANCE DATA TO BE FURNISHED IN ACCORDANCE WITH ND 1015404.

TABLE I

ELECTRICAL CHARACTERISTICS
(AT 25°C AMBIENT TEMPERATURE UNLESS OTHERWISE SPECIFIED) V_F=1.0V MAX AT I_F=200 mA ON ALL TYPES AT I_{ZT}=250μAMPS

NASA DASH NUMBER	JEDEC TYPE NUMBER (REF. ONLY)	NOMINAL ZENER VOLTAGE V_Z (VOLTS)±5%	MAX. ZENER IMPEDANCE Z_{ZT} (NOTE 2) (OHMS)	MAX. REVERSE CURRENT I_R (μA)	TEST VOLTAGE V_R (VOLTS)	MAX. ZENER CURRENT I_{ZM} (mA)
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11	IN4109	15	100	.05	11.40	16.3
12	IN4110	16	100	.05	12.15	15.4
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14	IN4112	18	100	.05	13.67	13.2
15	IN4113	19	150	.05	14.44	12.5
16	IN4114	20	150	.01	15.20	11.9
17	IN4115	22	150	.01	16.72	10.8
18	IN4116	24	150	.01	18.25	9.9
19	IN4117	25	150	.01	19.00	9.5
20	IN4118	27	150	.01	20.46	8.8
21	IN4119	28	200	.01	21.28	8.5
22	IN4120	30	200	.01	22.80	7.9
23	IN4121	33	200	.01	25.08	7.2
24	IN4122	36	200	.01	27.38	6.6
25	IN4123	39	200	.01	29.65	6.1
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27	IN4125	47	250	.01	35.75	5.1
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29	IN4127	56	300	.01	42.60	4.2
30	IN4128	60	400	.01	45.60	4.0
31	IN4129	62	500	.01	47.10	3.8
32	IN4130	68	700	.01	51.68	3.5
33	IN4131	75	700	.01	57.00	3.1
34	IN4132	82	800	.01	62.32	2.9
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36	IN4134	91	1200	.01	69.16	2.6
37	IN4135	100	1500	.01	76.00	2.3

MAX. NOISE DENSITY AT I_{ZT}=250μA N_D (FIG 1) = 40 (MICRO VOLTS PER SQUARE ROOT CYCLE)

NOTES FOR TABLE I:

1. ALL SPECIFICATIONS (EXCEPT FORWARD VOLTAGE DROP) ARE BASED ON A DC CURRENT FLOW THRU THE DIODE IN SUCH A DIRECTION THAT THE CATHODE IS POSITIVE WITH RESPECT TO THE ANODE.

2. ZENER IMPEDANCE IS MEASURED BY SUPERIMPOSING A 60 CYCLE AC CURRENT ON THE DC TEST CURRENT. THE MAGNITUDE OF THE AC CURRENT SHALL BE 10% OF THE DC LEVEL.

$$\left(Z_Z = \frac{E(AC)}{I(AC)}\right)$$

3. VOLTAGE REGULATION IS DETERMINED BY NOTING THE VALUE OF BREAKDOWN VOLTAGE AT 10% I_{ZM}, THEN INCREASING CURRENT TO 50% I_{ZM} AND NOTING VALUE OF BREADOWN VOLTAGE AFTER 90 SECONDS (MINIMUM). THE DIFFERENCE IN MEASURED VOLTAGE IS ΔV_Z. DURING THIS TEST THE DIODE SHALL BE SUSPENDED BY ITS LEADS A MINIMUM OF 1/2 INCH FROM THE BODY OF THE DIODE IN A STILL AIR AMBIENT OF 25°C.

REFERENCE											
KIC DASH NO.	NASA DASH NO.	KIC DASH NO.	NASA DASH NO.	KIC DASH NO.	NASA DASH NO.	KIC DASH NO.	NASA DASH NO.	KIC DASH NO.	NASA DASH NO.	KIC DASH NO.	NASA DASH NO.
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9602	2	9608	8	9614	14	9620	20	9626	26	9632	32
9603	3	9609	9	9615	15	9621	21	9627	27	9633	33
9604	4	9610	10	9616	16	9622	22	9628	28	9634	34
9605	5	9611	11	9617	17	9623	23	9629	29	9635	35
9606	6	9612	12	9618	18	9624	24	9630	30	9636 9637	36 37

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K.I.C. NO. 68415009601 THRU 9637

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MIT APPROVAL J Hazel 5/26/64

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HOUSTON, TEXAS

SEMICONDUCTOR DEVICE, DIODE (VOLTAGE REGULATOR, SILICON, AXIAL LEAD)
SPECIFICATION CONTROL DWG

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1012056
SCALE ~
WT
SHEET 2 OF 3

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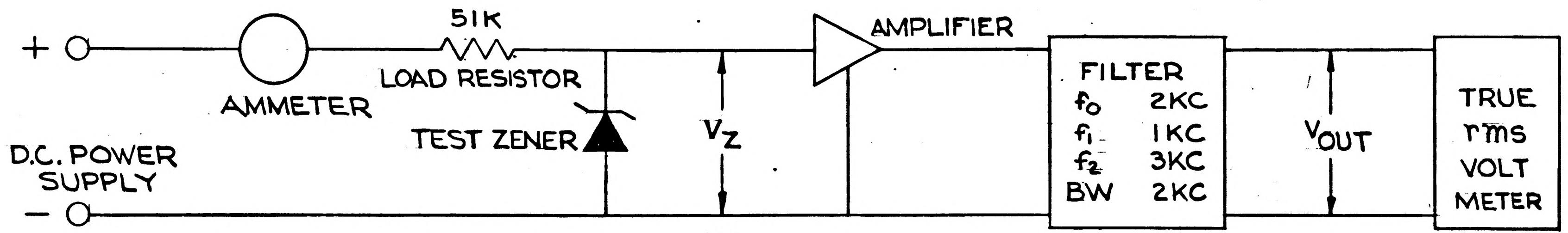
1012056 B

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 08924	5/26/64	
A	REVISED PER TDRR 19242	5/26/65	WK
B	REVISED PER TDRR 19805	6/22/65	WK.

NOISE DENSITY MEASUREMENT METHOD



$$\text{NOISE DENSITY (VOLTS PER SQUARE ROOT CYCLE)} = \frac{V_{OUT}}{\text{OVERALL GAIN } \sqrt{BW}}$$

WHERE: BW = FILTER BANDWIDTH (CYCLES)

V_{OUT} = OUTPUT NOISE (VOLTS RMS)

FIGURE I

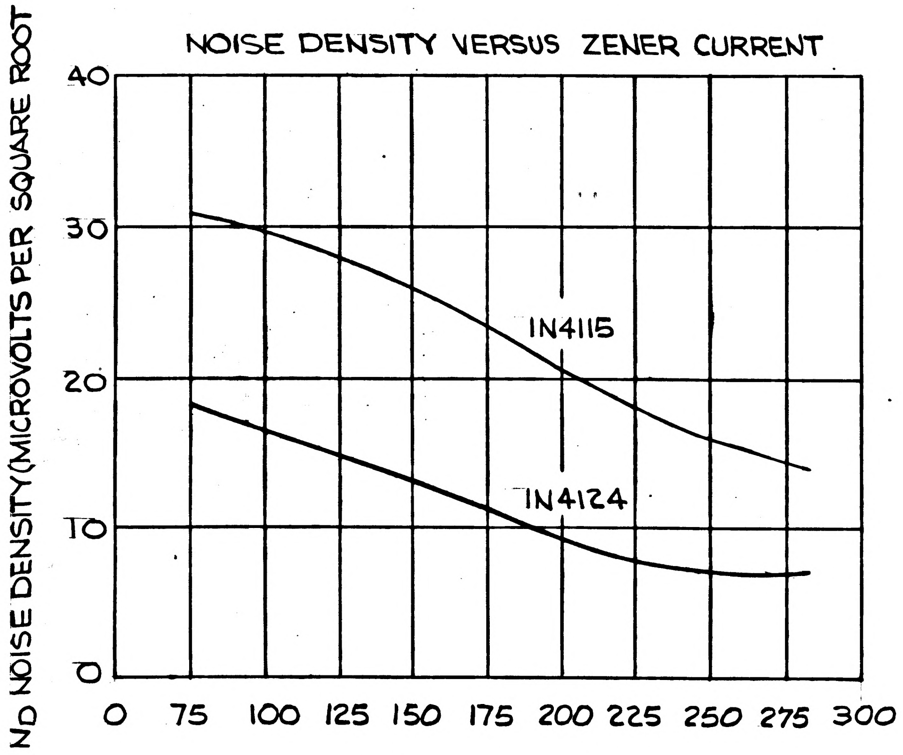

NOISE DENSITY VERSUS ZENER CURRENT

FIGURE II

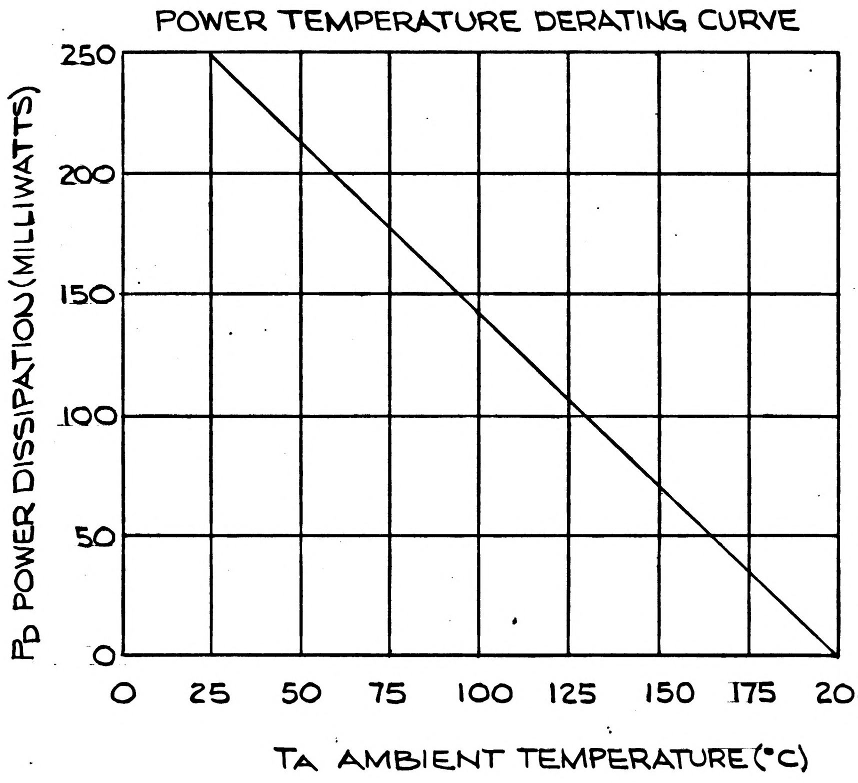

POWER TEMPERATURE DERATING CURVE

FIGURE III

K.I.C. NO. 68415009601 THRU 9637	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DWG. NO. CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
MATERIAL	DRAWN M.MENZORI DATE 4-2-64 CHECKED S. Zaleshuk 4-6-64 APPROVAL D.G.Kosso 5-26-64 APPROVAL	SEMICONDUCTOR DEVICE, DIODE (VOLTAGE REGULATOR, SILICON, AXIAL LEAD) SPECIFICATION CONTROL DWG
HEAT TREATMENT	NASA APPROVAL	CODE IDENT NO. 80230 SIZE C NASA DRAWING NO. 1012056
FINAL FINISH	MIT APPROVAL Walsh 5/26/64	SCALE WT SHEET 3 OF 3

MASTER

—	1012056

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 08924	5/26/67	

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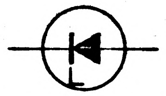
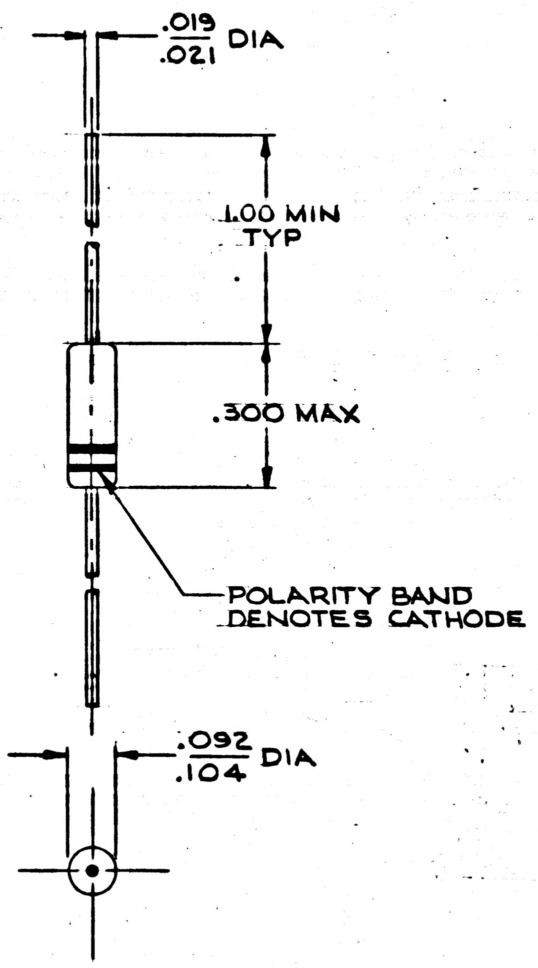
REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIERS SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002054, LIFE TEST CONDITIONS SHALL BE THE SAME AS BURN IN CONDITIONS.
   - D. PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH ND 1002129.
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - 1. DIMENSIONS AS SHOWN.
   - B. ELECTRICAL CHARACTERISTICS: PER TABLE I
     - 1. ZENER VOLTAGE (V_Z AT I_{ZT})
     - 2. ZENER IMPEDANCE (Z_{ZT})
     - 3. REVERSE CURRENT (I_R) AT 25°C
   - C. MARKING: THE MANUFACTURER'S NAME, TRADEMARK OR CODE; MANUFACTURER'S TYPE DESIGNATION; DATE CODE; NASA P/N AND REV LETTER AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED PER ND 1002019.
3. DESIGN REQUIREMENTS:
   - A. ELECTRICAL SPECIFICATIONS: PER TABLE I
   - B. MAXIMUM RATINGS: PER TABLE I
   - C. STORAGE TEMPERATURE: −65°C TO +200°C
   - D. SURGE CURRENT: 5 X I_{ZM} (TABLE I), 5 SURGES AT 1 MINUTE INTERVALS OF 8.3 M SEC DURATION SUPERIMPOSED ON I_{ZT}
   - E. POWER DISSIPATION: 250 MW MAX., DERATE 1.43 MW/°C ABOVE 25°C AMBIENT.
   - F. LEAD DATA: THE LEAD MATERIAL FOR THIS PART IS DUMET, PER ND 1015401, GOLD PLATED. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.



GRAPHICAL SYMBOL



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

MASTER

K.I.C. NO. 68415009601 THRU 9637	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
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APPLICATION	

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MATERIAL	DRAWN M. MENZORIO DATE 4-2-64 CHECKED S. Z 4-6-64 APPROVAL D Akosso 5-26-64 APPROVAL	SEMICONDUCTOR DEVICE, DIODE(VOLTAGE REGULATOR, SILICON, AXIAL LEAD) SPECIFICATION CONTROL DWG
HEAT TREATMENT	NASA APPROVAL	CODE IDENT NO. SIZE C NASA DRAWING NO. 1012056
FINAL FINISH	MIT APPROVAL 5/26/67	SCALE ~ WT SHEET 1 OF 3

INCHES 0 1 2 PHOTOGRAPHIC SCALE ONLY

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—	1012056

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 08924	5/26/67	

4. SPECIAL CONDITIONING: (BY SUPPLIER)

   A. BURN-IN SHALL BE FOR A PERIOD OF 240 HOURS UNDER THE FOLLOWING CONDITIONS:

      1. AMBIENT TEMPERATURE: SHALL BE +25° ± 10°C.
      2. POWER DISSIPATION: SHALL BE SUFFICIENT TO RAISE THE ABSOLUTE JUNCTION TEMPERATURE TO 105°C.

   B. PARAMETRIC STABILITY: DATA TAKEN AT 0, 120 AND 240 HOURS.

      1. ACCEPTANCE LIMITS

         (a) ZENER VOLTAGE: 1% OF INITIAL VALUE.
         (b) DYNAMIC IMPEDANCE: 5% OF INITIAL VALUE.

   C. THIS DATA SHALL BE RECORDED FOR EACH UNIT AND SUBMITTED WITH SHIPMENT IN ADDITION TO THE INSPECTION AND ACCEPTANCE DATA TO BE FURNISHED IN ACCORDANCE WITH ND 1015404.

TABLE I

ELECTRICAL CHARACTERISTICS
(AT 25°C AMBIENT TEMPERATURE UNLESS OTHERWISE SPECIFIED) V_F=1.0V MAX AT I_F=200 mA ON ALL TYPES AT I_{ZT}=250μAMPS

NASA DASH NUMBER	JEDEC TYPE NUMBER (REF. ONLY)	NOMINAL ZENER VOLTAGE V_Z (VOLTS)±5%	MAX. ZENER IMPEDANCE Z_{ZT} (NOTE 2) (OHMS)	MAX. REVERSE CURRENT I_R (μA)	TEST VOLTAGE V_R (VOLTS)	MAX. ZENER CURRENT I_{ZM} (mA)
1	IN4099	6.8	200	10	5.17	35.0
2	IN4100	7.5	200	10	5.70	31.8
3	IN4101	8.2	200	1.0	6.24	29.0
4	IN4102	8.7	200	1.0	6.61	27.4
5	IN4103	9.1	200	1.0	6.92	26.2
6	IN4104	10	200	1.0	7.60	24.8
7	IN4105	11	200	.05	8.44	21.6
8	IN4106	12	200	.05	9.12	20.4
9	IN4107	13	200	.05	9.87	19.0
10	IN4108	14	200	.05	10.65	17.5
11	IN4109	15	100	.05	11.40	16.3
12	IN4110	16	100	.05	12.15	15.4
13	IN4111	17	100	.05	12.92	14.5
14	IN4112	18	100	.05	13.67	13.2
15	IN4113	19	150	.05	14.44	12.5
16	IN4114	20	150	.01	15.20	11.9
17	IN4115	22	150	.01	16.72	10.8
18	IN4116	24	150	.01	18.25	9.9
19	IN4117	25	150	.01	19.00	9.5
20	IN4118	27	150	.01	20.46	8.8
21	IN4119	28	200	.01	21.28	8.5
22	IN4120	30	200	.01	22.80	7.9
23	IN4121	33	200	.01	25.08	7.2
24	IN4122	36	200	.01	27.38	6.6
25	IN4123	39	200	.01	29.65	6.1
26	IN4124	43	250	.01	32.65	5.5
27	IN4125	47	250	.01	35.75	5.1
28	IN4126	51	300	.01	38.76	4.6
29	IN4127	56	300	.01	42.60	4.2
30	IN4128	60	400	.01	45.60	4.0
31	IN4129	62	500	.01	47.10	3.8
32	IN4130	68	700	.01	51.68	3.5
33	IN4131	75	700	.01	57.00	3.1
34	IN4132	82	800	.01	62.32	2.9
35	IN4133	87	1000	.01	66.12	2.7
36	IN4134	91	1200	.01	69.16	2.6
37	IN4135	100	1500	.01	76.00	2.3

MAX. NOISE DENSITY AT I_{ZT}=250μA N_D (FIG 1) = 40 (MICRO VOLTS PER SQUARE ROOT CYCLE)

NOTES FOR TABLE I:

1. ALL SPECIFICATIONS (EXCEPT FORWARD VOLTAGE DROP) ARE BASED ON A DC CURRENT FLOW THRU THE DIODE IN SUCH A DIRECTION THAT THE CATHODE IS POSITIVE WITH RESPECT TO THE ANODE.

2. ZENER IMPEDANCE IS MEASURED BY SUPERIMPOSING A 60 CYCLE AC CURRENT ON THE DC TEST CURRENT. THE MAGNITUDE OF THE AC CURRENT SHALL BE 10% OF THE DC LEVEL.

$$\left(Z_Z = \frac{E(AC)}{I(AC)}\right)$$

3. VOLTAGE REGULATION IS DETERMINED BY NOTING THE VALUE OF BREAKDOWN VOLTAGE AT 10% I_{ZM}, THEN INCREASING CURRENT TO 50% I_{ZM} AND NOTING VALUE OF BREADOWN VOLTAGE AFTER 90 SECONDS (MINIMUM). THE DIFFERENCE IN MEASURED VOLTAGE IS ΔV_Z. DURING THIS TEST THE DIODE SHALL BE SUSPENDED BY ITS LEADS A MINIMUM OF 1/2 INCH FROM THE BODY OF THE DIODE IN A STILL AIR AMBIENT OF 25°C.

REFERENCE											
KIC DASH NO.	NASA DASH NO.	KIC DASH NO.	NASA DASH NO.	KIC DASH NO.	NASA DASH NO.	KIC DASH NO.	NASA DASH NO.	KIC DASH NO.	NASA DASH NO.	KIC DASH NO.	NASA DASH NO.
9601	1	9607	7	9613	13	9619	19	9625	25	9631	31
9602	2	9608	8	9614	14	9620	20	9626	26	9632	32
9603	3	9609	9	9615	15	9621	21	9627	27	9633	33
9604	4	9610	10	9616	16	9622	22	9628	28	9634	34
9605	5	9611	11	9617	17	9623	23	9629	29	9635	35
9606	6	9612	12	9618	18	9624	24	9630	30	9636 9637	36 37

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K.I.C. NO. 68415009601 THRU 9637

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DECIMALS ± —
ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT
DRAWN N. Nenzorio DATE 4-2-64
CHECKED S. Zakolski 4-6-64
APPROVAL D. A. Koso 5-26-64
APPROVAL
NASA APPROVAL
MIT APPROVAL 5/26/67

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SEMICONDUCTOR DEVICE, DIODE (VOLTAGE REGULATOR, SILICON, AXIAL LEAD)
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SHEET 2 OF 3

INCHES
0 1 2
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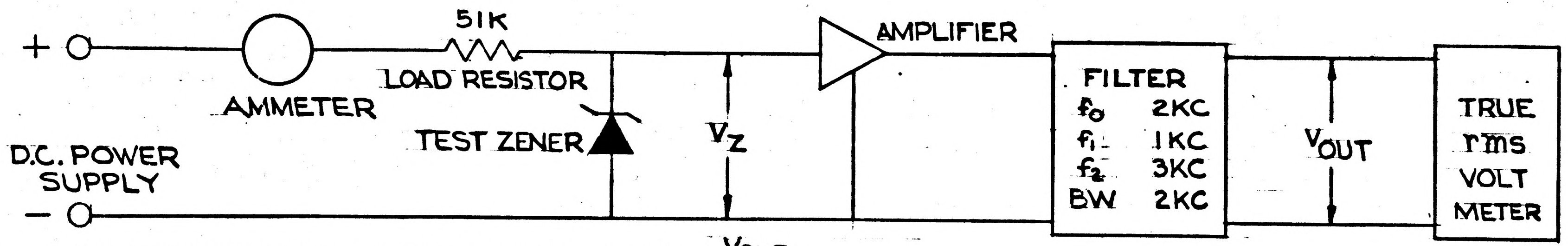
NOISE DENSITY MEASUREMENT METHOD



$$\text{NOISE DENSITY (VOLTS PER SQUARE ROOT CYCLE)} = \frac{V_{OUT}}{\text{OVERALL GAIN}\ \sqrt{BW}}$$

WHERE: BW = FILTER BANDWIDTH (CYCLES)

V_{OUT} = OUTPUT NOISE (VOLTS RMS)

FIGURE I

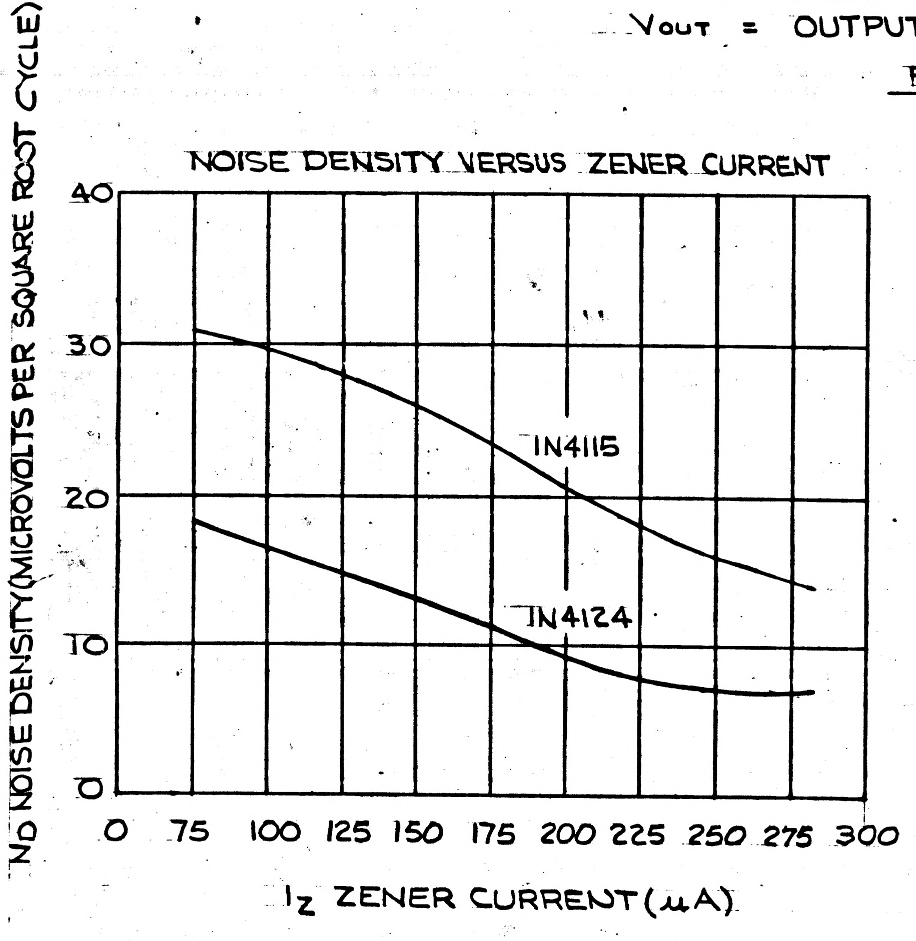


FIGURE II

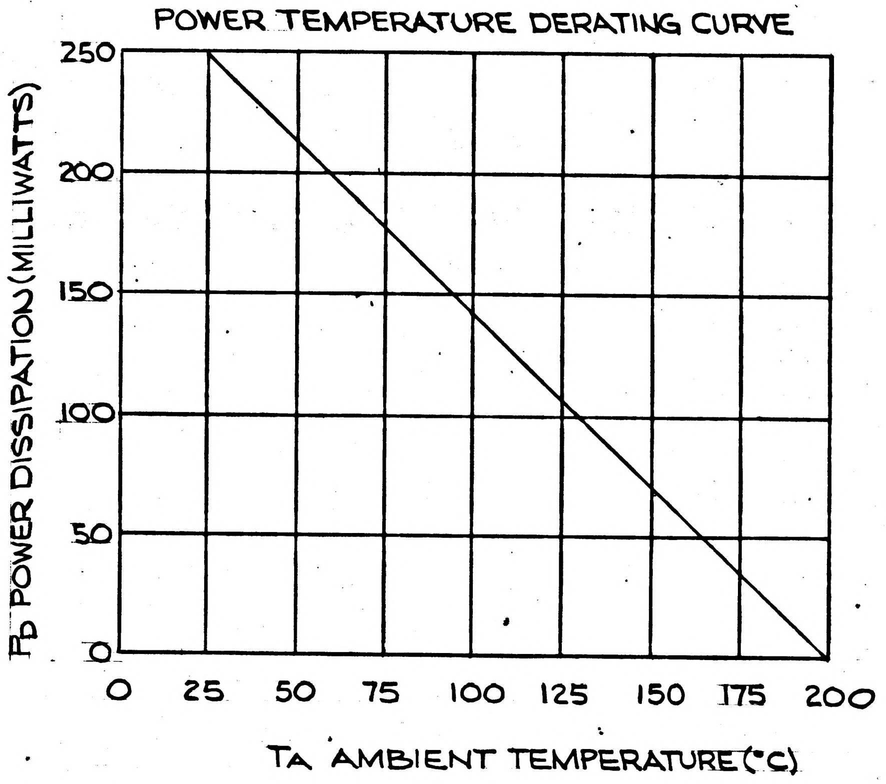


FIGURE III

K.I.C. NO. 68415009601 THRU 9637

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LIST OF MATERIALS

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TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
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DWG. NO. CONTRACT
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CHECKED S. Zalesluk 4-6-64
APPROVAL D.A.Koso 5-26-64
APPROVAL
NASA APPROVAL
MIT APPROVAL 5/26/64

MANNED SPACECRAFT CENTER
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SHEET 3 OF 3

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1012065 A

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR # 12675				
A		REVISED PER TDRR 14359			[illegible]/67	[illegible]

REVISIONS 12675

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS I.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL REQUIREMENTS SPECIFIED IN PROCUREMENT SPECIFICATION PS1012065.
   - D. UNIT SHALL BE SHIPPED MOUNTED ON A FIXTURE WHICH PREVENTS ROTOR (INNER MEMBER) FROM CONTACTING STATOR (OUTER MEMBER). PACKAGING SHALL BE PER ND1002215 CLASS II CODE I
2. INSPECTION AND ACCEPTANCE
   - A. UNIT SHALL BE CAPABLE OF MEETING INSPECTION AND ACCEPTANCE REQUIREMENTS OF PS 1012065.
   - B. MECHANICAL
     1. DIMENSIONS AS SHOWN
     2. ALL MECHANICAL DIMENSIONS APPLY WHEN DISTANCE BETWEEN SURFACES X AND Y EQUALS .045. UNITS MUST MEET ALL OTHER REQUIREMENTS WHEN DISTANCE BETWEEN X AND Y IS VARIED TO ANY FIXED POSITION BETWEEN .038 AND .0[illegible]
     3. NO PORTION OF UNIT, INCLUDING FASTENERS AND WIRES, SHALL PROJECT BEYOND SPECIFIED RADIUS
     4. NO PORTION OF ROTOR SHALL PROJECT BEYOND SURFACE Z MORE THAN .010
     5. INTERNAL WIRING SHALL BE ARRANGED TO ALLOW ROTOR MECHANICAL ROTATION 82° MIN IN A CLOCKWISE DIRECTION AND 43° MIN IN A COUNTER-CLOCKWISE DIRECTION FROM POSITION SHOWN WHEN VIEWED FROM SIDE WITH INDEX MARKS.
     6. MARK REFERENCE DESIGNATIONS ON RESOLVER AND CONNECTORS, .12±.02 HIGH, PER ND 1002019.
     7. EXTERNAL WIRES PER MIL-W-16878, TYPE AND SIZE E-28, COLOR CODED IN ACCORDANCE WITH FIGURES I, II, AND III.
     8. TWIST EXTERNAL WIRES, PER WIRING LEGEND, IN ACCORDANCE WITH ND 1002032.
     9. LACE EXTERNAL WIRES PER ND 1002032
     10. POT CONNECTORS IN ACCORDANCE WITH ND1002236
         - a. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION
         - b. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
     11. IDENTIFY USING NASA DRAWING NUMBER, REV LETTER AND MANUFACTURERS SYMBOL PER ND1002019 AND SERIAL NUMBER PER ND 1002023.
   - C. ELECTRICAL
     1. WHEN RESOLVER ASSEMBLY IS AT ELECTRICAL ZERO, THE TWO INDEX MARKS SHALL BE ALIGNED WITHIN 2°
     2. FOR ALL RESOLVERS, A POSITIVE ANGLE "A" OCCURS WHEN THE INNER MEMBER IS ROTATED CCW FROM ELECTRICAL ZERO WHEN VIEWED IN THE DIRECTION OF THE ORIENTATION ARROW.
     3. WITH VOLTAGES DEFINED BY FIGURE I, THE 64-SPEED RESOLVER, B1, SHALL SATISFY THE FOLLOWING EQUATIONS:

        $E_{S3} = K_1 (E_{P3} \cos 64A - E_{P4} \sin 64A)$

        $E_{S4} = K_1 (E_{P3} \sin 64A + E_{P4} \cos 64A)$

        INNER MEMBER IS PRIMARY.
     4. WITH VOLTAGES DEFINED BY FIGURE II, THE TWO-SPEED RESOLVER, B2, SHALL SATISFY THE FOLLOWING EQUATION:

        $E_{S4} = K_2 (E_{P4} \cos 2A - E_{P3} \sin 2A)$

        INCLUSION OF SECOND SECONDARY PHASE (S1-S3) OPTIONAL. IF INCLUDED, LEADS SHALL BE TERMINATED INTERNALLY OPEN CIRCUIT. OUTER MEMBER IS PRIMARY.
     5. WITH VOLTAGES DEFINED BY FIGURE III, THE ONE-SPEED RESOLVER, B3, SHALL SATISFY THE FOLLOWING EQUATIONS:

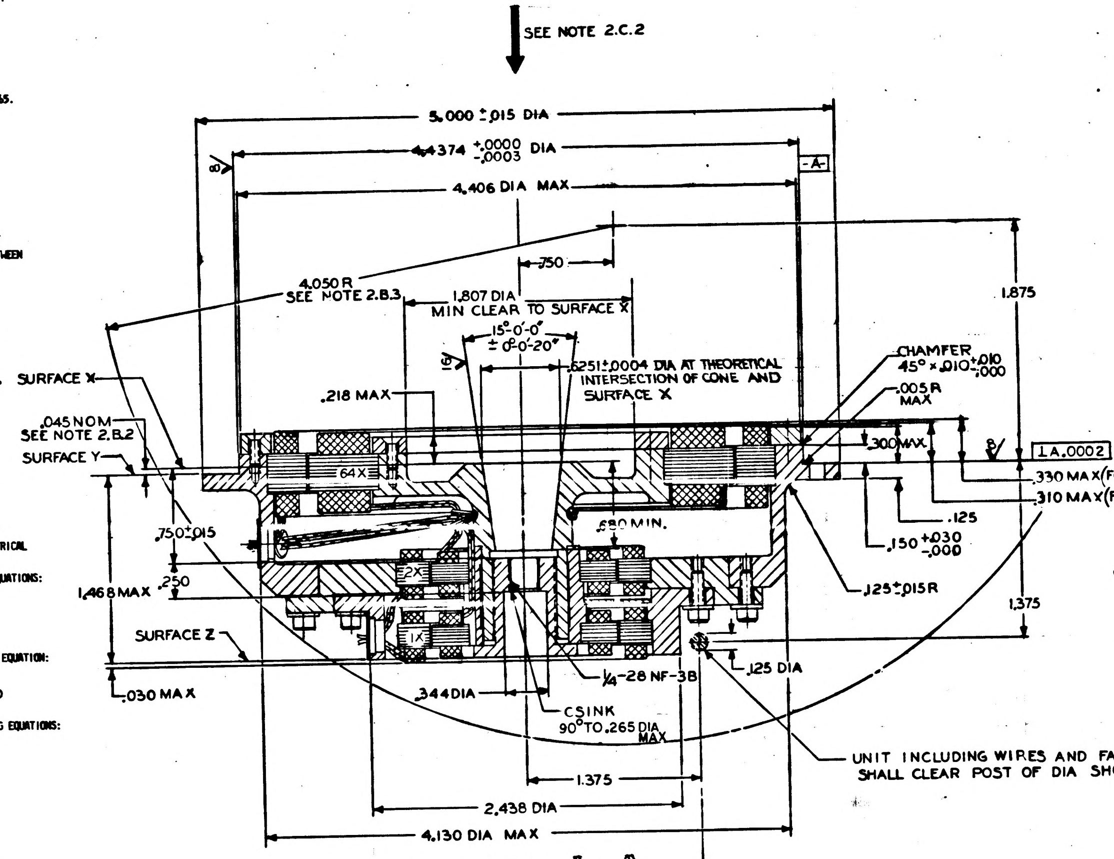
        $E_{S3} = K_3 E_{P3} \cos A$

        $E_{S4} = K_3 E_{P3} \sin A$

        INNER MEMBER IS PRIMARY.
3. DESIGN
   - A. UNIT SHALL MEET THE DESIGN REQUIREMENTS SPECIFIED IN PS1012065
   - B. MECHANICAL
     1. UNIT SHALL MEET ALL OPERATIONAL REQUIREMENTS WHEN ROTOR IS MOUNTED ON A TAPERED SHAFT WHICH MAY HAVE UP TO .0001 T.I.R. RUNOUT WHEN RUN ON ITS BEARINGS, AND 4.4374 DIAMETER OF STATOR IS MOUNTED IN A 4.4375 $^{+.0003}_{-.000[illegible]}$ DIAMETER HOLE WHICH MAY BE ECCENTRIC TO ITS BEARING BORE BY .0002 T.I.R.
     2. ROTOR HUBS AND STATOR HOUSINGS SHALL BE BERYLLIUM PER ND1002125 HEAT TREATED PER ND 1002114. FASTENERS AND THREADED ROTOR LOCKING NUT SHALL BE CORROSION-RESISTANT STEEL - 300 SERIES (NON-MAGNETIC)
     3. ROTOR LOCKING NUT SHALL BE BONDED TO ROTOR HUB PER ND 1002211
     4. WIRES SHALL BE GROUPED AS INDICATED AND PASS THROUGH HOUSING AT APPROXIMATE LOCATIONS SHOWN. ONLY ONE WIRE SHALL PASS THROUGH EACH HOLE IN GROMMET OR EQUIVALENT. FIT OF WIRE IN GROMMET AND GROMMET IN HOUSING SHALL PROVIDE A CASUAL SEAL. WIRES SHALL NOT INTERFERE WITH ASSEMBLING AND TIGHTENING OF SCREWS IN MOUNTING SLOTS.
     5. SUITABLE STRAIN RELIEF SHALL BE PROVIDED FOR WIRES AT INNER SIDE OF GROMMETS
     6. EACH SOLDER JOINT, AT CONNECTORS, SHALL BE PROTECTED WITH INSULATION SLEEVING 1010490.
     7. TOTAL WEIGHT OF UNIT SHALL NOT EXCEED 2 LBS.
     8. VIBRATION PROOF ALL SCREWS PER ND1002211 OR BY USE OF SELF-LOCKING SCREWS
   - C. ELECTRICAL
     1. SOLDER CONDUCTORS TO CONNECTORS, PER WIRING LEGEND, IN ACCORDANCE WITH ND1002071.
4. SPECIAL CONDITIONING
   - A. PRIOR TO INSPECTION AND ACCEPTANCE TESTS, UNIT SHALL BE TEMPERATURE CYCLED TWICE IN THE FOLLOWING MANNER:

ROOM TEMPERATURE TO +93°C ±3°C	3 HOURS
93°C ±3°C	4 HOURS
93°C ±3°C TO ROOM TEMPERATURE	3 HOURS
ROOM TEMPERATURE	4 HOURS
ROOM TEMPERATURE TO -50°C ±5°C	3 HOURS
-50°C ±5°C	4 HOURS
-50°C ±5°C TO ROOM TEMPERATURE	3 HOURS
ROOM TEMPERATURE	[illegible] HOURS

PROCURE ONLY FROM APPROVED SOURCE OF SUPPLY LISTED ON ND 1002034 FOR THIS DRAWING



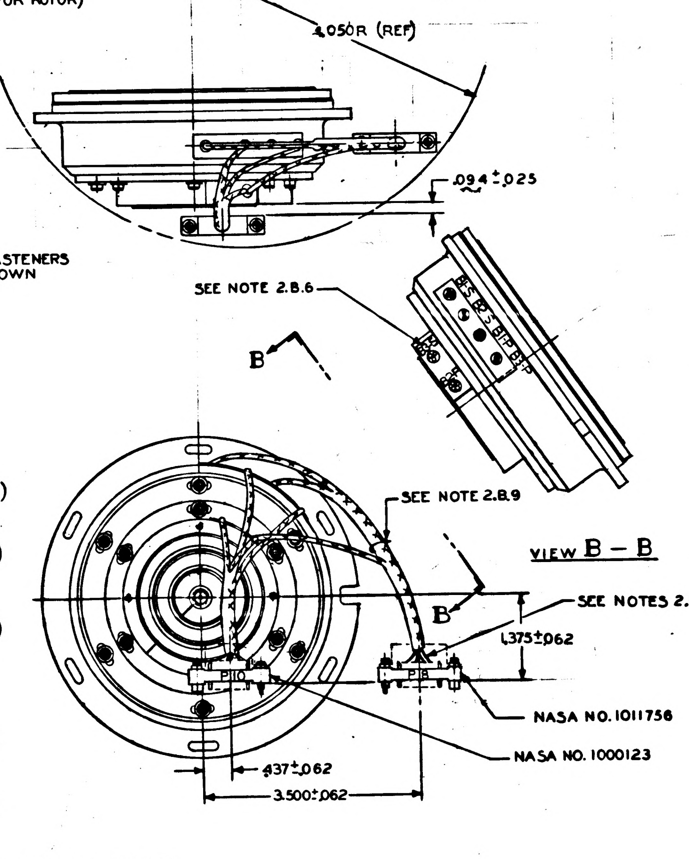
SEE NOTE 2.C.2
5.000 ±.015 DIA
4.4374 +.0000 -.0003 DIA
-A-
4.406 DIA MAX
.750
4.050 R SEE NOTE 2.B.3
1.807 DIA MIN CLEAR TO SURFACE X
15°-0'-0" ±0°-0'-20"
.6251±.0004 DIA AT THEORETICAL INTERSECTION OF CONE AND SURFACE X
CHAMFER 45° × .010 +.010 -.000
.005 R MAX
1.875
SURFACE X
.218 MAX
.045 NOM SEE NOTE 2.B.2
SURFACE Y
.300 MAX
A .0002
.330 MAX (FOR STATOR)
.310 MAX (FOR ROTOR)
64X
.125
.150 +.030 -.000
.750±.015
.250 MIN.
2X
1.468 MAX
.250
.125±.015R
1.375
SURFACE Z
1X
.030 MAX
.344 DIA
1/4-28 NF-3B
.125 DIA
CSINK 90° TO .265 DIA MAX
UNIT INCLUDING WIRES AND FASTENERS SHALL CLEAR POST OF DIA SHOWN
1.375
2.438 DIA
4.130 DIA MAX

SECTION A-A
SCALE 2/1

WIRING LEGEND

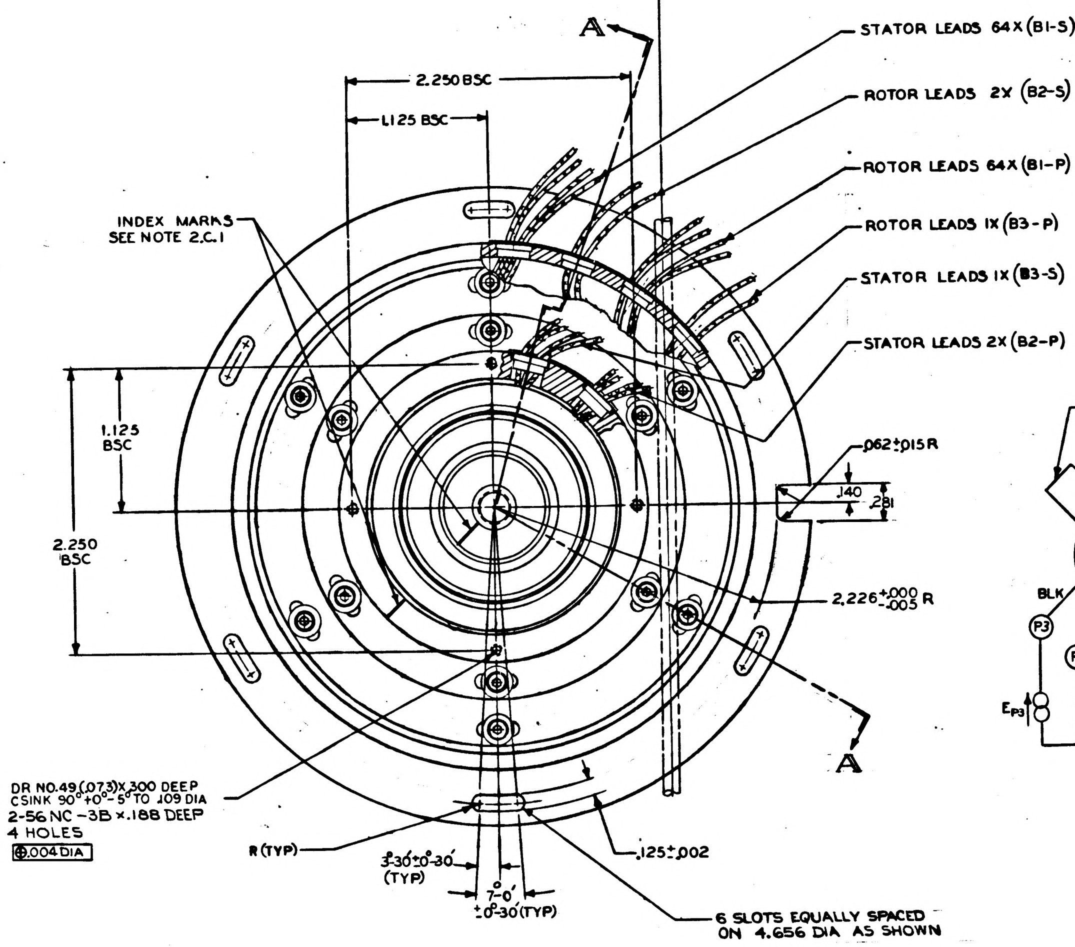
** COND NO.	COLOR	FROM	TO	SEE NOTE
D1	YELLOW-WHITE	B1 — P2	P8 — D	8
D2	BLUE- WHITE	B1 — P4	P8 — H	
D3	BLACK-WHITE	B1 — P3	P8 — L	8
D4	RED - WHITE	B1 — P1	P8 — P	
D5	BLUE- WHITE	B1 — S4	P8 — Z	8
D6	YELLOW-WHITE	B1 — S2	P8 — c	
D7	RED - WHITE	B1 — S1	P8 — b	8
D8	BLACK-WHITE	B1 — S3	P8 — [illegible]	
D9	WHITE	B2 — P3	P8 — V	8
D10	ORANGE	B2 — P1	P8 — Y	
D11	GREEN	B2 — S4	P10 — A	8
D12	BROWN	B2 — S2	P10 — D	
D13	BROWN	B2 — P2	P10 — H	8
D14	GREEN	B2 — P4	P10 — L	
D15	BLACK	B3 — S3	P10 — W	8
D16	RED	B3 — S1	P10 — Z	
D17	YELLOW	B3 — S2	P10 — Y	8
D18	BLUE	B3 — S4	P10 — b	
D19	RED	B3 — P1	P10 — C	8
D20	BLACK	B3 — P3	P10 — F	

** CONDUCTORS NUMBERS FOR REFERENCE ONLY WIRES SHALL NOT BE MARKED

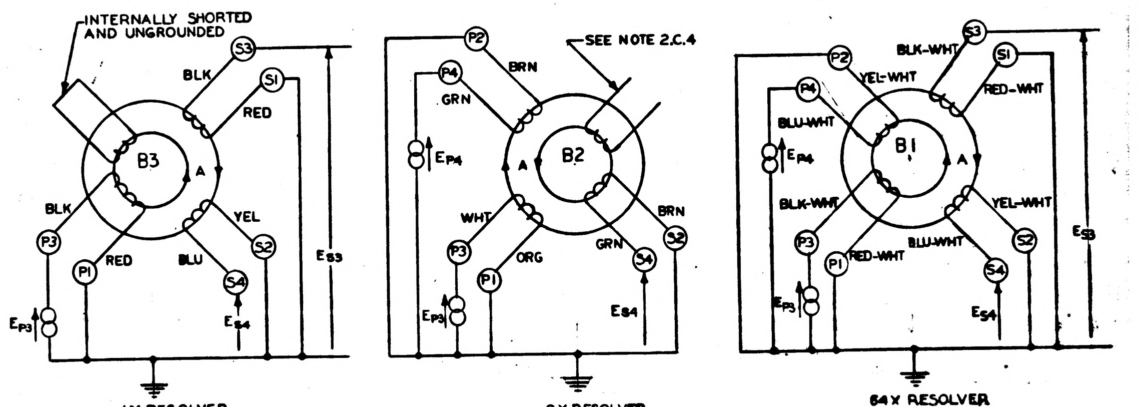


4.050R (REF)
.094±.025
SEE NOTE 2.B.6
B
SEE NOTE 2.B.9
SEE NOTES 2.B.10 AND 3.B.6
B
.375±.062
P10
P8
NASA NO. 1011756
NASA NO. 1000123
.437±.062
3.500±.062

VIEW B - B



A
STATOR LEADS 64X (B1-S)
ROTOR LEADS 2X (B2-S)
ROTOR LEADS 64X (B1-P)
ROTOR LEADS 1X (B3-P)
STATOR LEADS 1X (B3-S)
STATOR LEADS 2X (B2-P)
2.250 BSC
1.125 BSC
INDEX MARKS SEE NOTE 2.C.1
1.125 BSC
2.250 BSC
.062±.015R
.140
.281
2.226 +.000 -.005 R
A
DR NO.49 (.073) X .300 DEEP CSINK 90° +0° -5° TO .109 DIA 2-56 NC-3B × .188 DEEP 4 HOLES
⊕ .004 DIA
R (TYP)
3°30'±0°30' (TYP)
7°-0' ±0°30' (TYP)
.125±.002
6 SLOTS EQUALLY SPACED ON 4.656 DIA AS SHOWN



INTERNALLY SHORTED AND UNGROUNDED
S3
BLK
S1
RED
B3
A
BLK
YEL
P3
P1
RED
BLU
S2
S4
EP3
ES3
ES4
P2
BRN
GRN
SEE NOTE 2.C.4
EP4
B2
A
WHT
BRN
P3
ORG
GRN
S2
P1
S4
EP3
ES4
S3
BLK-WHT
S1
P2
YEL-WHT
P4
RED-WHT
BLU-WHT
EP4
B1
A
BLK-WHT
YEL-WHT
P3
P1
RED-WHT
BLU-WHT
S2
S4
EP3
ES3
ES4

1X RESOLVER FIGURE III

2X RESOLVER FIGURE II

64X RESOLVER FIGURE I

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
2011890	2011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± 1°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN E. DRAPALA [illegible]
CHECKED T. SULLIVAN 9-17-64
APPROVED [illegible] 9-17-64
APPROVED R. J. [illegible] 9-17-64
APPROVED MIT [illegible]
APPROVED MSC [illegible]
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESOLVER ASSEMBLY
1 SPEED, 2 SPEED AND 64 SPEED
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE E
DRAWING NO. 1012065
SCALE 1/1 & 2/1
SHEET 1 OF

APOLLO G&N Specification
PS 1012065 A

Original Issue Date: 17 Sept 1964
Release Authority: TDRR 12656
Class A Release

PROCUREMENT SPECIFICATION
FOR
RESOLVER ASSEMBLY, ONE, TWO AND SIXTY-FOUR SPEED

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
9/29/64	A	13103	9, 10	10/1/64	WJR

This specification consists of page i
and 1 to 15 inclusive.

APPROVALS	NASA/MSC	CCB 9/17/64	Dep. Asst. Div	D. A. Koso Asst. Dir MIT/IL	MIT STAFF	E. P. Armstrong Engr. Specialist

PROCUREMENT SPECIFICATION

RESOLVER ASSEMBLY, ONE, TWO AND SIXTY-FOUR SPEED

1. SCOPE

1.1 This specification establishes the requirements for the procurement of the One, Two and Sixty-Four Speed Resolver Assembly, hereinafter called the resolver assembly.

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on the date of invitation for bids from a part of this specification to the extent specified herein.

SPECIFICATIONS

APOLLO G&N

ND-1002013	Resolvers, Electrical, AC, General Specification for

DRAWINGS

APOLLO G&N

1012065	Resolver Assembly, One, Two and Sixty-Four Speed

3. REQUIREMENTS

3.1 GENERAL

3.1.1 One Speed Resolver. The one speed resolver of the resolver assembly shall conform to the requirements of Specification ND-1002013 with the following exceptions or additions:

a. Accuracy determination shall be made with loads of 2000 ohms ± 10 percent on both secondary windings. The relative accuracy between the two loads shall be ± 0.25 percent.

b. The resolver shall be tested as an RX only with P3 (BLK) excited high and P1 (RD) grounded.

c. The following paragraphs of Specification ND 1002013 are not applicable.

(1) Phase Shift Variations Due to Voltage
(2) Angular Error Versus Voltage
(3) Angular Error Versus Frequency
(4) Primary Impedance Unbalance
(5) Temperature Rise
(6) Friction Torque
(7) Brush Slip Ring Continuity

d. Measurement of air gap per side shall be made and shall conform to the value listed in 3.5.1q.

3.1.2 Two Speed Resolver. The two speed resolver of the resolver assembly shall conform to the requirements of Specification ND-1002013 with the following exceptions or additions:

a. Color coding of lead wire shall be as follows:

Lead	Color
P1	Orange
P3	White
P2	Brown
P4	Green
S2	Brown
S4	Green

b. The resolver shall be tested as an RC only.

c. Accuracy determination shall be made with a load of 5000 ohms ± 10 percent across the secondary winding, S2(BRN) - S4(GRN).

d. Angular error shall be determined for the secondary winding, S2(BRN) -S4(GRN).only.

e. During the Angular Accuracy test, the total null between S2(BRN) -S4(GRN) shall be determined at each angular interval and shall not exceed the value specified in 3. 5. 2e (3).

f. The resolver shall be tested for variations in phase shift as the input voltage is varied from 1. 0 to 28. 0 volts in 4. 5 volts increments. The values measured shall not deviate from the nominal at 28. 0 volt input by more than the value specified in 3. 5. 2 h.

g. The following paragraphs of Specification ND-1002013 are not applicable:

   (1) Angular Error Versus Voltage
   (2) Angular Error Versus Frequency
   (3) Temperature Rise
   (4) Friction Torque
   (5) Impedance Torque
   (6) Brush-Slip Ring Continuity

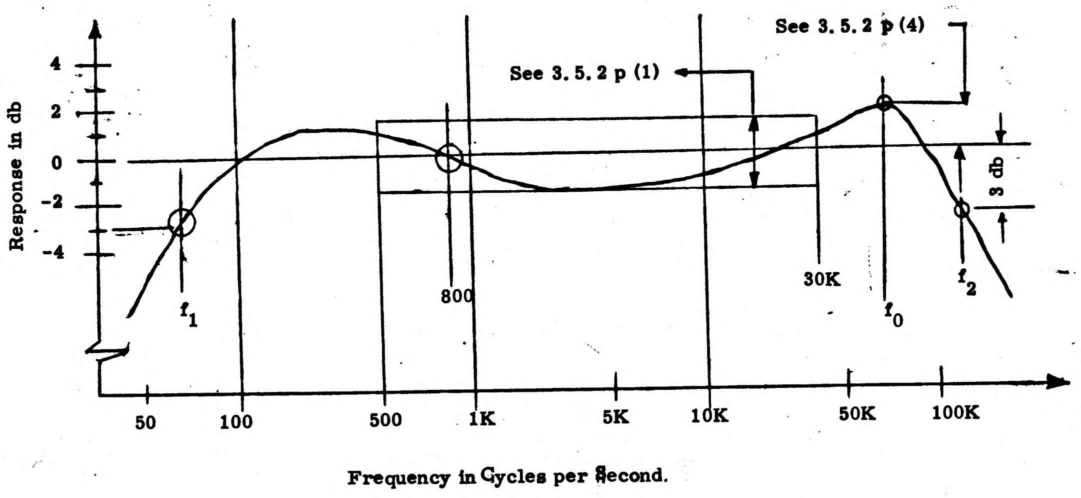
h. The frequency response of the resolver shall be measured over a frequency range extending from below the lower half-power point to above the resonant peak. When tested in accordance with 4. 2. 1. 1, the following requirements shall be met: (See Figure 1).

   (1) The indicated deviation R from O db over the frequency range from 500 cps to 30, 000 cps shall not exceed the value specified in 3. 5. 2 q(1).
   (2) The lower half-power frequency shall not exceed the value specified in 3. 5. 2 q (2).
   (3) Any resonant frequency, F_o, at which $R > 1$ db shall not occur at less than the value specified in 3. 5. 2 q (3).
   (4) The indicated R at any resonant frequency, F_o, shall not exceed the value specified in 3. 5. 2 q (4).
   (5) If no resonance per item (3) above occurs, record the upper half-power frequency, F_2.

NOTE: Limits in (1) and (4) above include 1/2 db total error in measuring EP_3 and ES_2 and thus are limits on the indicated response without correction.

3. 1. 3 Sixty-Four Speed Resolver. The sixty-four speed resolver of the resolver assembly shall conform to the requirements of Specification ND 1002013 with the following exceptions or additions:

a. The resolver shall be tested as an RX only with P3(BLK/WHT) excited high and P1(RD/WHT) grounded. P2(YEL/WHT) shall be commoned with P4 (BLU/WHT) but ungrounded. S2(YEL/WHT) shall be commoned with S1 (RD/WHT) and grounded.



FREQUENCY RESPONSE REQUIREMENTS

FIGURE 1

INCHES
0 1 2
PHOTOGRAPHING SCALE ONLY

b. Accuracy determination shall be made with loads of 5K ohms resistive ± 10 percent on both secondary windings. Relative accuracy between the two loads shall be 0.25 percent.

c. The following paragraphs of Specification ND-1002013 are not applicable:

(1) Phase Shift Variations Due to Voltage
(2) Angular Error Versus Voltage
(3) Angular Error Versus Frequency
(4) Primary Impedance Unbalance
(5) Temperature Rise
(6) Friction Torque
(7) Brush-Slip Ring Continuity
(8) Phase Shift Versus Rotation.

3.1.4 Resolver Assembly.

3.1.4.1 Cross Coupling. The resolver assembly shall be tested for cross coupling in accordance with 4.2.1.2 and shall conform to the values specified in 3.5.4 a.

3.1.4.2 Coincidence of Electrical Zero. When tested in accordance with 4.2.1.3, the electrical zeroes of the one speed and two speed resolvers shall coincide with that of the sixty-four speed resolver within the limits specified in 3.5.4 b.

3.2 DESIGN AND CONSTRUCTION. The resolver assembly shall be of the design, construction and physical dimensions shown on Drawing 1012065. The manufacture, materials, processes and mechanical and electrical construction of the resolver assembly shall be in accordance with the requirements of Specification ND-1002013. All parts, materials and processes to be used shall be submitted to the contractor for approval.

3.3 FINISHES AND PROTECTIVE TREATMENT. The resolver finishes, protective treatment and moisture, fungus and corrosion treatments shall be in accordance with the requirements of Specification ND-1002013 and Drawing 1012065.

3.4 QUALIFICATION PERFORMANCE CHARACTERISTICS AND CONDITIONS.

3.4.1 Individual Resolvers. The individual resolvers shall conform to the requirements of Specification ND-1002013 with the following exceptions or additions:

3.4.1.1 Environmental.

3.4.1.1.1 Vibration, Operating Condition. With the resolver tested as specified, the angular deviation shall not exceed:

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

a. 10 arc seconds peak for the 1X resolver.

b. 30 arc seconds peak for the 2X resolver.

c. 1 arc second peak for the 64X resolver.

3.4.1.1.2 Shock, Operating. With the resolver tested as specified, the angular deviation shall not exceed:

a. 10 arc seconds peak for the 1X resolver.

b. 30 arc seconds peak for the 2X resolver.

c. 1 arc second peak for the 64X resolver.

3.4.1.1.3 Low Temperature, Operating. With the resolver subjected to a temperature of -73.3° ± 2.8°C (-100° ± 5°F) and tested as specified, the angular deviation and fundamental null voltage variation shall not exceed:

a. 20 arc seconds peak and 20 mv, rms for the 1X resolver

b. 40 arc seconds peak and 10 mv, rms for the 2X resolver

c. 3 arc second peak and 2 mv, rms for the 64X resolver

3.4.1.1.4 High Temperature, Operating. With the resolver subjected to a temperature of 93.3° ± 2.8°C (200° ± 5°F) and tested as specified, the angular deviation and fundamental null voltage variation shall not exceed:

a. 20 arc seconds, peak and 20 mv, rms for the 1X resolver

b. 40 arc seconds, peak and 10 mv, rms for the 2X resolver

c. 3 arc second, peak and 2 mv, rms for the 64X resolver

3.4.1.1.5 52°C Temperature, Operating. With the resolver subjected to a temperature of 52° ± 2.8°C (125.6° ± 5°F) and tested as specified, the angular deviation and fundamental null voltage shall not exceed:

a. 5 arc seconds, peak and 5 mv, rms for the 1X resolver

b. 20 arc seconds, peak and 5 mv, rms for the 2X resolver

c. 1.5 arc seconds peak and 1.0 mv, rms for the 64X resolver.

3.4.1.1.6 Thermal Shock. The resolver shall be tested as specified with the low temperature specified in 3.4.1.1.3.

3.4.1.1.7 Humidity, Operating. With the resolver tested as specified, the angular deviation shall not exceed:

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

a. 10 arc seconds, peak for the 1X resolver

b. 30 arc seconds, peak for the 2X resolver

c. 0.5 arc seconds, peak for the 64X resolver.

3.4.1.1.8 Thermal Vacuum. The resolver shall be tested as specified while exposed to a vacuum level of 1×10^{-7} mm, Hg and the low and high temperatures specified in 3.4.1.1.3 and 3.4.1.1.4, respectively.

3.4.1.2 Endurance. During the applicable portions of endurance testing, the following conditions shall be maintained:

a. Low Temperature	$-40^{\circ} \pm 2.8^{\circ}C$ ($-40^{\circ} \pm 5^{\circ}F$)
b. High Temperature	$37.8^{\circ} \pm 2.8^{\circ}C$ ($100^{\circ} \pm 5^{\circ}F$)
c. Operating Speed	0 RPM

3.4.2 Resolver Assembly. After subjection to the qualification tests for the individual resolvers, the resolver assembly shall successfully meet the requirements of 3.1.4.

3.5 DETAIL PERFORMANCE CHARACTERISTICS

3.5.1 One Speed Resolver. The one speed resolver of the resolver assembly shall have the following specific characteristics when tested at the applicable ambient conditions as specified in ND 1002013.

a. Primary	Inner Member
b. Phases	
(1) Primary	2
(2) Secondary	2
c. Test Voltage	28V ± 2%
d. Test Frequency	800 cps ± 0.5%
e. Impedances	
(1) Z_{po} (P_1-P_3 only)	200 ohms ± 20% + j 600 ohms ± 20%
(2) Z_{ps}	200 ohms + j 790 ohms, nominal
(2) Z_{so} (S_1-S_3 only)	260 ohms ± 20% + j 700 ohms ± 20%
(3) Z_{ss}	167 ohms + j 77 ohms, nominal

f. Null Voltage	
(1) Total	28 millivolts, maximum
(2) Fundamental	28 millivolts, maximum
g. Phase Shift	6° ± 3°
h. Phase Shift vs Rotation	± 0.5°
i. Transformation Ratio	1.00 ± 2%
j. Angular Error	2 arc minutes, peak
(1) Angular Interval for Accuracy Measurement	Every 5° from -10° to +55°
k. Impedance Unbalance, Secondary	100 Z sec, max.
m. Input Current, Unloaded	45 milliamperes, nominal
n. Input Power, Unloaded	0.4 watts, nominal
p. DC Resistance	
(1) Primary	65 ohms ± 20%
(2) Secondary	110ohms ± 20%
q. Air Gap per Side	0.003 inch, ~~minimum~~

3.5.2 Two Speed Resolver. The two speed resolver of the resolver assembly shall have the following specific characteristics when tested at the applicable ambient conditions as specified in Specification ND 1002013.

a. Primary	Stator (Outer Member)
b. Test Voltage	28 V ± 2%
c. Test Frequency	800 cps ± 0.5%
d. Impedance	
(1) Z_{po}	470 ohms ± 20% + j 1770ohms ± 20%
~~(2) Z_{pss}~~	~~ohms + j ohms, nominal~~
(2) Z_{so}	275 ohms ± 20% + j1050 ohms ± 20%
(3) Z_{ss}	325 ohms + j 160 ohms, nominal

e. Null Voltage	
(1) Total	20 mv, maximum
(2) Fundamental	20 mv, maximum
(3) Null vs Rotation	25 mv, maximum
f. Phase Shift	9° ± 1°
g. Phase Shift vs Rotation	± 0.5°
h. Phase Shift vs Voltage	± 1.0°
i. Transformation Ratio	0.707 ± 2%
j. Angular Error	2 arc minutes, peak of one speed shaft
(1) Angular Interval for Accuracy Measurement, Mechanical	Every 5° from -10° to + 55°
k. Impedance Unbalance, Primary	100 Z-sec, maximum
m. Primary Current, Unloaded	0.015 amps, nominal
n. Primary Power, Unloaded	0.11 watts, nominal
p. DC Resistance	
(1) Primary	300 ohms ± 20%
(2) Secondary	170 ohms ± 20%
q. Frequency Response	
(1) Midband Response	± 1.5 db, maximum
(2) Lower Half-Power Frequency	100 cps, maximum
(3) Resonant Frequency	50K cps, minimum
(4) Resonant Peak Response	+ 2.5 db, maximum
r. Air Gap per Side	0.003 inch, minimum

3.5.3 Sixty-Four Speed Resolver. The sixty-four speed resolver of the resolver assembly shall have the following specific characteristics when tested at the applicable ambient conditions as specified in Specification ND-1002013.

a. Primary	Inner Member
b. Phases	
(1) Primary	2
(2) Secondary	2
c. Test Voltage	28 V ± 2%
d. Test Frequency	800 cps ± 0.5%
e. Impedances	
(1) Z_{po}	310 ohms ± 20% + j 245 ohms ± 20%
(2) Z_{ps}	315 ohms + j 345 ohms, nominal
(3) Z_{ss}	435 ohms ± 20% + j 100 ohms ± 20%
(2) Z_{ss}	550 ohms, maximum
f. Null Voltages	
(1) Total	20 mv, max
(2) Fundamental	15 mv, max
g. Phase Shift	$50^\circ \pm 3^\circ$
h. Tranformation Ratio	0.179 ± 5%
i. Angular Error	10 arc seconds, peak to peak of one speed shaft and an average of ± 2 arc seconds
(1) Angular Interval for Accuracy Measurement, Mechanical	$1/4^\circ$ increments from -10° to $+ 55^\circ$
j. Impedance Unbalance, Secondary	0.75 Z-sec
k. Input Current, Unloaded	0.070 amps, nominal
m. Input Power, Unloaded	1.50 watts, nominal
n. DC Resistance	
(1) Primary	300 ohms ± 20%
(2) Secondary	[illegible]
p. Air Gap per Side	0.003 inch, minimum

INCHES
0 2
PHOTOGRAPHIC SCALE ONE

3.5.4 Resolver Assembly. The resolver assembly shall have the following specific characteristics when tested at the ambient conditions specified in Specification ND-1002013.

a. Cross Coupling

(1) 1X to 2X output	25 mv, max.
(2) 1X to 64X output	0.1 mv, max.
(3) 2X to 1X output	20 mv, max.
(4) 2X to 64X output	0.1 mv, max.

b. Coincidence of Electrical Zero

(1) 1X elec. zero to 64X elec. zero	2 arc min, max, referred to 1X mech. shaft.
(2) 2X elec. zero to 64X elec. zero	2 arc min, max, referred to 1X mech. shaft.

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

4. QUALITY ASSURANCE PROVISIONS

4.1 GENERAL. Sampling, inspection and testing shall be in accordance with the requirements of Specification ND-1002013 and as specified herein.

4.2 TESTS

4.2.1 Description of Tests.

4.2.1.1 Frequency Response, Two Speed Resolver. The two speed resolver shall be connected as shown in Figure 2.

a. P3 (Hi) and P1 (Low and grounded) shall be connected to a signal generator having a 600 ohm source impedance.

b. The voltage, E_{P3}, shall be maintained constant at 2.0 volts, rms within 1/4 db at all frequencies measured.

c. A direct current of 10 milliamperes shall flow through this winding from P3 to P1.

d. P2 - P4 shall be commanded but ungrounded

e. S2 (Hi) and S4 (Low and grounded) shall be loaded with 75K ohms and connected to a VTVM capable of measuring E_{S2} relative to an initial setting within 1/4 db.

f. Resolver rotation shall be such that S2 -S4 is at maximum coupling and S2 is in phase with P3.

4.2.1.1.1 Test Procedure. The test shall be conducted as follows:

a. Set E_{P3} to 2.0 volts, 800 cps.

b. Measure $E_{S2} = E_R$. E_R is the reference output.

c. Vary the signal generator frequency over the required frequency range, measuring E_{S2} at enough points to determine the response versus frequency.

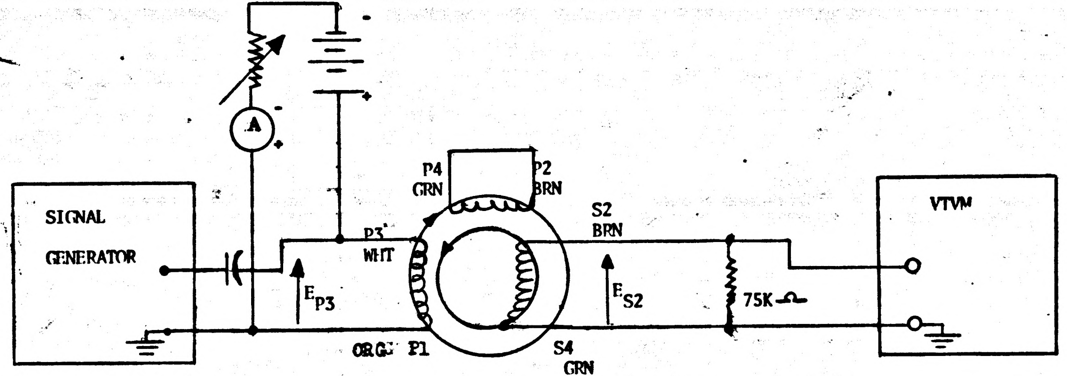
d. Express the response, R, in DB relative to E_R; that is:

$$R = 20 \log \left(\frac{E_{S2}}{E_R}\right)$$

e. Locate the lower half-power frequency, F_1, defined as the frequency at which R first drops to minus 3 db as the frequency is lowered from 800 cps.

f. Locate all resonant peaks for which $R > 1$ db.

g. If no peaks are found in the previous step, locate the upper half-power frequency, F_2, defined as the frequency at which R first drops to minus 3 db. as the frequency is raised from 800 cps.


A
SIGNAL
GENERATOR
E_{P3}
P3
WHT
P4
GRN
P2
BRN
ORG P1
S2
BRN
E_{S2}
S4
GRN
75K Ω
VTVM

Mounting Fixture Grounded

NOTE: Resolver set at maximum coupling with S2 in phase with P3 at 800 cps (+45° mechanical from EZ)

FREQUENCY RESPONSE TEST CONNECTIONS

Figure 2

4.2.1.2 Cross Coupling, Resolver Assembly. During these tests, the specified loads shall be applied to all resolvers.

4.2.1.2.1 One Speed to Two and Sixty-Four Speed Resolvers. With the one speed transmitter excited by applying 28 volts ± 2%, 800 cps ± 0.5% between P3 (Hi) and P1 (Lo) and with the primary windings of the two and sixty-four speed resolvers shorted P2 to P4 and P1 to P3, the total null voltage measured at either output phase of the two and sixty-four speed resolvers shall not exceed the values specified in 3.5.4 a as the resolver assembly is rotated from -10° to $+55^\circ$.

4.2.1.2.2 Two Speed to One and Sixty-Four Speed Resolvers. With the two speed resolver connected as per Figure 3 and the primary windings of the one and sixty-four speed resolvers shorted P2 to P4 and P3 to P1, the total null voltage measured at either output phase of the one speed or sixty-four speed resolvers shall not exceed the values specified in 3.5.4 a as the electrical angle of the resolver standard is varied in 30° increments from 0° to 360°.

4.2.1.3 Coincidence of Electrical Zero. With the specified loads and rated test excitation applied to all resolvers, their electrical zero positions shall be determined. Each resolver shall be excited with P3 high, P1 low and the P2 - P4 winding shorted but ungrounded. The electrical zeros of both the one speed and two speed resolvers shall coincide with that determined for the sixty-four speed within the value specified in 3.5.4 b.

5. PREPARATION FOR DELIVERY. Preparation for delivery shall be in accordance with the requirements of Specification ND-1002013.

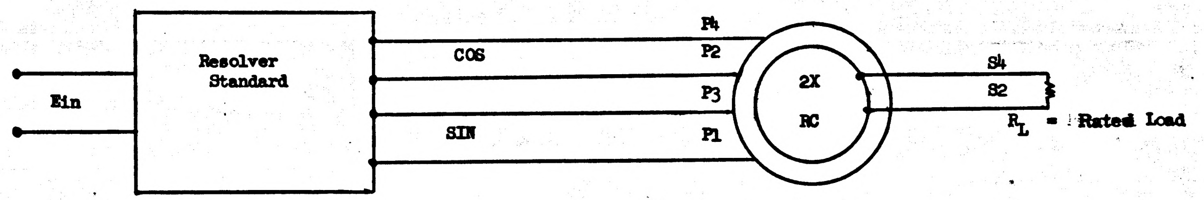
6. NOTES.

6.1 GENERAL SPECIFICATION. The notes specified in Specification ND 1002013 are applicable to this resolver assembly.

6.2 DC AVERAGE. The dc average is the algebraic sum of all error readings divided by the total number of readings.

Where:

$$DC_{AVE} = \frac{\sum e}{n}$$


Ein
Resolver
Standard
COS
SIN
P4
P2
P3
P1
2X
RC
S4
S2
R_L = Rated Load

Ein = 28 volts ± 2%, 800 cps ± 0.5%

Cross Coupling (two speed to one and sixty-four speed transmitter)

FIGURE 13

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS I.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL REQUIREMENTS SPECIFIED IN PROCUREMENT SPECIFICATION PS1012065.
   - D. UNIT SHALL BE SHIPPED MOUNTED ON A FIXTURE WHICH PREVENTS ROTOR (INNER MEMBER) FROM CONTACTING STATOR (OUTER MEMBER). PACKAGING SHALL BE PER ND1002215 CLASS II CODE I
2. INSPECTION AND ACCEPTANCE
   - A. UNIT SHALL BE CAPABLE OF MEETING INSPECTION AND ACCEPTANCE REQUIREMENTS OF PS 1012065.
   - B. MECHANICAL
     1. DIMENSIONS AS SHOWN
     2. ALL MECHANICAL DIMENSIONS APPLY WHEN DISTANCE BETWEEN SURFACES X AND Y EQUALS .045. UNITS MUST MEET ALL OTHER REQUIREMENTS WHEN DISTANCE BETWEEN X AND Y IS VARIED TO ANY FIXED POSITION BETWEEN .038 AND .052
     3. NO PORTION OF UNIT, INCLUDING FASTENERS AND WIRES, SHALL PROJECT BEYOND SPECIFIED RADIUS
     4. NO PORTION OF ROTOR SHALL PROJECT BEYOND SURFACE Z MORE THAN .010
     5. INTERNAL WIRING SHALL BE ARRANGED TO ALLOW ROTOR MECHANICAL ROTATION 82° MIN IN A CLOCKWISE DIRECTION AND 43° MIN IN A COUNTER-CLOCKWISE DIRECTION FROM POSITION SHOWN WHEN VIEWED FROM SIDE WITH INDEX MARKS.
     6. MARK REFERENCE DESIGNATIONS ON RESOLVER AND CONNECTORS, PER ND 1002019.
     7. EXTERNAL WIRES PER MIL-W-16878, TYPE AND SIZE E-28, COLOR CODED IN ACCORDANCE WITH FIGURES I, II, AND III.
     8. TWIST EXTERNAL WIRES, PER WIRING LEGEND, IN ACCORDANCE WITH ND 1002032.
     9. LACE EXTERNAL WIRES PER ND 1002032
     10. POT CONNECTORS IN ACCORDANCE WITH ND1002240
         - a. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION
         - b. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
     11. IDENTIFY USING NASA DRAWING NUMBER, REV LETTER AND MANUFACTURERS SYMBOL PER ND1002019 AND SERIAL NUMBER PER ND 1002023.
   - C. ELECTRICAL
     1. WHEN RESOLVER ASSEMBLY IS AT ELECTRICAL ZERO, THE TWO INDEX MARKS SHALL BE ALIGNED WITHIN 2°
     2. FOR ALL RESOLVERS, A POSITIVE ANGLE "A" OCCURS WHEN THE INNER MEMBER IS ROTATED CCW FROM ELECTRICAL ZERO WHEN VIEWED IN THE DIRECTION OF THE ORIENTATION ARROW.
     3. WITH VOLTAGES DEFINED BY FIGURE I, THE 64-SPEED RESOLVER, B1, SHALL SATISFY THE FOLLOWING EQUATIONS:

        $E_{S3} = K_1 (E_{P3} \cos 64A - E_{P4} \sin 64A)$

        $E_{S4} = K_1 (E_{P3} \sin 64A + E_{P4} \cos 64A)$

        INNER MEMBER IS PRIMARY.
     4. WITH VOLTAGES DEFINED BY FIGURE II, THE TWO-SPEED RESOLVER, B2, SHALL SATISFY THE FOLLOWING EQUATION:

        $E_{S4} = K_2 (E_{P4} \cos 2A - E_{P3} \sin 2A)$

        INCLUSION OF SECOND SECONDARY PHASE (S1-S3) OPTIONAL. IF INCLUDED, LEADS SHALL BE TERMINATED INTERNALLY OPEN CIRCUIT. OUTER MEMBER IS PRIMARY.
     5. WITH VOLTAGES DEFINED BY FIGURE III, THE ONE-SPEED RESOLVER, B3, SHALL SATISFY THE FOLLOWING EQUATIONS:

        $E_{S3} = K_3 E_{P3} \cos A$

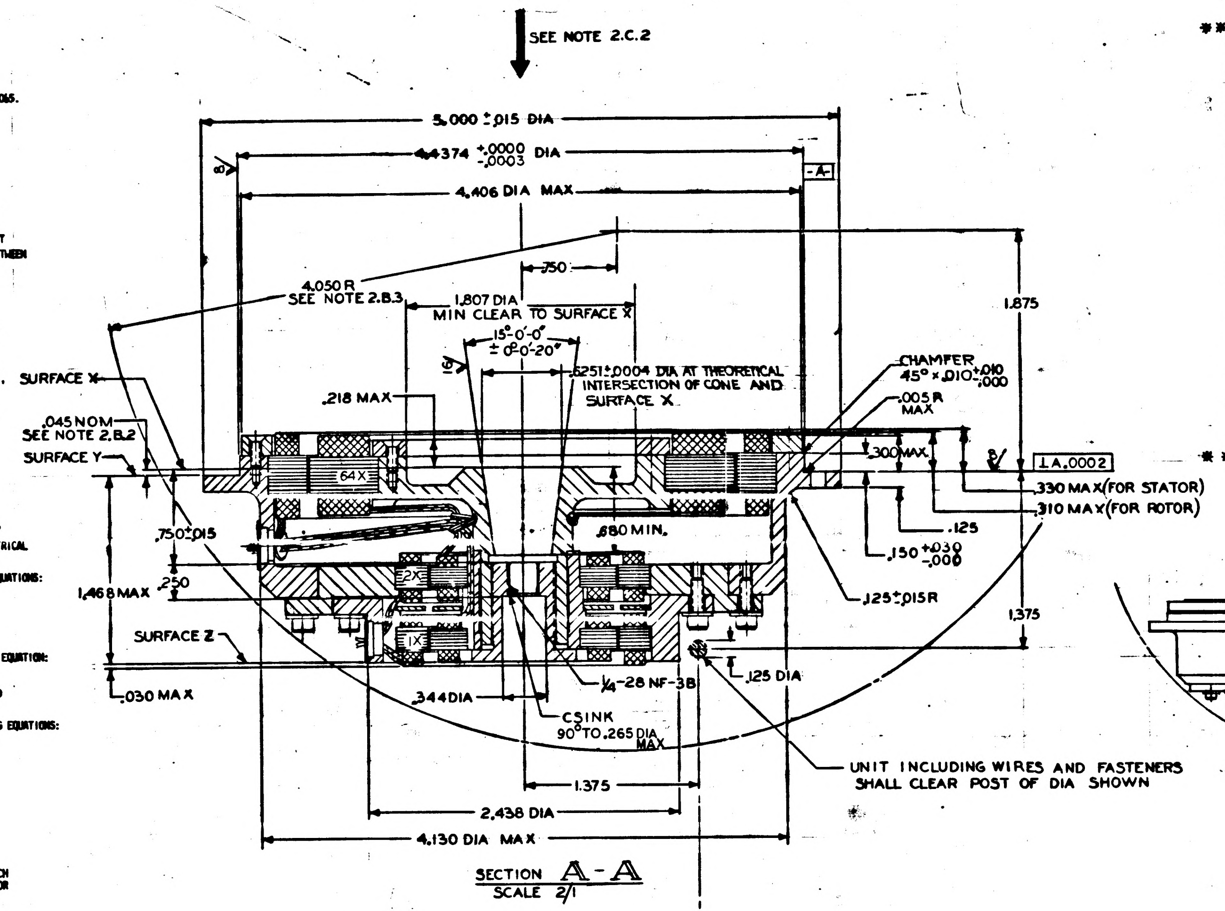
        $E_{S4} = K_3 E_{P3} \sin A$

        INNER MEMBER IS PRIMARY.
3. DESIGN
   - A. UNIT SHALL MEET THE DESIGN REQUIREMENTS SPECIFIED IN PS1012065
   - B. MECHANICAL
     1. UNIT SHALL MEET ALL OPERATIONAL REQUIREMENTS WHEN ROTOR IS MOUNTED ON A TAPERED SHAFT WHICH MAY HAVE UP TO .0001 T.I.R. RUNOUT WHEN RUN ON ITS BEARINGS, AND 4.4374 DIAMETER OF STATOR IS MOUNTED IN A 4.4375 $^{+.0003}_{-.0000}$ DIAMETER HOLE WHICH MAY BE ECCENTRIC TO ITS BEARING BORE BY .0002 T.I.R.
     2. ROTOR HUBS AND STATOR HOUSINGS SHALL BE BERYLLIUM PER ND1002125 HEAT TREATED PER ND 1002114. FASTENERS AND THREADED ROTOR LOCKING NUT SHALL BE CORROSION-RESISTANT STEEL – 300 SERIES (NON-MAGNETIC)
     3. ROTOR LOCKING NUT SHALL BE BONDED TO ROTOR HUB PER ND 1002211
     4. WIRES SHALL BE GROUPED AS INDICATED AND PASS THROUGH HOUSING AT APPROXIMATE LOCATIONS SHOWN. ONLY ONE WIRE SHALL PASS THROUGH EACH HOLE IN GROMMET OR EQUIVALENT. FIT OF WIRE IN GROMMET AND GROMMET IN HOUSING SHALL PROVIDE A CASUAL SEAL. WIRES SHALL NOT INTERFERE WITH ASSEMBLING AND TIGHTENING OF SCREWS IN MOUNTING SLOTS.
     5. SUITABLE STRAIN RELIEF SHALL BE PROVIDED FOR WIRES AT INNER SIDE OF GROMMETS
     6. EACH SOLDER JOINT, AT CONNECTORS, SHALL BE PROTECTED WITH INSULATION SLEEVING 1010490.
     7. TOTAL WEIGHT OF UNIT SHALL NOT EXCEED 2 LBS.
     8. VIBRATION PROOF ALL SCREWS PER ND1002211 OR BY USE OF SELF-LOCKING SCREWS
   - C. ELECTRICAL
     1. SOLDER CONDUCTORS TO CONNECTORS, PER WIRING LEGEND, IN ACCORDANCE WITH ND1002071.
4. SPECIAL CONDITIONING
   - A. PRIOR TO INSPECTION AND ACCEPTANCE TESTS, UNIT SHALL BE TEMPERATURE CYCLED TWICE IN THE FOLLOWING MANNER:

ROOM TEMPERATURE TO -50°C±5°C	2 HOURS
-50°C±5°C	[illegible] HOURS
-50°C±5°C TO ROOM TEMPERATURE	2 [illegible]
ROOM TEMPERATURE	4 HOURS
ROOM TEMPERATURE TO +93°C ± 3°C	2 HOURS
+93°C ± 3°C	4 HOURS
+93°C±3°C TO ROOM TEMPERATURE	2 HOURS
ROOM TEMPERATURE	[illegible] HOURS

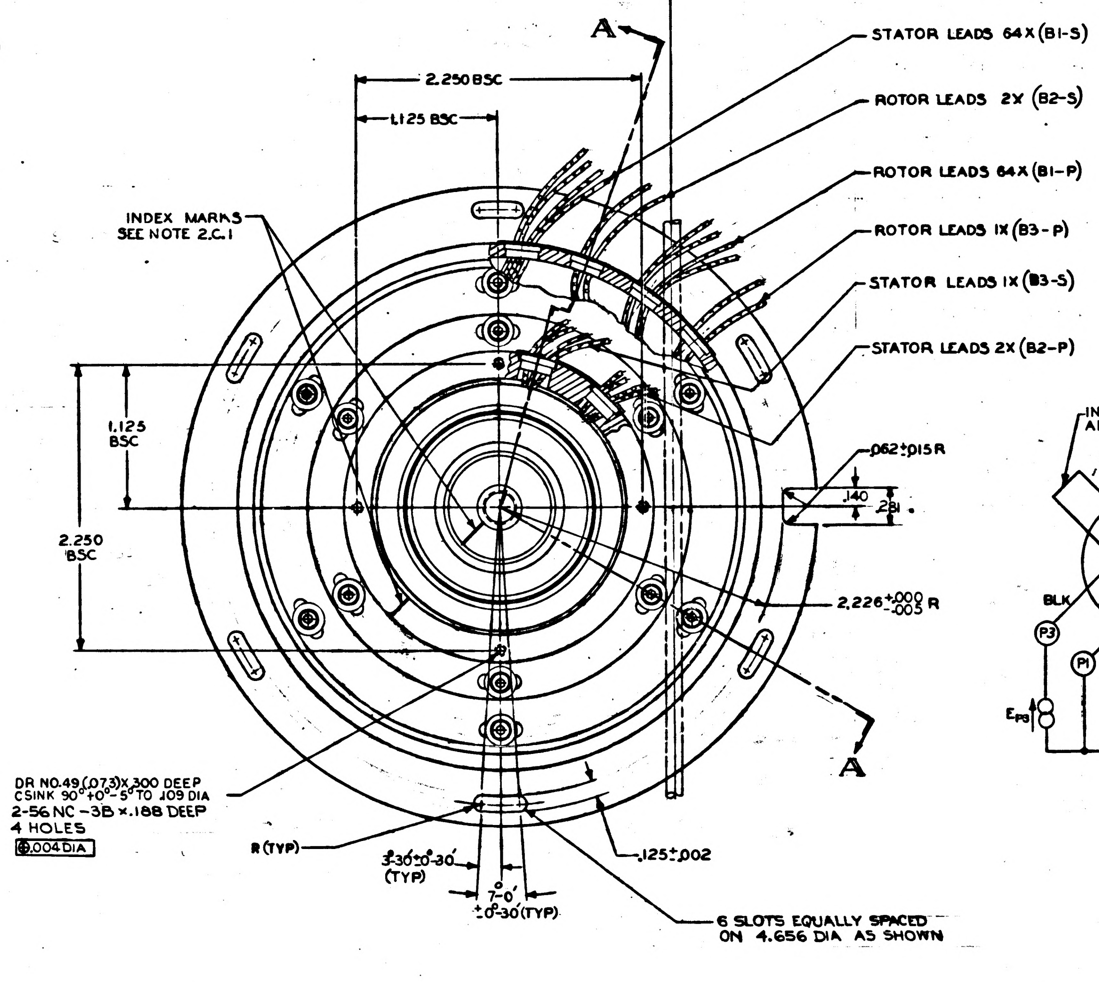
DETAILED PERFORMANCE CHARACTERISTICS OF PS1012065 PARA. 3.5.1 PRIOR TO AND AFTER SPECIAL CONDITIONING SHALL BE INCLUDED WITH EACH UNIT.

PROCURE ONLY FROM APPROVED SOURCE OF SUPPLY LISTED ON ND 1002034 FOR THIS DRAWING

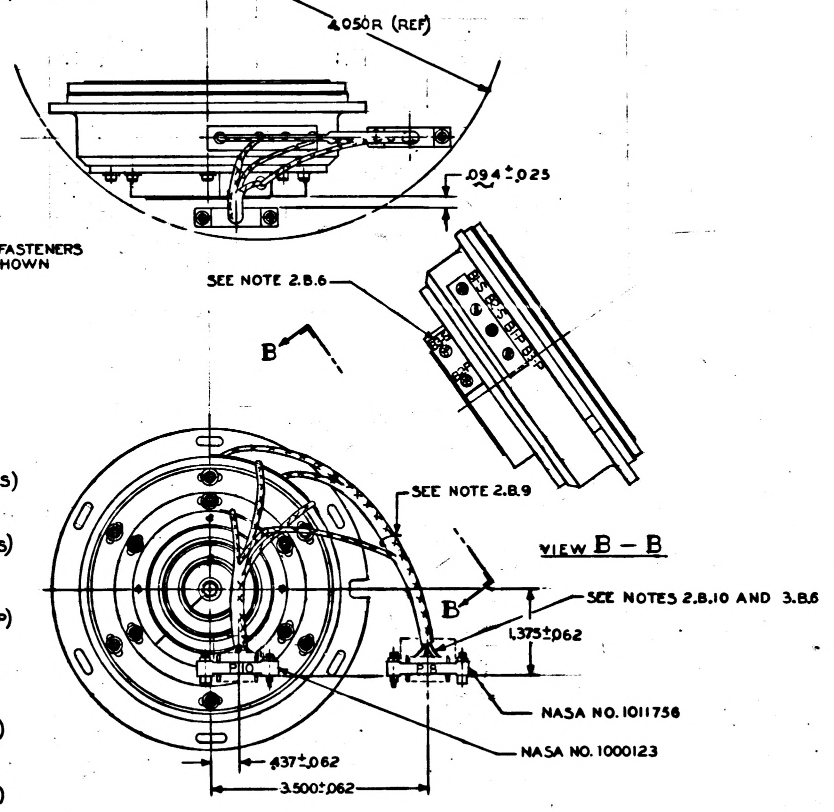


SEE NOTE 2.C.2
5.000 ±.015 DIA
4.4374 +.0000 -.0003 DIA
-A-
4.406 DIA MAX
.750
4.050 R
SEE NOTE 2.B.3
1.807 DIA
MIN CLEAR TO SURFACE X
15°-0'-0"
±0°-0'-20"
1.875
SURFACE X
.218 MAX
.251±.0004 DIA AT THEORETICAL INTERSECTION OF CONE AND SURFACE X
CHAMFER 45°×.010 +.010 -.000
.005 R MAX
.045 NOM
SEE NOTE 2.B.2
SURFACE Y
64X
.300 MAX
⊥ A .0002
.330 MAX (FOR STATOR)
.310 MAX (FOR ROTOR)
.750±.015
.680 MIN.
.125
.150 +.030 -.000
1.468 MAX
.250
2X
1X
.125±.015R
1.375
SURFACE Z
.125 DIA
1/4-28 NF-3B
.030 MAX
.344 DIA
CSINK 90° TO .265 DIA MAX
UNIT INCLUDING WIRES AND FASTENERS SHALL CLEAR POST OF DIA SHOWN
1.375
2.438 DIA
4.130 DIA MAX

SECTION A-A
SCALE 2/1



A
2.250 BSC
1.125 BSC
INDEX MARKS
SEE NOTE 2.C.1
STATOR LEADS 64X (B1-S)
ROTOR LEADS 2X (B2-S)
ROTOR LEADS 64X (B1-P)
ROTOR LEADS 1X (B3-P)
STATOR LEADS 1X (B3-S)
STATOR LEADS 2X (B2-P)
1.125 BSC
2.250 BSC
.062±.015 R
.140
.281
2.226 +.000 -.003 R
A
DR NO.49 (.073) X .300 DEEP
CSINK 90° +0° -5° TO .109 DIA
2-56 NC-3B × .188 DEEP
4 HOLES
⊕ .004 DIA
R (TYP)
3°-30'±0°-30' (TYP)
7°-0'
±0°-30' (TYP)
.125±.002
6 SLOTS EQUALLY SPACED ON 4.656 DIA AS SHOWN



4.050R (REF)
.094±.025
SEE NOTE 2.B.6
B
SEE NOTE 2.B.9
B
SEE NOTES 2.B.10 AND 3.B.6
1.375±.062
P10
P8
NASA NO. 1011756
NASA NO. 1000123
.437±.062
3.500±.062

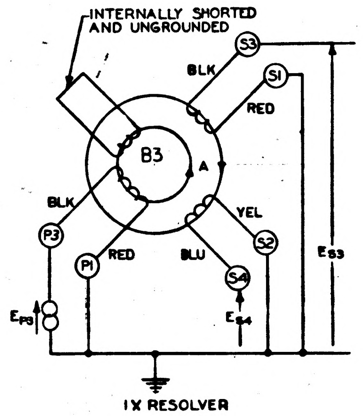
VIEW B-B

WIRING LEGEND				
** COND NO.	COLOR	FROM	TO	SEE NOTE
D1	YELLOW-WHITE	B1 — P2	P8 — D	8
D2	BLUE-WHITE	B1 — P4	P8 — H	
D3	BLACK-WHITE	B1 — P3	P8 — L	8
D4	RED-WHITE	B1 — P1	P8 — P	
D5	BLUE-WHITE	B1 — S4	P8 — Z	8
D6	YELLOW-WHITE	B1 — S2	P8 — c	
D7	RED-WHITE	B1 — S1	P8 — b	8
D8	BLACK-WHITE	B1 — S3	P8 — e	
D9	WHITE	B2 — P3	P8 — V	8
D10	ORANGE	B2 — P1	P8 — Y	
D11	GREEN	B2 — S4	P10 — A	8
D12	BROWN	B2 — S2	P10 — D	
D13	BROWN	B2 — P2	P10 — H	8
D14	GREEN	B2 — P4	P10 — L	
D15	BLACK	B3 — S3	P10 — W	8
D16	RED	B3 — S1	P10 — Z	
D17	YELLOW	B3 — S2	P10 — Y	8
D18	BLUE	B3 — S4	P10 — b	
D19	RED	B3 — P1	P10 — C	8
D20	BLACK	B3 — P3	P10 — F	

** CONDUCTORS NUMBERS FOR REFERENCE ONLY WIRES SHALL NOT BE MARKED

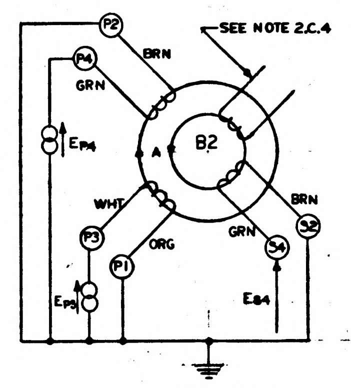
REVISIONS		12675				
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR # 12675				
A		REVISED PER TDRR 14359			4/21/67	
B		REVISED PER TDRR 16606				

1012065 B



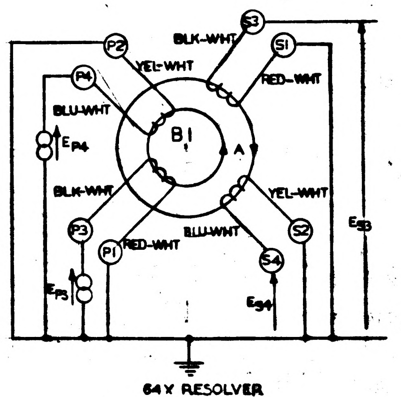
INTERNALLY SHORTED AND UNGROUNDED
S3
S1
BLK
RED
B3
A
BLK
YEL
P3
P1
RED
BLU
S2
S4
E_{S3}
E_{S4}
E_{P3}

1X RESOLVER
FIGURE III



P2
BRN
SEE NOTE 2.C.4
GRN
P4
E_{P4}
A
B2
WHT
BRN
P3
ORG
GRN
S2
P1
S4
E_{P3}
E_{S4}

2X RESOLVER
FIGURE II



P2
BLK-WHT
S3
S1
YEL-WHT
P4
RED-WHT
BLU-WHT
E_{P4}
B1
A
BLK-WHT
YEL-WHT
P3
BLU-WHT
S2
P1
RED-WHT
S4
E_{P3}
E_{S3}
E_{S4}

64X RESOLVER
FIGURE I

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
2011890	2011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± 1°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN E. DRAPALA 9-16-64
CHECKED T. SULLIVAN 9-17-64
APPROVED 9-17-64
APPROVED R. J. Thomas 9-17-64
APPROVED MIT
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESOLVER ASSEMBLY
1 SPEED, 2 SPEED AND 64 SPEED
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE E
DRAWING NO. 1012065
SCALE 1/1 & 2/1
SHEET 1 OF 1

MASTER

APOLLO G&N Specification
PS 1012065 B

Original Issue Date: 17 Sept 1964
Release Authority: TDRR 12656
Class A Release

PROCUREMENT SPECIFICATION
FOR
RESOLVER ASSEMBLY, ONE, TWO AND SIXTY-FOUR SPEED

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
9/29/64	A	13103	9, 10		WJR
11-23-64	B	14455	1, 2, 3, 4, 5, 6, 7, 8,		
			9, 10, 11, 12, 13, 14, 15	WJR.	
			16		

This specification consists of page i
and 1 to 16 inclusive.

APPROVALS	NASA/MSC	I. Hagee CCO 9/17/64	Gilbert E. Miller Dep Asst Dir	D A Koso Asst Dir MIT/IL	R. J. Thessin MIT STAFF	E. P. Armstrong Engr Specialist

PROCUREMENT SPECIFICATION

RESOLVER ASSEMBLY, ONE, TWO AND SIXTY-FOUR SPEED

1. SCOPE

1.1 This specification establishes the requirements for the procurement of the One, Two and Sixty-Four Speed Resolver Assembly, hereinafter called the resolver assembly.

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on the date of invitation for bids form a part of this specification to the extent specified herein.

SPECIFICATIONS

APOLLO G&N

ND-1002013	Resolvers, Electrical, AC, General Specification for

DRAWINGS

APOLLO G&N

1012065	Resolver Assembly, One, Two and Sixty-Four Speed

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

3. REQUIREMENTS

3.1 GENERAL

3.1.1 One Speed Resolver. The one speed resolver of the resolver assembly shall conform to the requirements of Specification ND-1002013 with the following exceptions or additions:

a. Accuracy determination shall be made with loads of 2000 ohms ± 10 percent on both secondary windings. The relative accuracy between the two loads shall be ± 0.25 percent.

b. The resolver shall be tested as an RX only with P3 (BLK) excited high and P1 (RD) grounded.

c. The following paragraphs of Specification ND 1002013 are not applicable.

(1) Phase Shift Variations Due to Voltage
(2) Angular Error Versus Voltage
(3) Angular Error Versus Frequency
(4) Primary Impedance Unbalance
(5) Temperature Rise
(6) Friction Torque
(7) Brush Slip Ring Continuity
(8) Phase Shift Versus Rotation

d. Measurement of air gap per side shall be made and shall conform to the value listed in 3.5.1q.

3.1.2 Two Speed Resolver. The two speed resolver of the resolver assembly shall conform to the requirements of Specification ND-1002013 with the following exceptions or additions:

a. Color coding of lead wire shall be as follows:

Lead	Color
P1	Orange
P3	White
P2	Brown
P4	Green
S2	Brown
S4	Green

b. The resolver shall be tested as an RC only.

c. Accuracy determination shall be made with a load of 5000 ohms ± 10 percent across the secondary winding, S2(BRN) - S4(GRN).

d. Angular error shall be determined for the secondary winding, S2(BRN) -S4(GRN).only.

e. During the Angular Accuracy test, the total null between S2(BRN) -S4(GRN) shall be determined at each angular interval and shall not exceed the value specified in 3.5.2e (3).

f. The resolver shall be tested for variations in phase shift as the input voltage is varied from 1.0 to 28.0 volts in 4.5 volts increments. The values measured shall not deviate from the nominal at 28.0 volt input by more than the value specified in 3.5.2 h.

g. The following paragraphs of Specification ND-1002013 are not applicable:

(1) Angular Error Versus Voltage
(2) Angular Error Versus Frequency
(3) Temperature Rise
(4) Friction Torque
(5) Impedance Torque
(6) Brush-Slip Ring Continuity
(7) Phase Shift Versus Rotation

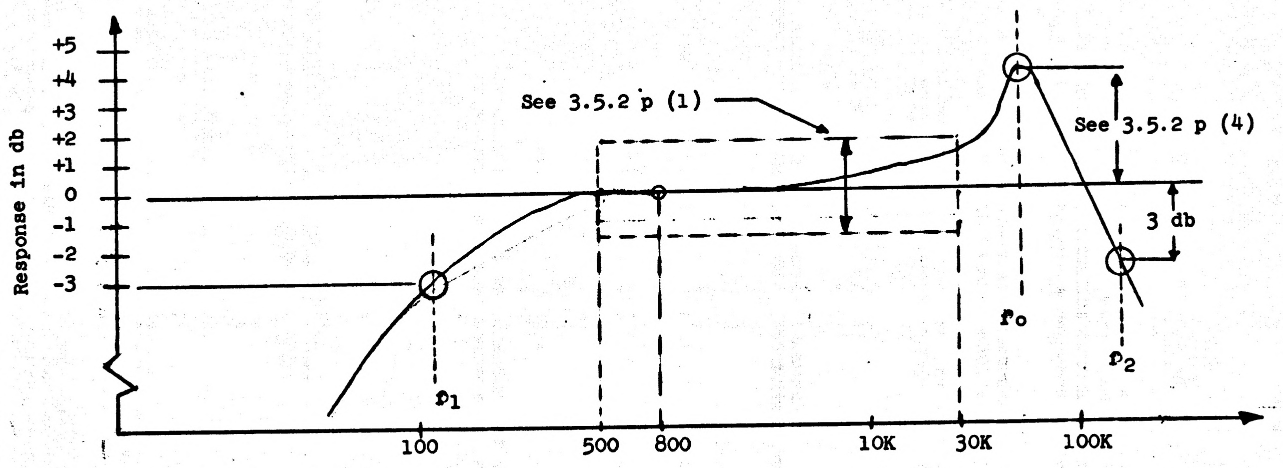
h. The frequency response of the resolver shall be measured over a frequency range extending from below the lower half-power point to above the resonant peak. When tested in accordance with 4.2.1.1, the following requirements shall be met: (See Figure 1).

(1) The indicated deviation R from O db over the frequency range from 500 cps to 30,000 cps shall not exceed the value specified in 3.5.2 q(1).
(2) The lower half-power frequency shall not exceed the value specified in 3.5.2 q (2).
(3) Any resonant frequency, F_o, at which $R > 1$ db shall not occur at less than the value specified in 3.5.2 q (3).
(4) The indicated R at any resonant frequency, F_o, shall not exceed the value specified in 3.5.2 q (4).
(5) If no resonance per item (3) above occurs, record the upper half-power frequency, F_2.

NOTE: Limits in (1) and (4) above include 1/2 db total error in measuring EP_3 and ES_2 and thus are limits on the indicated response without correction.

3.1.3 Sixty-Four Speed Resolver. The sixty-four speed resolver of the resolver assembly shall conform to the requirements of Specification ND 1002013 with the following exceptions or additions:

a. The resolver shall be tested as an RX only with P3(BLK/WHT) excited high and P1(RD/WHT) grounded. P2(YEL/WHT) shall be commoned with P4 (BLU/WHT) but ungrounded. S2(YEL/WHT) shall be commoned with S1 (RD/WHT) and grounded.



Frequency in cycles per second

FREQUENCY RESPONSE REQUIREMENTS

FIGURE I

b. Accuracy determination shall be made with loads of 5K ohms resistive ± 10 percent on both secondary windings. Relative accuracy between the two loads shall be 0.25 percent.

c. The following paragraphs of Specification ND-1002013 are not applicable:

(1) Phase Shift Variations Due to Voltage
(2) Angular Error Versus Voltage
(3) Angular Error Versus Frequency
(4) Primary Impedance Unbalance
(5) Temperature Rise
(6) Friction Torque
(7) Brush-Slip Ring Continuity
(8) Phase Shift Versus Rotation.

3.1.4 Resolver Assembly.

3.1.4.1 Cross Coupling. The resolver assembly shall be tested for cross coupling in accordance with 4.2.1.2 and shall conform to the values specified in 3.5.4 a.

3.1.4.2 Coincidence of Electrical Zero. When tested in accordance with 4.2.1.3, the electrical zeroes of the one speed and two speed resolvers shall coincide with that of the sixty-four speed resolver within the limits specified in 3.5.4 b.

3.2 DESIGN AND CONSTRUCTION. The resolver assembly shall be of the design, construction and physical dimensions shown on Drawing 1012065. The manufacture, materials, processes and mechanical and electrical construction of the resolver assembly shall be in accordance with the requirements of Specification ND-1002013. All parts, materials and processes to be used shall be submitted to the contractor for approval.

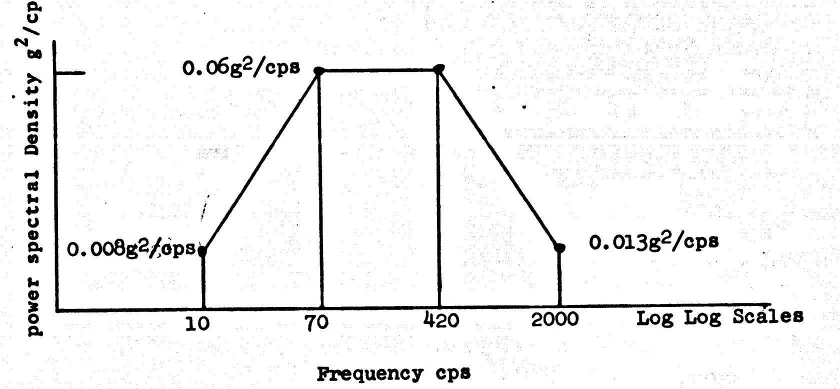
3.3 FINISHES AND PROTECTIVE TREATMENT. The resolver finishes, protective treatment and moisture, fungus and corrosion treatments shall be in accordance with the requirements of Specification ND-1002013 and Drawing 1012065. All finishes and protective coatings shall have no discontinuities on the surface they are intended to protect.

3.4 QUALIFICATION PERFORMANCE CHARACTERISTICS AND CONDITIONS.

3.4.1 Individual Resolvers. The individual resolvers shall conform to the requirements of Specification ND-1002013 with the following exceptions or additions:

3.4.1.1 Environmental.

3.4.1.1.1 Vibration, While operating, each resolver assembly shall be subjected to the following vibration requirements (Reference Figure 2). With the resolver tested as specified, the angular deviation after vibration cycling shall not exceed the values given in a and b below. Endurance test levels shall follow the same profile except that maximum level shall be $0.02g^2$/cps in lieu of $0.06g^2$/cps.



Test Time of 6 minutes per Axis

VIBRATION LEVELS

FIGURE 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

a. 10 arc seconds peak for the 1X resolver.

b. 30 arc seconds peak for the 2X resolver.

c. 1 arc second peak for the 64X resolver.

3.4.1.1.2 Shock, Operating. With the resolver tested as specified, the angular deviation after shock cycling shall not exceed:

a. 10 arc seconds peak for the 1X resolver.

b. 30 arc seconds peak for the 2X resolver.

c. 1 arc second peak for the 64X resolver.

3.4.1.1.3 Low Temperature, Operating. With the resolver subjected to a temperature of -45.5° ± 2.8°C (-50° ± 5°F) and tested as specified, the angular deviation and fundamental null voltage variation shall hot exceed:

a. 20 arc seconds peak and 20 mv, rms for the 1X resolver

b. 40 arc seconds peak and 10 mv, rms for the 2X resolver

c. 3 arc second peak and 2 mv, rms for the 64X resolver

3.4.1.1.4 High Temperature, Operating. With the resolver subjected to a temperature of 93.3° ± 2.8°C (200° ± 5°F) and tested as specified, the angular deviation and fundamental null voltage variation shall not exceed:

a. 20 arc seconds, peak and 20 mv, rms for the 1X resolver

b. 40 arc seconds, peak and 10 mv, rms for the 2X resolver

c. 3 arc second, peak and 2 mv, rms for the 64X resolver

3.4.1.1.5 52°C Temperature, Operating. With the resolver subjected to a temperature of 52° ± 2.8°C (125.6° ± 5°F) and tested as specified, the angular deviation and fundamental null voltage shall not exceed:

a. 5 arc seconds, peak and 5 mv, rms for the 1X resolver

b. 20 arc seconds, peak and 5 mv, rms for the 2X resolver

c. 1.5 arc seconds peak and 1.0 mv, rms for the 64X resolver.

3.4.1.1.6 Thermal Shock. The resolver shall be tested as specified with the low temperature specified in 3.4.1.1.3.

3.4.1.1.7 Humidity, Operating. With the resolver tested as specified, the angular deviation shall not exceed:

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

a. 10 arc seconds, peak for the 1X resolver

b. 30 arc seconds peak for the 2X resolver

c. 0.5 arc seconds, peak for the 64X resolver.

3.4.1.1.8 Thermal Vacuum. The resolver shall be tested as specified while exposed to a vacuum level of 1 x 10^{-7} mm, Hg and the low and high temperatures specified in 3.4.1.1.3 and 3.4.1.1.4, respectively.

3.4.1.2 Endurance. During the applicable portions of endurance testing, the following conditions shall be maintained:

a. Low Temperature	-34.5° ± 2.8°C (-30° ± 5°F)
b. High Temperature	37.8° ± 2.8°C (100° ± 5°F)
c. Operating Speed	0 RPM

3.4.2 Resolver Assembly. After subjection to the qualification tests for the individual resolvers, the resolver assembly shall successfully meet the requirements of 3.1.4.

3.5 DETAIL PERFORMANCE CHARACTERISTICS

3.5.1 One Speed Resolver. The one speed resolver of the resolver assembly shall have the following specific characteristics when tested at the applicable ambient conditions as specified in ND 1002013.

a. Primary	Inner Member
b. Phases	
(1) Primary	1 (and 1 internally shorted)
(2) Secondary	2
c. Test Voltage	28V ± 2%
d. Test Frequency	800 cps ± 0.5%
e. Impedances	
(1) Z_{po} (P_1-P_3 only)	185 ohms ± 30% + j 600 ohms ± 30%
(2) Z_{ps}	[illegible]
(2) Z_{so} (S_1-S_3 only)	250 ohms ± 20% + j 700 ohms ± 20%
(3) Z_{ss}	200 ohms + j 100 ohms, nominal

f. Null Voltage	
(1) Total	28 millivolts, maximum
(2) Fundamental	28 millivolts, maximum
g. Phase Shift	7°±4°
h. Transformation Ratio	1.00±3%
i. Angular Error	2 arc minutes, peak
(1) Angular Interval for Accuracy Measurement	Every 5° from -10° to +55°
j. Impedance Unbalance, Secondary	100 Z sec, max.
k. Input Current, Unloaded	45 milliamperes, nominal
m. Input Power, Unloaded	0.4 watts, nominal
n. DC Resistance	
(1) Primary	88 ohms ± 30%
(2) Secondary	130 ohms ± 30%
p. Air Gap per Side	0.003 inch, minimum

3.5.2 Two Speed Resolver. The two speed resolver of the resolver assembly shall have the following specific characteristics when tested at the applicable ambient conditions as specified in Specification ND 1002013.

a. Primary	Stator (Outer Member)
b. Test Voltage	28 V ± 2%
c. Test Frequency	800 cps±0.5%
d. Impedance	
(1) Z_{po}	400 ohms ± 30%+j1570ohms±30%
(2) Z_{so}	245 ohms±30%+j980ohms±30%
(3) Z_{ss}	325 ohms+j160ohms, nominal

e. Null Voltage	
(1) Total	20 mv, maximum
(2) Fundamental	20 mv, maximum
(3) Null vs Rotation	25 mv, maximum
f. Phase Shift	9° ± 1°
g. Phase Shift vs Voltage	±1.5° from value measured in 3.5.2f
h. Transformation Ratio	0.707±2%
i. Angular Error	2 arc minutes, peak of one speed shaft
(1) Angular Interval for Accuracy Measurement, Mechanical	Every 5° from -10° to +55°
j. Impedance Unbalance, Primary	100Z-sec, maximum
k. Primary Current, Unloaded	0.015 amps, nominal
m. Primary Power, Unloaded	0.11 watts, nominal
n. DC Resistance	
(1) Primary	250 ohms ± 35%
(2) Secondary	160 ohms ± 35%
p. Frequency Response	
(1) Midband Response	± 1.5 db, maximum
(2) Lower Half-Power Frequency	200 cps, maximum
(3) Resonant Frequency	50K cps, minimum
(4) Resonant Peak Response	+5 db, maximum
q. Air Gap per Side	0.003 inch, minimum

3.5.3 Sixty-Four Speed Resolver. The sixty-four speed resolver of the resolver assembly shall have the following specific characteristics when tested at the applicable ambient conditions as specified in Specification ND-1002013.

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

a. Primary	Inner Member
b. Phases	
(1) Primary	2
(2) Secondary	2
c. Test Voltage	28 V± 2%
d. Test Frequency	800 cps ± 0.5%
e. Impedances	
(1) Z_{po}	260 ohms±30%+j210 ohms± 30%
(2) Z_{ss}	550 ohms, maximum
f. Null Voltages	
(1) Total	20 mv, max
(2) Fundamental	20 mv, max
g. Phase Shift	50°±7°
h. Tranformation Ratio	0.179+10%-7%
i. Angular Error	10 arc seconds, peak to peak of one speed shaft and an average of ± 3 arc seconds
(1) Angular Interval for Accuracy Measurement, Mechanical	1/4° increments from -10° to +55°
j. Impedance Unbalance, Secondary	2.0 Z-sec
k. Input Current, Unloaded	0.080 amps, nominal
m. Input Power, Unloaded	1.70 watts, nominal
n. DC Resistance	
(1) Primary	250 ohms±25%
p. Air Gap per Side	0.003 inc-, minimum

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

3.5.4 Resolver Assembly. The resolver assembly shall have the following specific characteristics when tested at the ambient conditions specified in Specification ND-1002013.

a. Cross Coupling

(1) 1X to 2X output	5 mv, max.
(2) 1X to 64X output	0.1 mv, max.
(3) 2X to 1X output	5 mv, max.
(4) 2X to 64X output	0.1 mv, max.

b. Coincidence of Electrical Zero

(1) 1X elec. zero to 64X elec. zero	2 arc min, max, referred to 1X mech. shaft.
(2) 2X elec. zero to 64X elec. zero	2 arc min, max, referred to 1X mech. shaft.

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

4. QUALITY ASSURANCE PROVISIONS

4.1 GENERAL. Inspection and testing shall be in accordance with the requirements of Specification ND-1002013 and as specified herein.

4.2 TESTS

4.2.1 Description of Tests.

4.2.1.1 Frequency Response, Two Speed Resolver. The two speed resolver shall be connected as shown in Figure 2.

a. P3 (Hi) and P1 (Low and grounded) shall be connected to a signal generator having a 600 ohm source impedance.

b. The voltage, E_{P3}, shall be maintained constant at 2.0 volts, rms within 1/4 db at all frequencies measured.

c. A direct current of 10 milliamperes shall flow through this winding from P3 to P1.

d. P2 - P4 shall be commanded but ungrounded

e. S2 (Hi) and S4 (Low and grounded) shall be loaded with 30K ohms and connected to a VTVM capable of measuring E_{S2} relative to an initial setting within 1/4 db.

f. Resolver rotation shall be such that S2 -S4 is at maximum coupling and S2 is in phase with P3.

4.2.1.1.1 Test Procedure. The test shall be conducted as follows:

a. Set E_{P3} to 2.0 volts, 800 cps.

b. Measure $E_{S2} = E_R$. E_R is the reference output.

c. Vary the signal generator frequency over the required frequency range, measuring E_{S2} at enough points to determine the response versus frequency.

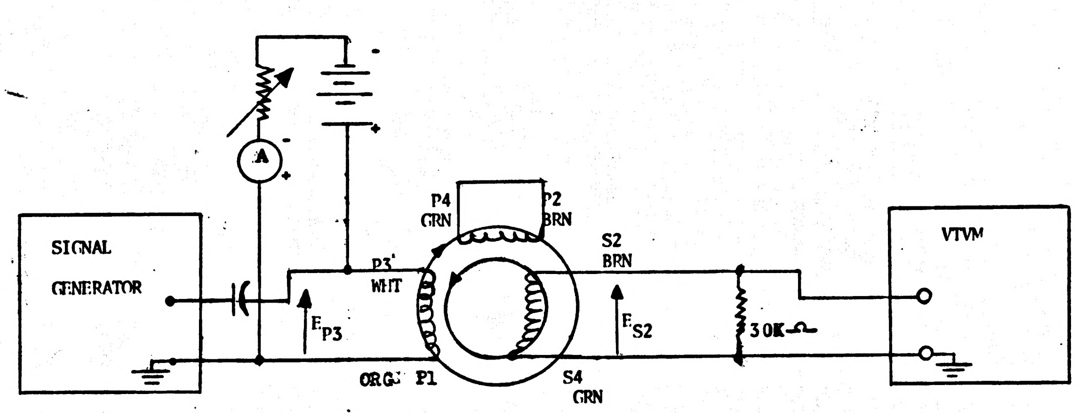
d. Express the response, R, in DB relative to E_R; that is:

$$R = 20 \log \left(\frac{E_{S2}}{E_R}\right)$$

e. Locate the lower half-power frequency, F_1, defined as the frequency at which R first drops to minus 3 db as the frequency is lowered from 800 cps.

f. Locate all resonant peaks for which $R > 1$ db.

g. If no peaks are found in the previous step, locate the upper half-power frequency, F_2, defined as the frequency at which R first drops to minus 3 db as the frequency is raised from 800 cps.


SIGNAL
GENERATOR
P4
GRN
P2
BRN
P3
WHT
E_{P3}
ORG P1
S2
BRN
E_{S2}
S4
GRN
30K Ω
VTVM

Mounting Fixture Grounded

NOTE: Resolver set at maximum coupling with S2 in phase with P3 at 800 cps (+45° mechanical from E2)

FREQUENCY RESPONSE TEST CONNECTIONS

Figure 3

4.2.1.2 Cross Coupling, Resolver Assembly. During these tests, the specified loads shall be applied to all resolvers.

4.2.1.2.1 One Speed to Two and Sixty-Four Speed Resolvers. With the one speed transmitter excited by applying 28 volts ± 2%, 800 cps ± 0.5% between P3 (Hi) and P1 (Lo) and with the primary windings of the two and sixty-four speed resolvers shorted P2 to P4 and P1 to P3, the total null voltage measured at either output phase of the two and sixty-four speed resolvers shall not exceed the values specified in 3.5.4 a as the resolver assembly is rotated from -10° to $+55^{\circ}$.

4.2.1.2.2 Two Speed to One and Sixty-Four Speed Resolvers. With the two speed resolver connected as per Figure 3 and the primary windings of the one and sixty-four speed resolvers shorted P2 to P4 and P3 to P1, the total null voltage measured at either output phase of the one speed or sixty-four speed resolver shall not exceed the values specified in 3.5.4 a as the electrical angle of the resolver standard is varied in 30° increments from 0° to 360°.

4.2.1.3 Coincidence of Electrical Zero. With the specified loads and rated test excitation applied to all resolvers, their electrical zero positions shall be determined. Each resolver shall be excited with P3 high, P1 low and the P2 - P4 winding shorted but ungrounded. The electrical zeros of both the one speed and two speed resolvers shall coincide with that determined for the sixty-four speed within the value specified in 3.5.4 b.

5. PREPARATION FOR DELIVERY. Preparation for delivery shall be in accordance with the requirements of Specification ND-1002013.

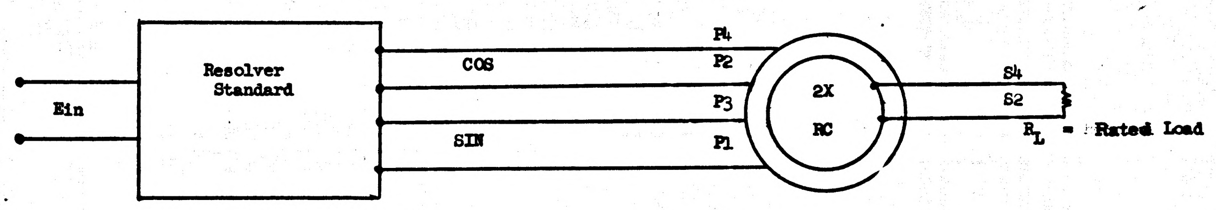
6. NOTES.

6.1 GENERAL SPECIFICATION. The notes specified in Specification ND 1002013 are applicable to this resolver assembly.

6.2 DC AVERAGE. The dc average is the algebraic sum of all error readings divided by the total number of readings.

Where:

$$DC_{AVE} = \frac{\sum_i e}{n}$$


Ein
Resolver Standard
COS
SIN
P4
P2
P3
P1
2X
RC
S4
S2
R_L = Rated Load

Ein = 28 volts ± 2%, 800 cps ± 0.5%

Cross Coupling (two speed to one and sixty-four speed transmitter)

FIGURE 18

APOLLO G&N Specification
PS 1012065 C

Original Issue Date: 17 Sept 1964
Release Authority: TDRR 12656
Class A Release

PROCUREMENT SPECIFICATION
FOR
RESOLVER ASSEMBLY, ONE, TWO AND SIXTY-FOUR SPEED

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
9/29/64	A	13103	9, 10	[illegible] 10/64	WJR
11-23-64	B	14455	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 16	WJR	[illegible]
2-9-65	C	16318	3,4,5,10,11,13,14,15	WJR	[illegible]

This specification consists of page i
and 1 to 16 inclusive.

APPROVALS	NASA/MSC	L. Hazel CCB 9/17/64	Gilbert E. Miller Dep Asst Div	[illegible] MIT/IL	R. J. [illegible] MIT STAFF	E. P. Armstrong Engr Specialist

d. Angular error shall be determined for the secondary winding, S2(BRN) -S4(GRN).only.

e. During the Angular Accuracy test, the total null between S2(BRN) -S4(GRN) shall be determined at each angular interval and shall not exceed the value specified in 3. 5. 2e (3).

f. The resolver shall be tested for variations in phase shift as the input voltage is varied from 1. 0 to 28. 0 volts in 4. 5 volts increments. The values measured shall not deviate from the nominal at 28. 0 volt input by more than the value specified in 3. 5. 2 h.

g. The following paragraphs of Specification ND-1002013 are not applicable:

(1) Angular Error Versus Voltage
(2) Angular Error Versus Frequency
(3) Temperature Rise
(4) Friction Torque
(5) Impedance Torque
(6) Brush-Slip Ring Continuity
(7) Phase Shift Versus Rotation

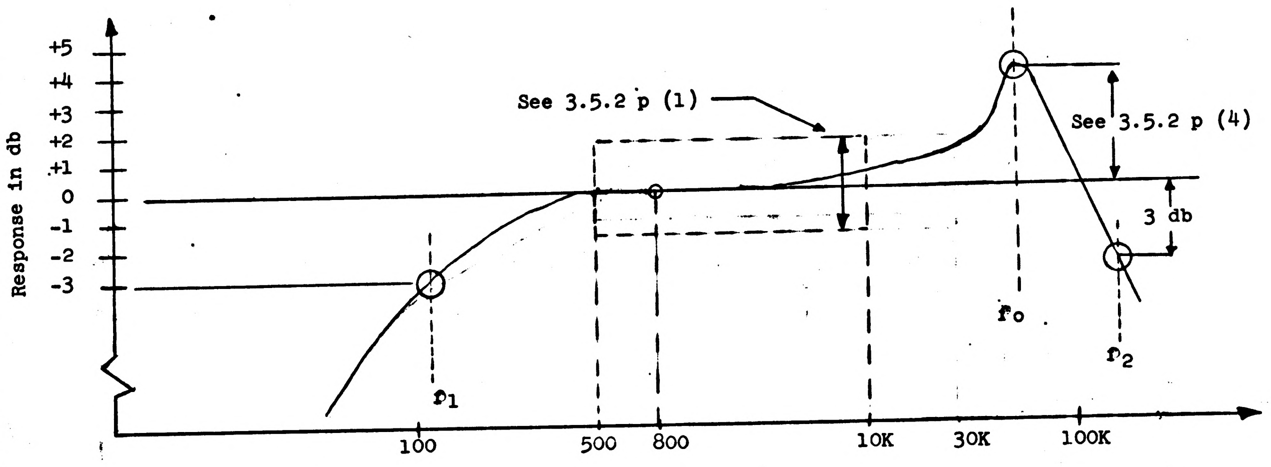
h. The frequency response of the resolver shall be measured over a frequency range extending from below the lower half-power point to above the resonant peak. When tested in accordance with 4. 2. 1. 1, the following requirements shall be met: (See Figure 1).

(1) The indicated deviation of R from 0 db over the frequency range from 500 cps to 10, 000 cps shall not exceed the value specified in 3. 5. 2 q(1). ✓
(2) The lower half-power frequency shall not exceed the value specified in 3. 5. 2 q (2).
(3) Any resonant frequency, F_o, at which R > 1 db shall not occur at less than the value specified in 3. 5. 2 q (3).
(4) The indicated R at any resonant frequency, F_o, shall not exceed the value specified in 3. 5. 2 q (4).
(5) If no resonance per item (3) above occurs, record the upper half-power frequency, F_2.

NOTE: Limits in (1) and (4) above inclu [illegible]/2 db total error in measuring EP_3 and ES_2 and thus are limits on the indicated response without correction.

3. 1. 3 Sixty-Four Speed Resolver. The sixty-four speed resolver of the resolver assembly shall conform to the requirements of Specification ND 1002013 with the following exceptions or additions:

a. The resolver shall be tested as an RX only with P3(BLK/WHT) excited high and P1(RD/WHT) grounded. P2(YEL/WHT) shall be commoned with P4 (BLU/WHT) but ungrounded. S2(YEL/WHT) shall be commoned with S1 (RD/WHT) and grounded.



FREQUENCY RESPONSE REQUIREMENTS

FIGURE 1

b. Accuracy determination shall be made with loads of 15K ohms resistive ± 10 percent on both secondary windings. Relative accuracy between the two loads shall be 0.25 percent.

c. The following paragraphs of Specification ND-1002013 are not applicable:

(1) Phase Shift Variations Due to Voltage
(2) Angular Error Versus Voltage
(3) Angular Error Versus Frequency
(4) Primary Impedance Unbalance
(5) Temperature Rise
(6) Friction Torque
(7) Brush-Slip Ring Continuity
(8) Phase Shift Versus Rotation.

3.1.4 Resolver Assembly.

3.1.4.1 Cross Coupling. The resolver assembly shall be tested for cross coupling in accordance with 4.2.1.2 and shall conform to the values specified in 3.5.4 a.

3.1.4.2 Coincidence of Electrical Zero. When tested in accordance with 4.2.1.3, the electrical zeroes of the one speed and two speed resolvers shall coincide with that of the sixty-four speed resolver within the limits specified in 3.5.4 b.

3.2 DESIGN AND CONSTRUCTION. The resolver assembly shall be of the design, construction and physical dimensions shown on Drawing 1012065. The manufacture, materials, processes and mechanical and electrical construction of the resolver assembly shall be in accordance with the requirements of Specification ND-1002013. All parts, materials and processes to be used shall be submitted to the contractor for approval.

3.3 FINISHES AND PROTECTIVE TREATMENT. The resolver finishes, protective treatment and moisture, fungus and corrosion treatments shall be in accordance with the requirements of Specification ND-1002013 and Drawing 1012065. All finishes and protective coatings shall have no discontinuities on the surface they are intended to protect.

3.4 QUALIFICATION PERFORMANCE CHARACTERISTICS AND CONDITIONS.

3.4.1 Individual Resolvers. The individual resolvers shall conform to the requirements of Specification ND-1002013 with the following exceptions or additions:

3.4.1.1 Environmental.

3.4.1.1.1 Vibration. While operating, each resolver assembly shall be subjected to the following vibration requirements (Reference Figure 2). With the resolver tested as specified, the angular deviation after vibration cycling shall not exceed the values given in a and b below. Endurance test levels shall follow the same profile except that maximum level shall be $0.02g^2$/cps in lieu of $0.06g^2$/cps.

e. Null Voltage	
(1) Total	20 mv, maximum
(2) Fundamental	20 mv, maximum
(3) Null vs Rotation	25 mv, maximum
f. Phase Shift	9° ± 1°
g. Phase Shift vs Voltage	±1.5° from value measured in 3.5.2f
h. Transformation Ratio	0.707±2%
i. Angular Error	2 arc minutes, peak of one speed shaft
(1) Angular Interval for Accuracy Measurement, Mechanical	Every 5° from -10° to +55°
j. Impedance Unbalance, Primary	100Z-sec, maximum
k. Primary Current, Unloaded	0.015 amps, nominal
m. Primary Power, Unloaded	0.11 watts, nominal
n. DC Resistance	
(1) Primary	250 ohms ± 35%
(2) Secondary	160 ohms ± 35%
p. Frequency Response	
(1) Midband Response	± 1.5 db, maximum
(2) Lower Half-Power Frequency	200 cps, maximum
(3) Resonant Frequency	31.5K cps, minimum
(4) Resonant Peak Response	+7 db, maximum
q. Air Gap per Side	0.003 inch, minimum

3.5.3 Sixty-Four Speed Resolver. The sixty-four speed resolver of the resolver assembly shall have the following specific characteristics when tested at the applicable ambient conditions as specified in Specification ND-1002013.

a. Primary	Inner Member
b. Phases	
(1) Primary	2
(2) Secondary	2
c. Test Voltage	28 V± 2%
d. Test Frequency	800 cps ± 0.5%
e. Impedances	
(1) Z_{po}	260 ohms±30%+j210 ohms± 30%
(2) Z_{ss}	550 ohms, maximum
f. Null Voltages	
(1) Total	20 mv, max
(2) Fundamental	20 mv, max
g. Phase Shift	50°±7°
h. Tranformation Ratio	0.179+10%-7%
i. Angular Error	10 arc seconds, peak to peak of one speed shaft and an average of ± 3 arc seconds
(1) Angular Interval for Accuracy Measurement, Mechanical	1/4° increments from -10° to +55°
j. Impedance Unbalance, Secondary	2.0 Z-sec
k. Input Current, Unloaded	0.080 amps, nominal
m. Input Power, Unloaded	1.70 watts, nominal
n. DC Resistance	
(1) Primary	250 ohms±25%
p. Air Gap per Side	0.003 inch, minimum

4. QUALITY ASSURANCE PROVISIONS

4.1 GENERAL Inspection and testing shall be in accordance with the requirements of Specification ND-1002013 and as specified herein.

4.2 TESTS

4.2.1 Description of Tests.

4.2.1.1 Frequency Response, Two Speed Resolver. The two speed resolver shall be connected as shown in Figure 3.

a. P3 (Hi) and P1 (Low and grounded) shall be connected to a signal generator having a 600 ohm source impedance.

b. The voltage, E_{P3}, shall be maintained constant at 2.0 volts, rms within 1/4 db at all frequencies measured.

c. A direct current of 10 milliamperes shall flow through this winding from P3 to P1.

d. P2-P4 shall be commonded but ungrounded

e. S2 (Hi) and S4 (Low and grounded) shall be loaded with 20K ohms ±10 percent in parallel with $C_L = 370$ pf minimum (including meter and external cable capacitance) and connected to a VTMV capable of measuring E_{S2} relative to an initial setting within 1/4 db.

f. Resolver rotation shall be such that S2-S4 is at maximum coupling and S2 is in phase with P3.

4.2.1.1.1 Test Procedure. The test shall be conducted as follows:

a. Set E_{P3} to 2.0 volts, 800 cps.

b. Measure $E_{S2} = E_R$. E_R is the reference output.

c. Vary the signal generator frequency over the required frequency range, measuring E_{S2} at enough points to determine the response versus frequency.

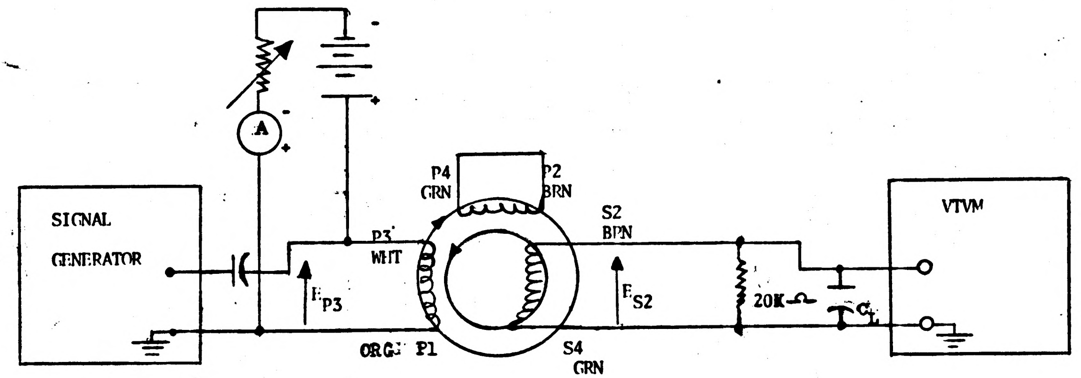
d. Express the response, R, in DB relative to E_R; that is:

$$R = 20 \log \left(\frac{E_{S2}}{E_R}\right)$$

e. Locate the lower half-power frequency, F_1, defined as the frequency at which R first drops to minus 3 db as the frequency is lowered from 800 cps.

f. Locate all resonant peaks for which $R > 1$ db.

g. If no peaks are found in the previous step, locate the upper half-power frequency, F_2, defined as the frequency at which R first drops to minus 3 db as the frequency is raised from 800 cps.


SIGNAL
GENERATOR
A
P3
WHT
E_{P3}
ORG P1
P4
GRN
P2
BRN
S2
BRN
E_{S2}
S4
GRN
20K Ω
C_L
VTVM

Mounting Fixture Grounded

NOTE: Resolver set at maximum coupling with S2 in phase with P3 at 800 cps (+45° mechanical from EZ) C_L includes all shunt capacitance beyond the resolver Assembly Connector.

FREQUENCY RESPONSE TEST CONNECTIONS

Figure 3

4.2.1.2 Cross Coupling, Resolver Assembly. During these tests, the specified loads shall be applied to all resolvers.

4.2.1.2.1 One Speed to Two and Sixty-Four Speed Resolvers. With the one speed transmitter excited by applying 28 volts ± 2%, 800 cps ± 0.5% between P3 (Hi) and P1 (Lo) and with the primary windings of the two and sixty-four speed resolvers shorted P2 to P4 and P1 to P3, the total null voltage measured at either output phase of the two and sixty-four speed resolvers shall not exceed the values specified in 3.5.4 a as the resolver assembly is rotated from -10° to + 55°.

4.2.1.2.2 Two Speed to One and Sixty-Four Speed Resolvers. With the two speed resolver connected as per Figure 4 and the primary windings of the one and sixty-four speed resolvers shorted P2 to P4 and P3 to P1, the total null voltage measured at either output phase of the one speed or sixty-four speed resolver shall not exceed the values specified in 3.5.4 a as the electrical angle of the resolver standard is varied in 30° increments from 0° to 360°.

4.2.1.3 Coincidence of Electrical Zero. With the specified loads and rated test excitation applied to all resolvers, their electrical zero positions shall be determined. Each resolver shall be excited with P3 high, P1 low and the P2 - P4 winding shorted but ungrounded. The electrical zeros of both the one speed and two speed resolvers shall coincide with that determined for the sixty-four speed within the value specified in 3.5.4 b.

5. PREPARATION FOR DELIVERY. Preparation for delivery shall be in accordance with the requirements of Specification ND-1002013.

6. NOTES.

6.1 GENERAL SPECIFICATION. The notes specified in Specification ND 1002013 are applicable to this resolver assembly.

6.2 DC AVERAGE. The dc average is the algebraic sum of all error readings divided by the total number of readings.

Where:

$$DC_{AVE} = \frac{\sum_{1} e}{n}$$

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1012065

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS I.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL REQUIREMENTS SPECIFIED IN PROCUREMENT SPECIFICATION PS1012065.
   - D. UNIT SHALL BE SHIPPED MOUNTED ON A FIXTURE WHICH PREVENTS ROTOR (INNER MEMBER) FROM CONTACTING STATOR (OUTER MEMBER). PACKAGING SHALL BE PER ND1002215 CLASS II
2. INSPECTION AND ACCEPTANCE
   - A. UNIT SHALL BE CAPABLE OF MEETING INSPECTION AND ACCEPTANCE REQUIREMENTS OF PS 1012065.
   - B. MECHANICAL
     1. DIMENSIONS AS SHOWN
     2. ALL MECHANICAL DIMENSIONS APPLY WHEN DISTANCE BETWEEN SURFACES X AND Y EQUALS .045. UNITS MUST MEET ALL OTHER REQUIREMENTS WHEN DISTANCE BETWEEN X AND Y IS VARIED TO ANY FIXED POSITION BETWEEN .035 AND .055
     3. NO PORTION OF UNIT, INCLUDING FASTENERS AND WIRES, SHALL PROJECT BEYOND SPECIFIED RADIUS
     4. NO PORTION OF ROTOR SHALL PROJECT BEYOND SURFACE Z.
     5. INTERNAL WIRING SHALL BE ARRANGED TO ALLOW ROTOR MECHANICAL ROTATION 82° MIN IN A CLOCKWISE DIRECTION AND 43° MIN IN A COUNTER-CLOCKWISE DIRECTION FROM POSITION SHOWN WHEN VIEWED FROM SIDE WITH INDEX MARKS.
     6. MARK REFERENCE DESIGNATIONS ON RESOLVER AND CONNECTORS, .12±.02 HIGH, PER ND 1002019.
     7. EXTERNAL WIRES PER MIL-W-16878, TYPE AND SIZE E-28, COLOR CODED IN ACCORDANCE WITH FIGURES I, II, AND III.
     8. TWIST EXTERNAL WIRES, PER WIRING LEGEND, IN ACCORDANCE WITH ND 1002032.
     9. LACE EXTERNAL WIRES PER ND10112032 USING 1011753-001
     10. POT CONNECTORS IN ACCORDANCE WITH ND1002236
         - a. POTTING SHALL NOT INTERFERE WITH POLARITY SCREW OPERATION
         - b. POTTING SHALL COVER WIRE INSULATION FOR A MINIMUM OF 1/8 INCH.
     11. IDENTIFY USING NASA DRAWING NUMBER, REV LETTER AND MANUFACTURERS SYMBOL PER ND1002019 AND SERIAL NUMBER PER ND 1002023.
   - C. ELECTRICAL
     1. WHEN RESOLVER ASSEMBLY IS AT ELECTRICAL ZERO, THE TWO INDEX MARKS SHALL BE ALIGNED WITHIN 2°
     2. FOR ALL RESOLVERS, A POSITIVE ANGLE "A" OCCURS WHEN THE INNER MEMBER IS ROTATED CCW FROM ELECTRICAL ZERO WHEN VIEWED IN THE DIRECTION OF THE ORIENTATION ARROW.
     3. WITH VOLTAGES DEFINED BY FIGURE I, THE 64-SPEED RESOLVER, B1, SHALL SATISFY THE FOLLOWING EQUATIONS:

        $E_{S3} = K_1 (E_{P3} \cos 64A - E_{P4} \sin 64A)$

        $E_{S4} = K_1 (E_{P3} \sin 64A + E_{P4} \cos 64A)$

        INNER MEMBER IS PRIMARY.
     4. WITH VOLTAGES DEFINED BY FIGURE II, THE TWO-SPEED RESOLVER, B2, SHALL SATISFY THE FOLLOWING EQUATION:

        $E_{S4} = K_2 (E_{P4} \cos 2A - E_{P3} \sin 2A)$

        INCLUSION OF SECOND SECONDARY PHASE (S1-S3) OPTIONAL. IF INCLUDED, LEADS SHALL BE TERMINATED INTERNALLY OPEN CIRCUIT. OUTER MEMBER IS PRIMARY.
     5. WITH VOLTAGES DEFINED BY FIGURE III, THE ONE-SPEED RESOLVER, B3, SHALL SATISFY THE FOLLOWING EQUATIONS:

        $E_{S3} = K_3 E_{P3} \cos A$

        $E_{S4} = K_3 E_{P3} \sin A$

        INNER MEMBER IS PRIMARY.
3. DESIGN
   - A. UNIT SHALL MEET THE DESIGN REQUIREMENTS SPECIFIED IN PS1012065
   - B. MECHANICAL
     1. UNIT SHALL MEET ALL OPERATIONAL REQUIREMENTS WHEN ROTOR IS MOUNTED ON A TAPERED SHAFT WHICH MAY HAVE UP TO .0001 T.I.R. RUNOUT WHEN RUN ON ITS BEARINGS, AND 4.4374 DIAMETER OF STATOR IS MOUNTED IN A 4.4375 $^{+.0003}_{-.000}$ DIAMETER HOLE WHICH MAY BE ECCENTRIC TO ITS BEARING BORE BY .0002 T.I.R.
     2. ROTOR HUBS AND STATOR HOUSINGS SHALL BE BERYLLIUM PER ND1002125 HEAT TREATED PER ND 1002114. FASTENERS AND THREADED ROTOR LOCKING NUT SHALL BE CORROSION-RESISTANT STEEL.
     3. ROTOR LOCKING NUT SHALL BE BONDED TO ROTOR HUB.
     4. WIRES SHALL BE GROUPED AS INDICATED AND PASS THROUGH HOUSING AT APPROXIMATE LOCATIONS SHOWN. ONLY ONE WIRE SHALL PASS THROUGH EACH HOLE IN GROMMET OR EQUIVALENT. FIT OF WIRE IN GROMMET AND GROMMET IN HOUSING SHALL PROVIDE A CASUAL SEAL. WIRES SHALL NOT INTERFERE WITH ASSEMBLING AND TIGHTENING OF SCREWS IN MOUNTING SLOTS.
     5. SUITABLE STRAIN RELIEF SHALL BE PROVIDED FOR WIRES AT INNER SIDE OF GROMMETS
     6. EACH SOLDER JOINT, AT CONNECTORS, SHALL BE PROTECTED WITH INSULATION SLEEVING 1010490.
     7. TOTAL WEIGHT OF UNIT SHALL NOT EXCEED 2 LBS.
   - C. ELECTRICAL
     1. SOLDER CONDUCTORS TO CONNECTORS, PER WIRING LEGEND, IN ACCORDANCE WITH ND1002071.
4. SPECIAL CONDITIONING
   - A. PRIOR TO INSPECTION AND ACCEPTANCE TESTS, UNIT SHALL BE TEMPERATURE CYCLED TWICE AT A SLOW RATE FROM ROOM AMBIENT TO +93° ±3°C THEN TO -50° ±5°C AND BACK TO ROOM AMBIENT.

PROCURE ONLY FROM APPROVED SOURCE OF SUPPLY LISTED ON ND1012034 FOR THIS DRAWING.

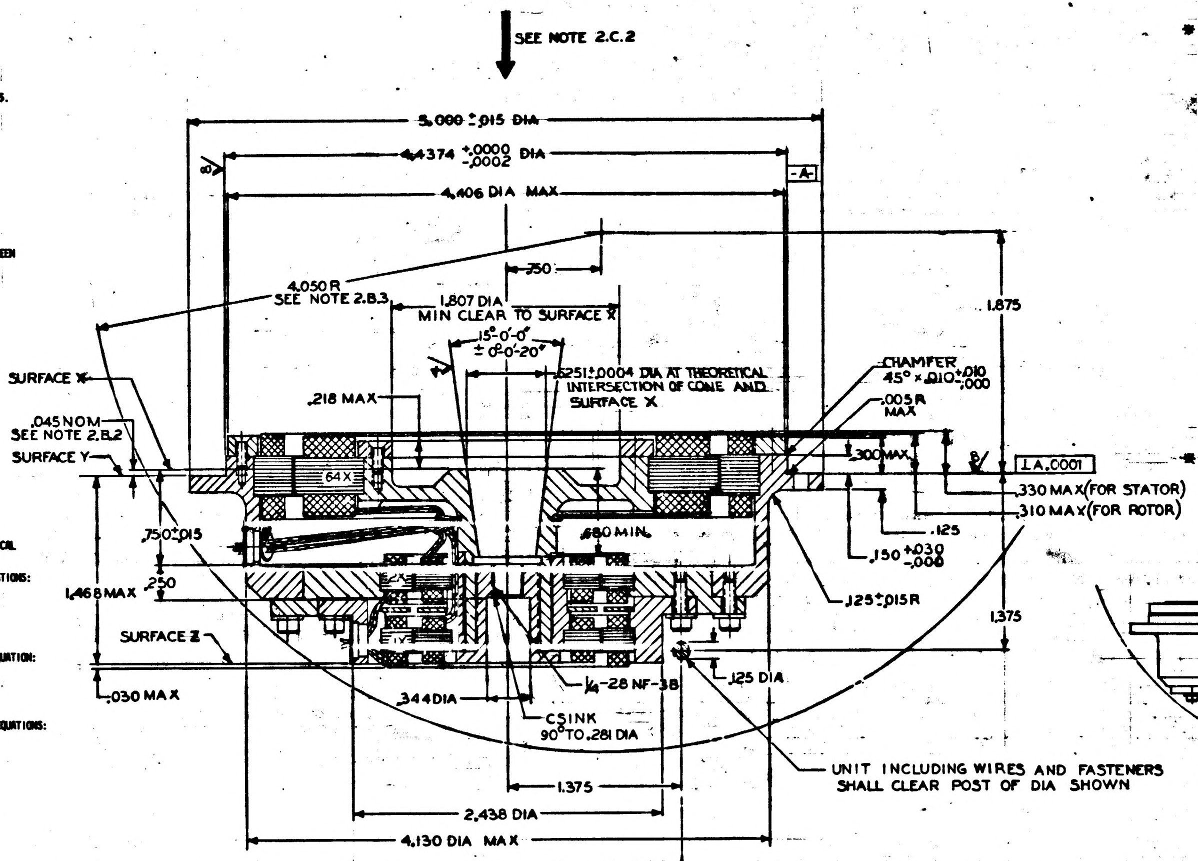
REVISIONS 12675

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR #				

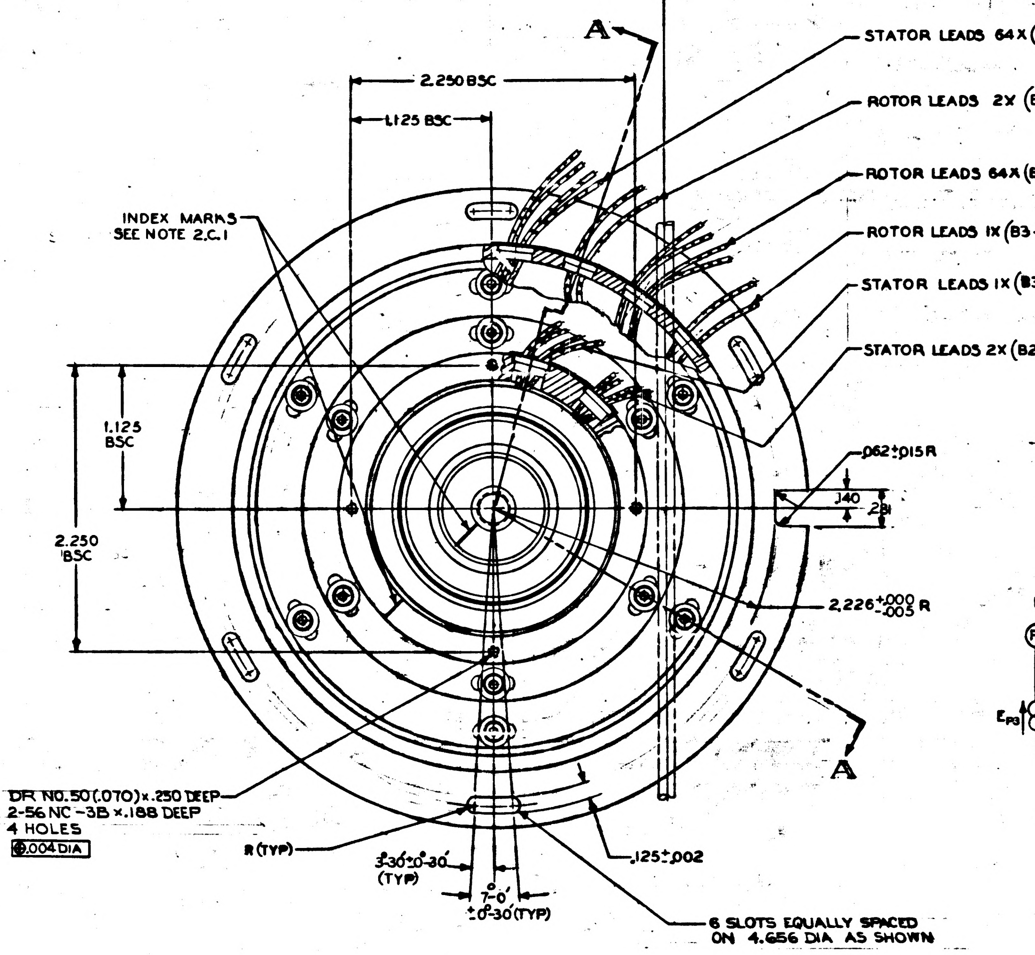
WIRING LEGEND

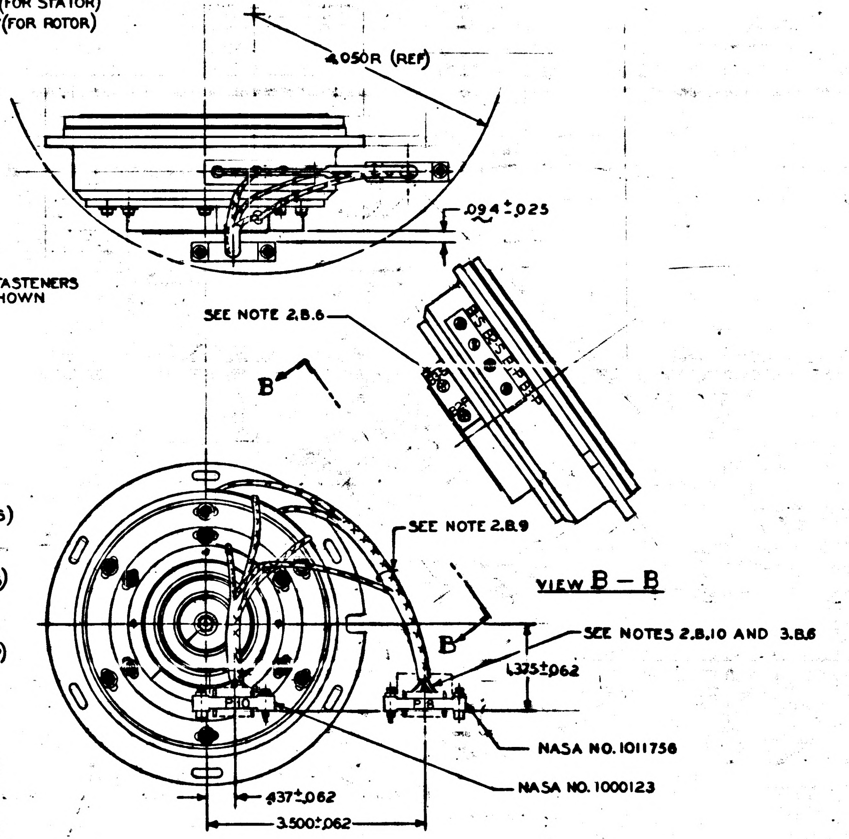
** COND NO.	COLOR	FROM	TO	SEE NOTE
D1	YELLOW-WHITE	B1 — P2	P8 — D	8
D2	BLUE-WHITE	B1 — P4	P8 — H	
D3	BLACK-WHITE	B1 — P3	P8 — L	8
D4	RED - WHITE	B1 — P1	P8 — P	
D5	BLUE - WHITE	B1 — S4	P8 — Z	8
D6	YELLOW-WHITE	B1 — S2	P8 — c	
D7	RED - WHITE	B1 — S1	P8 — b	8
D8	BLACK-WHITE	B1 — S3	P8 — e	
D9	WHITE	B2 — P3	P8 — V	8
D10	ORANGE	B2 — P1	P8 — Y	
D11	GREEN	B2 — S4	P10 — A	8
D12	BROWN	B2 — S2	P10 — D	
D13	BROWN	B2 — P2	P10 — H	8
D14	GREEN	B2 — P4	P10 — L	
D15	BLACK	B3 — S3	P10 — W	8
D16	RED	B3 — S1	P10 — Z	
D17	YELLOW	B3 — S2	P10 — Y	8
D18	BLUE	B3 — S4	P10 — b	
D19	RED	B3 — P1	P10 — C	8
D20	BLACK	B3 — P3	P10 — F	

** CONDUCTORS NUMBERS FOR REFERENCE ONLY WIRES SHALL NOT BE MARKED

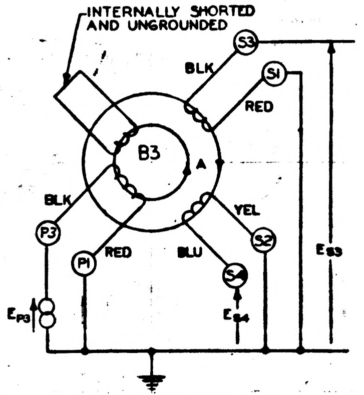

SEE NOTE 2.C.2
5.000 ±.015 DIA
4.4374 +.0000 -.0002 DIA
-A-
4.406 DIA MAX
4.050 R SEE NOTE 2.B.3
.750
1.807 DIA MIN CLEAR TO SURFACE X
15°-0'-0" ± 0°-0'-20"
.6251±.0004 DIA AT THEORETICAL INTERSECTION OF CONE AND SURFACE X
CHAMFER 45° x .010 +.010 -.000
.005 R MAX
1.875
SURFACE X
.218 MAX
.045 NOM SEE NOTE 2.B.2
SURFACE Y
64X
.300 MAX
⊥ A .0001
.330 MAX (FOR STATOR)
.310 MAX (FOR ROTOR)
.125
.150 +.030 -.000
.750±.015
.680 MIN
.125±.015R
1.468 MAX
.250
1.375
SURFACE Z
.030 MAX
.344 DIA
1/4-28 NF-3B
.125 DIA
CSINK 90° TO .281 DIA
UNIT INCLUDING WIRES AND FASTENERS SHALL CLEAR POST OF DIA SHOWN
1.375
2.438 DIA
4.130 DIA MAX

SECTION A-A
SCALE 2/1

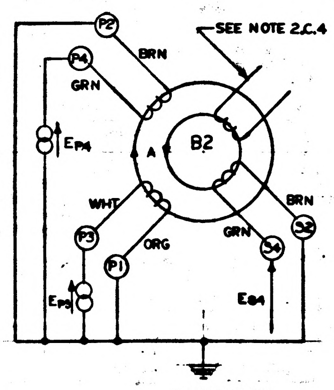

A
STATOR LEADS 64X (B1-S)
ROTOR LEADS 2X (B2-S)
ROTOR LEADS 64X (B1-P)
ROTOR LEADS 1X (B3-P)
STATOR LEADS 1X (B3-S)
STATOR LEADS 2X (B2-P)
2.250 BSC
1.125 BSC
INDEX MARKS SEE NOTE 2.C.1
1.125 BSC
2.250 BSC
.062±.015R
.140
.281
2.226 +.000 -.005 R
A
DR NO.50 (.070) x .250 DEEP
2-56 NC-3B x .188 DEEP
4 HOLES
⊕ .004 DIA
R (TYP)
3°-30'±0°-30' (TYP)
7°-0' ±0°-30' (TYP)
.125±.002
6 SLOTS EQUALLY SPACED ON 4.656 DIA AS SHOWN


4.050R (REF)
.094±.025
SEE NOTE 2.B.6
B
SEE NOTE 2.B.9
B
SEE NOTES 2.B.10 AND 3.B.6
1.375±.062
P10
P8
NASA NO. 1011758
NASA NO. 1000123
.437±.062
3.500±.062

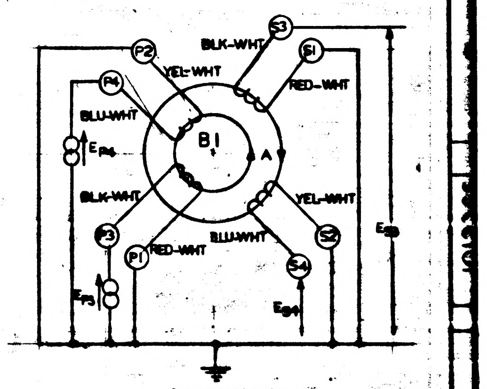
VIEW B - B


INTERNALLY SHORTED AND UNGROUNDED
S3
BLK
S1
RED
B3
A
BLK
YEL
P3
P1
RED
BLU
S2
S4
E_P3
E_S4
E_S3

1X RESOLVER
FIGURE III


P2
SEE NOTE 2.C.4
P4
BRN
GRN
E_P4
A
B2
WHT
BRN
P3
GRN
S2
ORG
S4
P1
E_P3
E_S4

2X RESOLVER
FIGURE II


S3
P2
BLK-WHT
S1
YEL-WHT
RED-WHT
P4
BLU-WHT
B1
E_P4
A
BLK-WHT
YEL-WHT
P3
BLU-WHT
S2
P1
RED-WHT
S4
E_P3
E_S4
E_S3

64X RESOLVER
FIGURE I

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
2011890	2011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± —   DECIMALS ±.005   ANGLES ± 1°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN E. DRAPALA 9-16-64
CHECKED T. SULLIVAN 9-17-64
APPROVED 9-17-64
APPROVED R. J. Thiessen 9-17-64
APPROVED MIT L. Hofel
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESOLVER ASSEMBLY
1 SPEED, 2 SPEED AND 64 SPEED
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE E
DRAWING NO. 1012065
SCALE 1/1 & 2/1
SHEET 1 OF

APOLLO G&N Specification
PS 1012065

Original Issue Date: 17 Sept 1964
Release Authority: TDRR 12656
Class A Release

PROCUREMENT SPECIFICATION
FOR
RESOLVER ASSEMBLY, ONE, TWO AND SIXTY-FOUR SPEED

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA

This specification consists of page i
and 1 to 15 inclusive.

APPROVALS	NASA/MSC	D. Hazel CCO 9/17/64	Dep Dir. Div	D A Koso asst Dir MIT/IL	R. J. Thessin MIT STAFF	E. P. Armstrong Eng Specialist

PROCUREMENT SPECIFICATION

RESOLVER ASSEMBLY, ONE, TWO AND SIXTY-FOUR SPEED

1. SCOPE

1.1 This specification establishes the requirements for the procurement of the One, Two and Sixty-Four Speed Resolver Assembly, hereinafter called the resolver assembly.

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on the date of invitation for bids from a part of this specification to the extent specified herein.

SPECIFICATIONS

APOLLO G&N

ND-1002013	Resolvers, Electrical, AC, General Specification for

DRAWINGS

APOLLO G&N

1012065	Resolver Assembly, One, Two and Sixty-Four Speed

3. REQUIREMENTS

3.1 GENERAL

3.1.1 One Speed Resolver. The one speed resolver of the resolver assembly shall conform to the requirements of Specification ND-1002013 with the following exceptions or additions:

a. Accuracy determination shall be made with loads of 2000 ohms ± 10 percent on both secondary windings. The relative accuracy between the two loads shall be ± 0.25 percent.

b. The resolver shall be tested as an RX only with P3 (BLK) excited high and P1 (RD) grounded.

c. The following paragraphs of Specification ND 1002013 are not applicable.

(1) Phase Shift Variations Due to Voltage
(2) Angular Error Versus Voltage
(3) Angular Error Versus Frequency
(4) Primary Impedance Unbalance
(5) Temperature Rise
(6) Friction Torque
(7) Brush Slip Ring Continuity

d. Measurement of air gap per side shall be made and shall conform to the value listed in 3.5.1q.

3.1.2 Two Speed Resolver. The two speed resolver of the resolver assembly shall conform to the requirements of Specification ND-1002013 with the following exceptions or additions:

a. Color coding of lead wire shall be as follows:

Lead	Color
P1	Orange
P3	White
P2	Brown
P4	Green
S2	Brown
S4	Green

b. The resolver shall be tested as an RC only.

c. Accuracy determination shall be made with a load of 5000 ohms ± 10 percent across the secondary winding, S2(BRN) - S4(GRN).

d. Angular error shall be determined for the secondary winding, S2(BRN) -S4(GRN).only.

e. During the Angular Accuracy test, the total null between S2(BRN) -S4(GRN) shall be determined at each angular interval and shall not exceed the value specified in 3. 5. 2e (3).

f. The resolver shall be tested for variations in phase shift as the input voltage is varied from 1. 0 to 28. 0 volts in 4. 5 volts increments. The values measured shall not deviate from the nominal at 28. 0 volt input by more than the value specified in 3. 5. 2 h.

g. The following paragraphs of Specification ND-1002013 are not applicable:

(1) Angular Error Versus Voltage
(2) Angular Error Versus Frequency
(3) Temperature Rise
(4) Friction Torque
(5) Impedance Torque
(6) Brush-Slip Ring Continuity

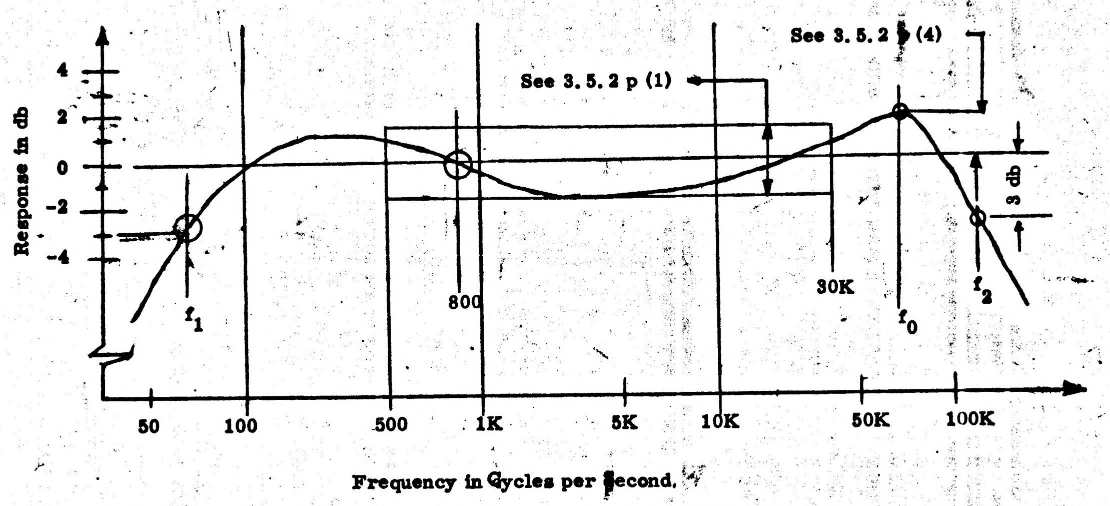
h. The frequency response of the resolver shall be measured over a frequency range extending from below the lower half-power point to above the resonant peak. When tested in accordance with 4. 2. 1. 1, the following requirements shall be met: (See Figure 1).

(1) The indicated deviation R from O db over the frequency range from 500 cps to 30, 000 cps shall not exceed the value specified in 3. 5. 2 q(1).
(2) The lower half-power frequency shall not exceed the value specified in 3. 5. 2 q (2).
(3) Any resonant frequency, F_o, at which $R > 1$ db shall not occur at less than the value specified in 3. 5. 2 q (3).
(4) The indicated R at any resonant frequency, F_o, shall not exceed the value specified in 3. 5. 2 q (4).
(5) If no resonance per item (3) above occurs, record the upper half-power frequency, F_2.

NOTE: Limits in (1) and (4) above include 1/2 db total error in measuring EP_3 and ES_2 and thus are limits on the indicated response without correction.

3. 1. 3 Sixty-Four Speed Resolver. The sixty-four speed resolver of the resolver assembly shall conform to the requirements of Specification ND 1002013 with the following exceptions or additions:

a. The resolver shall be tested as an RX only with P3(BLK/WHT) excited high and P1(RD/WHT) grounded. P2(YEL/WHT) shall be commoned with P4 [illegible]/WHT) but ungrounded. S2(YEL/WHT) shall be commoned with S1 (RD/WHT) and grounded.



FREQUENCY RESPONSE REQUIREMENTS

FIGURE 1

b. Accuracy determination shall be made with loads of 5K ohms resistive ± 10 percent on both secondary windings. Relative accuracy between the two loads shall be 0.25 percent.

c. The following paragraphs of Specification ND-1002013 are not applicable:

(1) Phase Shift Variations Due to Voltage
(2) Angular Error Versus Voltage
(3) Angular Error Versus Frequency
(4) Primary Impedance Unbalance
(5) Temperature Rise
(6) Friction Torque
(7) Brush-Slip Ring Continuity
(8) Phase Shift Versus Rotation.

3.1.4 Resolver Assembly.

3.1.4.1 Cross Coupling. The resolver assembly shall be tested for cross coupling in accordance with 4.2.1.2 and shall conform to the values specified in 3.5.4 a.

3.1.4.2 Coincidence of Electrical Zero. When tested in accordance with 4.2.1.3, the electrical zeroes of the one speed and two speed resolvers shall coincide with that of the sixty-four speed resolver within the limits specified in 3.5.4 b.

3.2 DESIGN AND CONSTRUCTION. The resolver assembly shall be of the design, construction and physical dimensions shown on Drawing 1012065. The manufacture, materials, processes and mechanical and electrical construction of the resolver assembly shall be in accordance with the requirements of Specification ND-1002013. All parts, materials and processes to be used shall be submitted to the contractor for approval.

3.3 FINISHES AND PROTECTIVE TREATMENT. The resolver finishes, protective treatment and moisture, fungus and corrosion treatments shall be in accordance with the requirements of Specification ND-1002013 and Drawing 1012065.

3.4 QUALIFICATION PERFORMANCE CHARACTERISTICS AND CONDITIONS.

3.4.1 Individual Resolvers. The individual resolvers shall conform to the requirements of Specification ND-1002013 with the following exceptions or additions:

3.4.1.1 Environmental.

3.4.1.1.1 Vibration, Operating Condition. With the resolver tested as specified, the angular deviation shall not exceed:

a. 10 arc seconds peak for the 1X resolver

b. 30 arc seconds peak for the 2X resolver

c. 1 arc second peak for the 64X resolver.

3.4.1.1.2 Shock, Operating. With the resolver tested as specified, the angular deviation shall not exceed:

a. 10 arc seconds peak for the 1X resolver

b. 30 arc seconds peak for the 2X resolver

c. 1 arc second peak for the 64X resolver.

3.4.1.1.3 Low Temperature, Operating. With the resolver subjected to a temperature of -73.3° ± 2.8°C (-100° ± 5°F) and tested as specified, the angular deviation and fundamental null voltage variation shall not exceed:

a. 20 arc seconds peak and 20 mv, rms for the 1X resolver

b. 40 arc seconds peak and 10 mv, rms for the 2X resolver

c. 3 arc second peak and 2 mv, rms for the 64X resolver

3.4.1.1.4 High Temperature, Operating. With the resolver subjected to a temperature of 93.3° ± 2.8°C (200° ± 5°F) and tested as specified, the angular deviation and fundamental null voltage variation shall not exceed:

a. 20 arc seconds, peak and 20 mv, rms for the 1X resolver

b. 40 arc seconds, peak and 10 mv, rms for the 2X resolver

c. 3 arc second, peak and 2 mv, rms for the 64X resolver

3.4.1.1.5 52°C Temperature, Operating. With the resolver subjected to a temperature of 52° ± 2.8°C (125.6° ± 5°F) and tested as specified, the angular deviation and fundamental null voltage shall not exceed:

a. 5 arc seconds, peak and 5 mv, rms for the 1X resolver

b. 20 arc seconds, peak and 5 mv, rms for the 2X resolver

c. 1.5 arc seconds peak and 1.0 mv, rms for the 64X resolver.

3.4.1.1.6 Thermal Shock. The resolver shall be tested as specified with the low temperature specified in 3.4.1.1.3.

3.4.1.1.7 Humidity, Operating. With the resolver tested as specified, the angular deviation shall not exceed:

a. 10 arc seconds, peak for the 1X resolver

b. 30 arc seconds, peak for the 2X resolver

c. 0.5 arc seconds, peak for the 64X resolver.

3.4.1.1.8 Thermal Vacuum. The resolver shall be tested as specified while exposed to a vacuum level of 1 x 10^{-7} mm, Hg and the low and high temperatures specified in 3.4.1.1.3 and 3.4.1.1.4, respectively.

3.4.1.2 Endurance. During the applicable portions of endurance testing, the following conditions shall be maintained:

a. Low Temperature	-40° ± 2.8°C (-40° ± 5°F)
b. High Temperature	37.8° ± 2.8°C (100° ± 5°F)
c. Operating Speed	0 RPM

3.4.2 Resolver Assembly. After subjection to the qualification tests for the individual resolvers, the resolver assembly shall successfully meet the requirements of 3.1.4.

3.5 DETAIL PERFORMANCE CHARACTERISTICS

3.5.1 One Speed Resolver. The one speed resolver of the resolver assembly shall have the following specific characteristics when tested at the applicable ambient conditions as specified in ND 1002013.

a. Primary	Inner Member
b. Phases	
(1) Primary	2
(2) Secondary	2
c. Test Voltage	28V ± 2%
d. Test Frequency	800 cps ± 0.5%
e. Impedances	
(1) Z_{po} (P_1-P_3 only)	200 ohms ± 20% + j 600 ohms ± 20%
~~(2) Z_{ps}~~	~~[illegible] ohms + j [illegible] ohms, nominal~~
(2) Z_{so} (S_1-S_3 only)	260 ohms ± 20% + j 700 ohms ± 20%
(3) Z_{ss}	167 ohms + j 77 ohms, nominal

f. Null Voltage	
(1) Total	28 millivolts, maximum
(2) Fundamental	28 millivolts, maximum
g. Phase Shift	8° ± 3°
h. Phase Shift vs Rotation	± 0.5°
i. Transformation Ratio	1.00 ± 2%
j. Angular Error	2 arc minutes, peak
(1) Angular Interval for Accuracy Measurement	Every 5° from -10° to +55°
k. Impedance Unbalance, Secondary	100 Z sec, max.
m. Input Current, Unloaded	45 milliamperes, nominal
n. Input Power, Unloaded	0.4 watts, nominal
p. DC Resistance	
(1) Primary	65 ohms ± 20%
(2) Secondary	110 ohms ± 20%
q. Air Gap per Side	0.003 inch, ~~minimum~~

3.5.2 Two Speed Resolver. The two speed resolver of the resolver assembly shall have the following specific characteristics when tested at the applicable ambient conditions as specified in Specification ND 1002013.

a. Primary	Stator (Outer Member)
b. Test Voltage	28 V ± 2%
c. Test Frequency	800 cps ± 0.5%
d. Impedance	
(1) Z_{po}	470 ohms ± 20% + j 1770 ohms ± 20%
(2) Z_{pss}	___ ohms + j ___ ohms, nominal
(2) Z_{so}	275 ohms ± 20% + j 1050 ohms ± 20%
(3) Z_{ss}	325 ohms + j 160 ohms, nominal

e.	Null Voltage	
	(1) Total	20 mv, maximum
	(2) Fundamental	20 mv, maximum
	(3) Null vs Rotation	25 mv, maximum
f.	Phase Shift	9° ± 0.5°
g.	Phase Shift vs Rotation	± 0.5°
h.	Phase Shift vs Voltage	± 1.0°
i.	Transformation Ratio	0.707 ± 2%
j.	Angular Error	~~4 ar.~~ 4 arc minutes, peak
	(1) Angular Interval for Accuracy Measurement, Mechanical	Every 5° from -10° to + 55°
k.	Impedance Unbalance, Primary	100 Z-sec, maximum
m.	Primary Current, Unloaded	0.015 amps, nominal
n.	Primary Power, Unloaded	0.11 watts, nominal
p.	DC Resistance	
	(1) Primary	300 ohms ± 20%
	(2) Secondary	170 ohms ± 20%
q.	Frequency Response	
	(1) Midband Response	± 1.5 db, maximum
	(2) Lower Half-Power Frequency	100 cps, maximum
	(3) Resonant Frequency	50K cps, minimum
	(4) Resonant Peak Response	+ 2.5 db, maximum
r.	Air Gap per Side	0.003 inch, minimum

3.5.3 Sixty-Four Speed Resolver. The sixty-four speed resolver of the resolver assembly shall have the following specific characteristics when tested at the applicable ambient conditions as specified in Specification ND-1002013.

a.	Primary	Inner Member
b.	Phases	
	(1) Primary	2
	(2) Secondary	2
c.	Test Voltage	28 V ± 2%
d.	Test Frequency	800 cps ± 0.5%
e.	Impedances	
	(1) Z_{po}	310 ohms ± 20% + j 245 ohms ± 20%
	(2) Z_{ps}	818 ohms + j 245 ohms, nominal
	(3) Z_{so}	435 ohms ± 20% + j 180 ohms ± 20%
	(4) Z_{ss}	440 ohms + j 180 ohms, nominal
f.	Null Voltages	
	(1) Total	20 mv, max
	(2) Fundamental	15 mv, max
g.	Phase Shift	$50^{\circ} \pm 3^{\circ}$
h.	Tranformation Ratio	0.179 ± 5%
i.	Angular Error	10 arc seconds, peak to peak of one speed shaft and an average of ± 2 arc seconds
	(1) Angular Interval for Accuracy Measurement, Mechanical	$1/4^{\circ}$ increments from -10° to $+55^{\circ}$
j.	Impedance Unbalance, Secondary	0.75 Z-sec
k.	Input Current, Unloaded	0.070 amps, nominal
m.	Input Power, Unloaded	1.50 watts, nominal
n.	DC Resistance	
	(1) Primary	300 ohms ± 20%
	(2) Secondary	425 ohms ± 20%
p.	Air Gap per Side	0.003 inch, minimum

3.5.4 Resolver Assembly. The resolver assembly shall have the following specific characteristics when tested at the ambient conditions specified in Specification ND-1002013.

a. Cross Coupling

(1) 1X to 2X output	25 mv, max.
(2) 1X to 64X output	0.1 mv, max.
(3) 2X to 1X output	20 mv, max.
(4) 2X to 64X output	0.1 mv, max.

b. Coincidence of Electrical Zero

(1) 1X elec. zero to 64X elec. zero	2 arc min, max, referred to 1X mech. shaft.
(2) 2X elec. zero to 64X elec. zero	2 arc min, max, referred to 1X mech. shaft.

4. QUALITY ASSURANCE PROVISIONS

4.1 GENERAL. Sampling, inspection and testing shall be in accordance with the requirements of Specification ND-1002013 and as specified herein.

4.2 TESTS

4.2.1 Description of Tests.

4.2.1.1 Frequency Response, Two Speed Resolver. The two speed resolver shall be connected as shown in Figure 2.

a. P3 (Hi) and P1 (Low and grounded) shall be connected to a signal generator having a 600 ohm source impedance.

b. The voltage, E_{P3}, shall be maintained constant at 2.0 volts, rms within 1/4 db at all frequencies measured.

c. A direct current of 10 milliamperes shall flow through this winding from P3 to P1.

d. P2 - P4 shall be commanded but ungrounded

e. S2 (Hi) and S4 (Low and grounded) shall be loaded with 75K ohms and connected to a VTVM capable of measuring E_{S2} relative to an initial setting within 1/4 db.

f. Resolver rotation shall be such that S2 -S4 is at maximum coupling and S2 is in phase with P3.

4.2.1.1.1 Test Procedure. The test shall be conducted as follows:

a. Set E_{P3} to 2.0 volts, 800 cps.

b. Measure $E_{S2} = E_R$. E_R is the reference output.

c. Vary the signal generator frequency over the required frequency range, measuring E_{S2} at enough points to determine the response versus frequency.

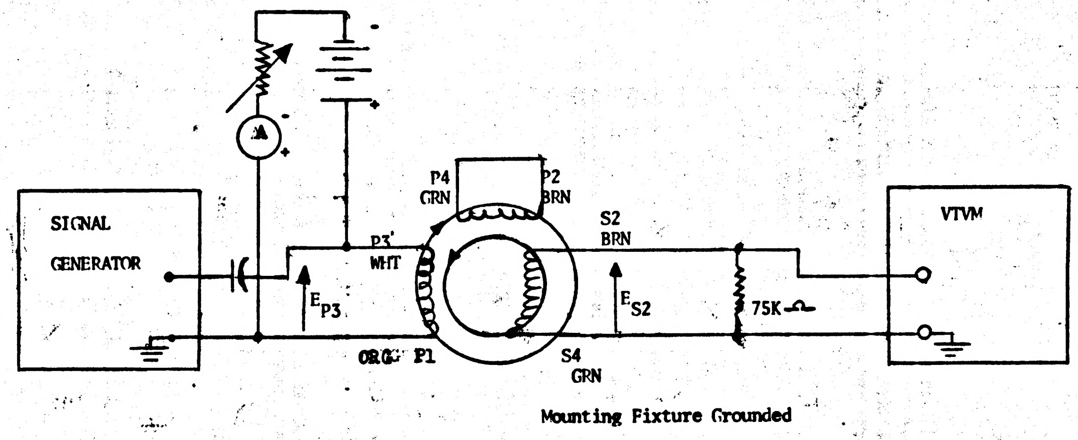
d. Express the response, R, in DB relative to E_R; that is:

$$R = 20 \log \left(\frac{E_{S2}}{E_R}\right)$$

e. Locate the lower half-power frequency, F_1, defined as the frequency at which R first drops to minus 3 db as the frequency is lowered from 800 cps.

f. Locate all resonant peaks for which $R > 1$ db.

g. If no peaks are found in the previous step, locate the upper half-power frequency, F_2, defined as the frequency at which R first drops to minus 3 db. as the frequency is raised from 800 cps.


SIGNAL
GENERATOR
P4
GRN
P2
BRN
S2
BRN
P3
WHT
E_{P3}
E_{S2}
ORG P1
S4
GRN
75K Ω
VTVM
Mounting Fixture Grounded

NOTE: Resolver set at maximum coupling with S2 in phase with P3 at 800 cps (+45° mechanical from EZ)

FREQUENCY RESPONSE TEST CONNECTIONS

Figure 2

4.2.1.2 Cross Coupling, Resolver Assembly. During these tests, the specified loads shall be applied to all resolvers.

4.2.1.2.1 One Speed to Two and Sixty-Four Speed Resolvers. With the one speed transmitter excited by applying 28 volts ± 2%, 800 cps ± 0.5% between P3 (Hi) and P1 (Lo) and with the primary windings of the two and sixty-four speed resolvers shorted P2 to P4 and P1 to P3, the total null voltage measured at either output phase of the two and sixty-four speed resolvers shall not exceed the values specified in 3.5.4 a as the resolver assembly is rotated from -10° to $+55^{\circ}$.

4.2.1.2.2 Two Speed to One and Sixty-Four Speed Resolvers. With the two speed resolver connected as per Figure 3 and the primary windings of the one and sixty-four speed resolvers shorted P2 to P4 and P3 to P1, the total null voltage measured at either output phase of the one speed or sixty-four speed resolvers shall not exceed the values specified in 3.5.4 a as the electrical angle of the resolver standard is varied in 30° increments from 0° to 360°.

4.2.1.3 Coincidence of Electrical Zero. With the specified loads and rated test excitation applied to all resolvers, their electrical zero positions shall be determined. Each resolver shall be excited with P3 high, P1 low and the P2 - P4 winding shorted but ungrounded. The electrical zeros of both the one speed and two speed resolvers shall coincide with that determined for the sixty-four speed within the value specified in 3.5.4 b.

5. PREPARATION FOR DELIVERY. Preparation for delivery shall be in accordance with the requirements of Specification ND-1002013.

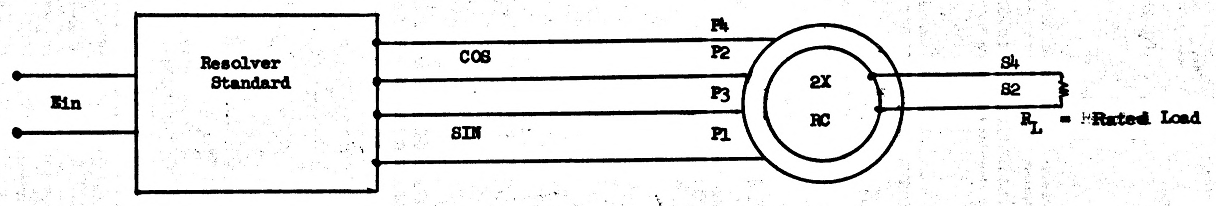
6. NOTES.

6.1 GENERAL SPECIFICATION. The notes specified in Specification ND 1002013 are applicable to this resolver assembly.

6.2 DC AVERAGE. The dc average is the algebraic sum of all error readings divided by the total number of readings.

Where:

$$DC_{AVE} = \frac{\sum_{1} e}{n}$$


Ein
Resolver Standard
COS
SIN
P4
P2
P3
P1
2X
RC
S4
S2
R_L = Rated Load

Ein = 28 volts ± 2%, 800 cps ± 0.5%

Cross Coupling (two speed to one and sixty-four speed transmitter)

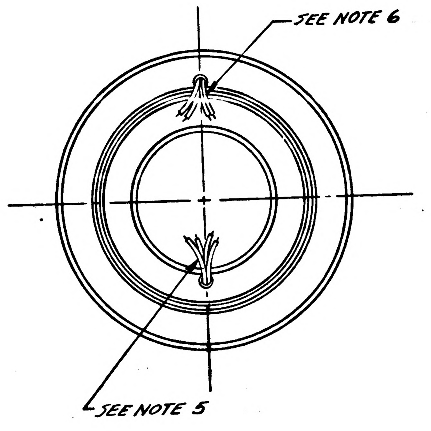
FIGURE 18

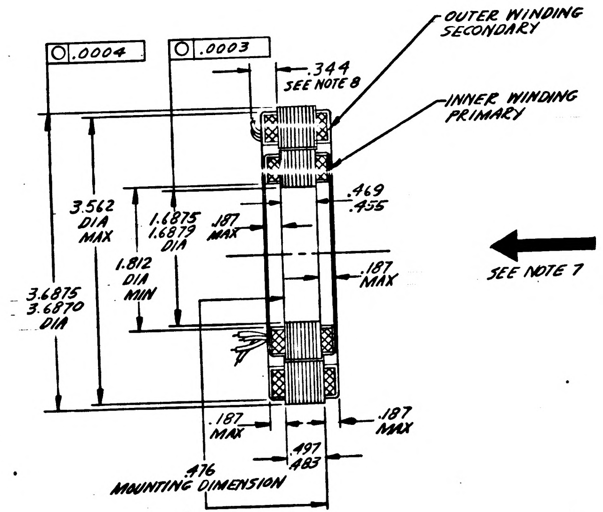
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

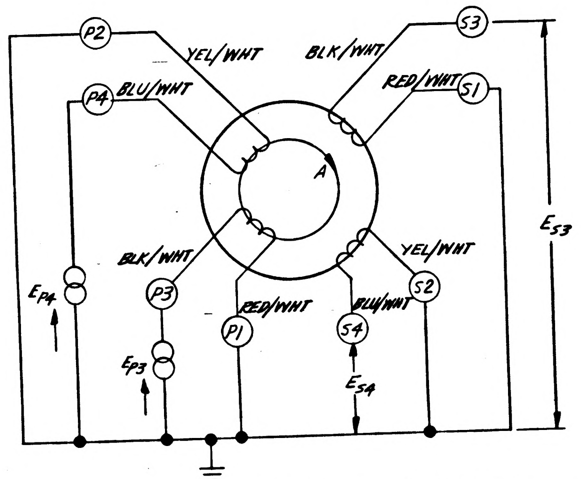
11540

REVISIONS

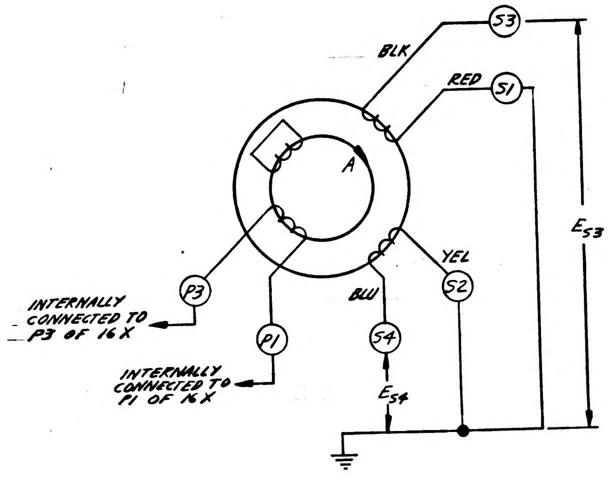
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 20703	CY		[illegible]	W.H.


SEE NOTE 6
SEE NOTE 5


.0004
.0003
.344
SEE NOTE 8
OUTER WINDING SECONDARY
INNER WINDING PRIMARY
3.562 DIA MAX
1.6875
1.6879 DIA
.187 MAX
.469
.455
1.812 DIA MIN
3.6875
3.6870 DIA
.187 MAX
SEE NOTE 7
.187 MAX
.187 MAX
.497
.483
.476
MOUNTING DIMENSION


P2
YEL/WHT
BLK/WHT
S3
P4
BLU/WHT
RED/WHT
S1
A
E_{S3}
BLK/WHT
YEL/WHT
E_{P4}
P3
S2
RED/WHT
BLU/WHT
P1
S4
E_{P3}
E_{S4}

16X RESOLVER (SEE NOTE 11)


S3
BLK
RED
S1
A
E_{S3}
YEL
INTERNALLY CONNECTED TO P3 OF 16X
P3
BLU
S2
P1
S4
INTERNALLY CONNECTED TO P1 OF 16X
E_{S4}

1X RESOLVER

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. RESOLVERS SHALL BE AT ELECTRICAL ZERO WITHIN ±2° WHEN LEADS ARE POSITIONED AS SHOWN.
3. LEADS TO BE 18 INCHES MINIMUM LENGTH PER MIL-W-16878 TYPE E28.
4. PART MUST CONFORM TO SPEC PS-1012066.
5. LEADS TO EXIT THRU A .156 DIA HOLE LOCATED ON A 1.000 R.
6. LEADS TO EXIT THRU A .156 DIA HOLE LOCATED ON A 1.450 R.
7. A POSITIVE RESOLVER ANGLE "A" RESULTS WHEN THE INNER RESOLVER WINDING IS ROTATED CLOCKWISE FROM ELECTRICAL ZERO AS VIEWED IN THE DIRECTION INDICATED BY THE ORIENTATION ARROW IN SECTIONAL VIEW. POLARITY IS SUCH THAT THE FOLLOWING CONDITIONS ARE SATISFIED:

   FOR 16X:

   $$E_{S3} = K[E_{P3} \cos 16A + E_{P4} \sin 16A]$$

   $$E_{S4} = K[E_{P4} \cos 16A - E_{P3} \sin 16A]$$

   WHERE K IS THE 16X TRANSFORMATION RATIO.

   FOR 1X:

   $$E_{S3}' = K' E_{P3} \cos A$$

   $$E_{S4}' = K' E_{P3} \sin A$$

   WHERE K' IS THE 1X TRANSFORMATION RATIO.
8. LEAD DRESS TO BE SUFFICIENT TO ALLOW INDICATED BEND.
9. HARNESS PULL TEST: INNER AND OUTER HARNESS SHALL EACH WITHSTAND A 4 LB. AXIAL PULL FOR 10 SECONDS, APPLIED GRADUALLY.
10. PRIOR TO INSPECTION AND ACCEPTANCE TESTS UNITS SHALL BE TEMPERATURE CYCLED TWICE IN THE FOLLOWING MANNER:

ROOM TEMP TO −50°C ±5°C	2 HRS
−50°C ±5°C	4 HRS
−50°C TO ROOM TEMP	2 HRS
ROOM TEMP	4 HRS
ROOM TEMP TO +93°C ±3°C	2 HRS
+93°C ±3°C	4 HRS
+93°C ±3°C TO ROOM TEMP	2 HRS
ROOM TEMP	4 HRS

   DETAILED PERFORMANCE CHARACTERISTICS OF PS 1012066 PARA. 3.5.1 PRIOR TO AND AFTER SPECIAL COND. SHALL BE INCLUDED WITH EACH UNIT.
11. GROUND CONNECTIONS IN SCHEMATIC ILLUSTRATE PHASE ROTATION ONLY.

PROCURE ONLY FROM APPROVED SOURCES LISTED IN NO 1002034 FOR THIS DRAWING

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN	THENO	6-13-64
CHECKED	CMK	12 Aug 64
APPROVED	R.J. Thurston	8-4-64
APPROVED		
APPROVED MIT	W. Kupfer	12 Aug 64
APPROVED MSC	[illegible]	8/14/64
		DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESOLVER
MULTIPLE SPEED
(16X & 1X)
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
	D	1012066

SCALE FULL
SHEET 1 OF 1

Apollo G&N Specification
PS-1012066 A
Date 8-12-64
Class A Release
TDRR 11538

PROCUREMENT SPECIFICATION

RESOLVER, MULTIPLE SPEED (16X and 1X)

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
9/29/64	A	13052	4, 5, 6		WJR

This specification consists of page i to iii and 1 to 6 inclusive.

The purpose of this document is to establish the requirements for the procurement of the Multiple Speed (16X and 1X) Resolver for use in the Apollo Guidance and Navigation Equipment.

W Kupfer 12 Aug 64
MIT/IL DATE

TB Michael 8/12/64
NASA/MSC DATE

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

PREPARED BY TITLE DATE

S. P. Armstrong Spec Engr Writer 8-12-64

MIT/IL TITLE DATE

EXAMINED BY

D. Alexander Koso Asst. Dir 9-30-64

MIT/IL TITLE DATE

APPROVED BY

Robert J. Therrien MIT STAFF 12 Aug 1964

MIT/IL TITLE DATE

APPROVED BY

John E. Miller Dy. Ass. Dir. 12 Aug 64

MIT/IL TITLE DATE

APPROVED BY

W Kupfer CCB 12 Aug 64

PROCUREMENT SPECIFICATION

RESOLVER, MULTIPLE SPEED (16X and 1X)

1. SCOPE

1.1 This specification establishes the requirements for the procurement of the Multiple Speed Resolver (16X and 1X), hereinafter called the dual resolver unit.

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on the date of invitation for bids form a part of this specification to the extent specified herein.

SPECIFICATIONS

Apollo G&N

ND-1002013	Resolvers, Electrical, AC, General Specification for

DRAWINGS

Apollo G&N

1012066	Resolver, Multiple Speed (16X and 1X), Specification Control Drawing

3. REQUIREMENTS

3.1 GENERAL

3.1.1 Sixteen Speed Resolver. The sixteen speed resolver of the dual resolver unit shall conform to the requirements of Specification ND-1002013 with the following exceptions or additions:

a. Color coding of lead wire shall be as specified except with white tracer (i.e. S1 - RD/WHT, S2 - YEL/WHT, etc.)

b. The resolver shall be tested as an RX only with P3 (BLK/WHT) excited high and P1 (RD/WHT) grounded. P2 (YEL/WHT) shall be commoned with P4 (BLU/WHT) but ungrounded. S4 (BLU/WHT) shall be commoned with S1 (RD/WHT) and grounded.

c. Accuracy determination shall be made with rated excitation and rated loads on both resolvers of the dual resolver unit. Rated load on the sixteen speed resolver is 15K ohms, resistive ±10 percent on both secondary windings, matched within 0.25 percent. The rated load on the one speed resolver is as specified in 3.1.2b.

INCHES
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d. The following paragraphs of Specification ND-1002013 are not applicable:

1) Phase Shift Variation Due to Voltage
2) Angular Error Versus Voltage
3) Angular Error Versus Frequency
4) Primary Impedance Unbalance
5) Temperature Rise
6) Friction Torque
7) Brush Slip Ring Continuity
8) Phase Shift Versus Rotation

3.1.2 One Speed Resolver. The one speed resolver of the dual resolver unit shall conform to the requirements of Specification ND-1002013 with the following exceptions or additions:

a. The resolver shall be tested as an RX only with P3 (BLK/WHT) excited high and P1 (RD/WHT) grounded.

b. Accuracy determination shall be made with rated excitation and rated loads on both resolvers of the dual resolver unit. Rated load on the one speed resolver is 2,000 ohms, resistive ±10 percent with a relative accuracy between the two resistors of 0.25 percent. The rated load on the sixteen speed resolver is as specified in 3.1.1c.

c. The following paragraphs of Specification ND-1002013 are not applicable:

1) Phase Shift Variation Due to Voltage
2) Angular Error Versus Voltage
3) Angular Error Versus Frequency
4) Temperature Rise
5) Primary Impedance Unbalance
6) Friction Torque
7) Brush Slip Ring Continuity

3.1.3 Dual Resolver Unit. The dual resolver unit shall be checked for coincidence of electrical zero between the sixteen speed and one speed resolvers. The values measured shall be witnin the tolerance specified in 3.5.2a.

3.2 DESIGN AND CONSTRUCTION. The dual resolver unit shall be of the design, construction and physical dimensions shown on drawing 1012066. The manufacture, materials and the mechanical and electrical construction shall be in accordance with the requirements of Specification ND-1002013.

3.3 FINISHES AND PROTECTIVE TREATMENT. The resolver finishes, protective treatment and moisture, fungus and corrosion treatments shall be in accordance with the requirements of Specification ND-1002013 and drawing 1012066.

3.4 QUALIFICATION PERFORMANCE CHARACTERISTICS AND CONDITIONS.

3.4.1 Individual Resolvers. The individual resolvers shall conform to the requirements of Specification ND-1002013 with the following exceptions or additions:

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

3.4.1.1 Environmental.

3.4.1.1.1 Vibration, Operating Condition. With the resolver tested as specified, the angular deviation shall not exceed:

a. 10 arc seconds for one speed resolvers
b. 5 arc seconds for sixteen speed resolvers

3.4.1.1.2 Shock, Operating Condition. With the resolver tested as specified, the angular deviation shall not exceed:

a. 10 arc seconds for one speed resolvers
b. 5 arc seconds for sixteen speed resolvers

3.4.1.1.3 Low Temperature, Operating. With the resolver subjected to a temperature of -73.3° ±2.8°C (-100 ±5° F) and tested as specified, the angular deviation and fundamental null voltage variations shall not exceed:

a. 10 arc seconds peak and 20 millivolts, respectively, for one speed resolvers
b. 5 arc seconds peak and 1.0 millivolt, respectively, for sixteen speed resolvers

3.4.1.1.4 High Temperature, Operating. With the resolver subjected to a temperature of 93.3° ±2.8°C (200 ±5° F) and tested as specified, the angular deviation and fundamental null voltage variations shall not exceed:

a. 10 arc seconds peak and 20 millivolts, respectively, for one speed resolvers
b. 5 arc seconds peak and 1.0 millivolt

3.4.1.1.5 52° Temperature, Operating. With the resolver subjected to a temperature of 52° ±1°C (125.6 ±1.8° F) and tested as specified, the angular deviation and fundamental null voltage variation shall not exceed:

a. 5 arc seconds peak and 5 millivolts, respectively, for sixteen speed resolvers
b. 4 arc seconds peak and 1.0 millivolt, respectively, for sixteen speed resolvers

3.4.1.1.6 Humidity, Operating. With the resolver tested as specified, the angular deviation shall not exceed:

a. 10 arc seconds peak for one speed resolvers
b. 5 arc seconds peak for sixteen speed resolvers

3.4.1.1.7 Thermal Vacuum. The resolver shall be tested as specified while exposed to a vacuum level of 1 x 10^{-7} mm Hg and the low and high temperatures specified in 3.4.1.1.3 and 3.4.1.1.4, respectively.

3.4.1.2 Endurance. During the applicable portions of endurance testing, the following conditions shall be maintained:

a. Low Temperature	-40° ± 2.8°C (-40°±5°F)
b. High Temperature	37.8°± 2.8°C (100°±5°F)
c. Operating Speed	0 rpm

3.4.2 Dual Resolver Unit. After subjection to the qualification tests for the individual resolvers, the dual resolver unit shall successfully meet the requirements of 3.1.3.

3.5 DETAIL PERFORMANCE CHARACTERISTICS

3.5.1 Individual Resolvers. The individual resolvers shall have the following specific characteristics when tested at the applicable ambient conditions as specified in Specification ND-1002013.

	1X Inner Member	16X Inner Member
a. Primary		
b. Phases		
(1) Primary	2	2
(2) Secondary	2	2
c. Test Voltage Primary	28V±2%	28V±2%
d. Test Frequency Primary	800 cps± 0.5%	800 cps±0.5%
e. Impedances		
(1) Zpo (P_2 - p_4 only)		215±20% + j 1100±20% ohms
(2) Zss	200 ohms, max.	100 ohms, max.
f. Null Voltages		
(1) Total	28 mv, max.	5.0 mv, max.
(2) Fundamental	28 mv, max.	3.5 mv, max.
g. Phase Shift	4°±1.5°	11°±2°
h. Phase Shift vs. Rotation	0°±1°	
Angular Interval for ∅ vs. Rotation Measurement	±5° elec. from all null points	

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

i.	Transformation Ratio	1.00±2%	0.179±4%
j.	Angular Error	2 arc min., max.	20 arc seconds, max. of 1X mechanical shaft
	Angular Interval for Accuracy Measurement, Mechanical	5°	1°
k.	Impedance Unbalance	70 Z-sec., max.	4 Z-sec.,max. of 1X mechanical shaft
	Angle for Impedance Unbalance Measurement	45° and 35°	45° and 315° of second electrical cycle
m.	DC Resistance		
	(1) Primary		200 ohms ± 20%

3.5.2 Dual Resolver Unit. The dual resolver unit shall have the following specific characteristics when tested at the ambient conditions specified in Specification ND-1002013:

a.	Coincidence of Electrical Zero	2 arc minute, max., referred to the 1X mechanical shaft
b.	Air Gap Per Side	0.003 in., minimum
c.	Input Current, Unloaded	0.045 amps, nominal
d.	Input Power, Unloaded	0.28 watts, nominal
e.	Common Impedance, Z_{po} (P_1-P_3 only)	145±20% + j 620± 20% ohms
f.	DC Resistance, Primary (P_1-P_3 only)	68 ohms±20%

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

4. QUALITY ASSURANCE PROVISIONS

4.1 General Sampling, inspection and testing shall be in accordance with the requirements of Specification ND-1002013 and as specified herein.

5. PREPARATION FOR DELIVERY

5.1 Preparation for delivery shall be in accordance with the requirements of Specification ND-1002013.

6. NOTES

6.1 The notes specified in Specification ND-1002013 are applicable to this specification.

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

12. MEASURE AND RECORD THE STATOR LAMINATION STACK DIM. MEASURE AND RECORD THE ROTOR LAMINATION STACK DIM. A MINIMUM DIFFERENCE BETWEEN THE TWO SHALL BE .020 SEE NOTE 1

REVISIONS						11540
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
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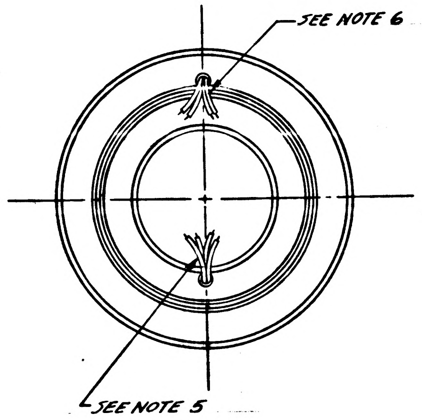
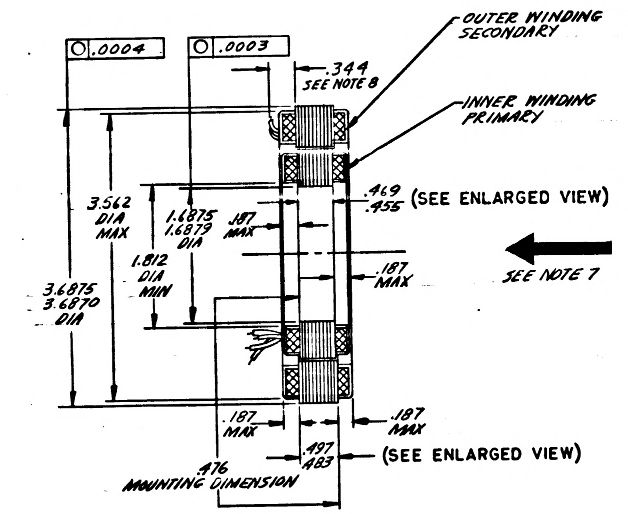
B		REVISED PER TDRR 22447	KCH		20 SEP 65	WK


SEE NOTE 6
SEE NOTE 5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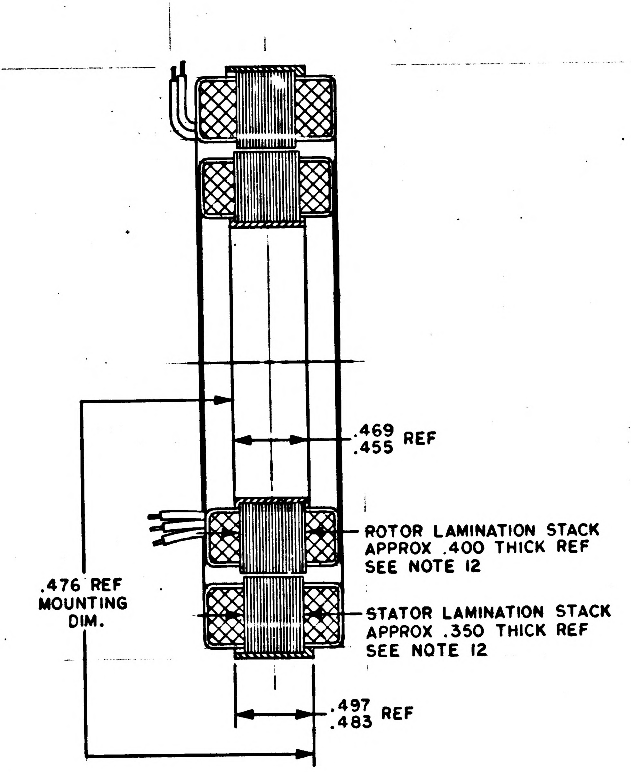
.0003
.344
SEE NOTE 8
OUTER WINDING SECONDARY
INNER WINDING PRIMARY
.469
.455
(SEE ENLARGED VIEW)
3.562 DIA MAX
1.6875
1.6879
DIA
.187 MAX
1.812 DIA MIN
3.6875
3.6870
DIA
.187 MAX
SEE NOTE 7
.187 MAX
.187 MAX
.497
.483
(SEE ENLARGED VIEW)
.476
MOUNTING DIMENSION


.469
.455 REF
ROTOR LAMINATION STACK
APPROX .400 THICK REF
SEE NOTE 12
STATOR LAMINATION STACK
APPROX .350 THICK REF
SEE NOTE 12
.476 REF
MOUNTING
DIM.
.497
.483 REF

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. RESOLVERS SHALL BE AT ELECTRICAL ZERO WITHIN ±2° WHEN LEADS ARE POSITIONED AS SHOWN.
3. LEADS TO BE 18 INCHES MINIMUM LENGTH PER MIL-W-16878 TYPE E28.
4. PART MUST CONFORM TO SPEC PS-1012066.
5. LEADS TO EXIT THRU A .156 DIA HOLE LOCATED ON A 1.000 R.
6. LEADS TO EXIT THRU A .156 DIA HOLE LOCATED ON A 1.450 R.
7. A POSITIVE RESOLVER ANGLE "A" RESULTS WHEN THE INNER RESOLVER WINDING IS ROTATED CLOCKWISE FROM ELECTRICAL ZERO AS VIEWED IN THE DIRECTION INDICATED BY THE ORIENTATION ARROW IN SECTIONAL VIEW. POLARITY IS SUCH THAT THE FOLLOWING CONDITIONS ARE SATISFIED:

   FOR 16X:

   $E_{S3} = K[E_{P3} \cos 16A + E_{P4} \sin 16A]$

   $E_{S4} = K[E_{P4} \cos 16A - E_{P3} \sin 16A]$

   WHERE K IS THE 16X TRANSFORMATION RATIO.

   FOR 1X:

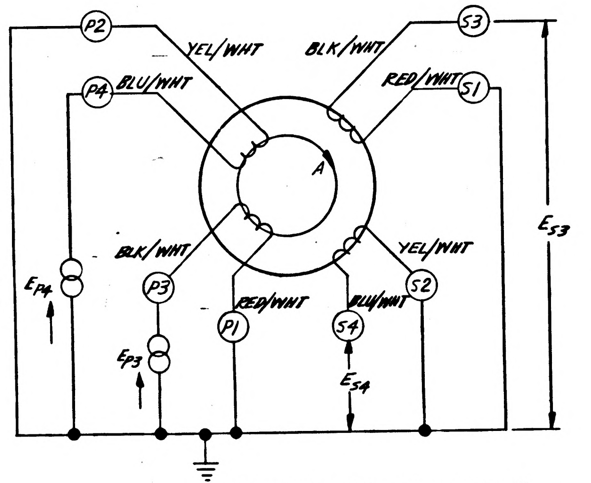
   $E_{S3}' = K' E_{P3} \cos A$

   $E_{S4}' = K' E_{P3} \sin A$

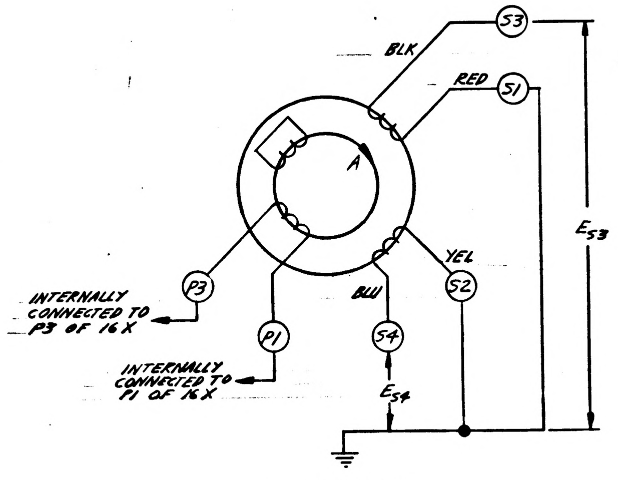
   WHERE K' IS THE 1X TRANSFORMATION RATIO.

8. LEAD DRESS TO BE SUFFICIENT TO ALLOW INDICATED BEND.
9. HARNESS PULL TEST: INNER AND OUTER HARNESS SHALL EACH WITHSTAND A 4 LB. AXIAL PULL FOR 10 SECONDS, APPLIED GRADUALLY.

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING


P2
YEL/WHT
BLK/WHT
S3
P4
BLU/WHT
RED/WHT
S1
A
BLK/WHT
YEL/WHT
E_{P4}
P3
RED/WHT
BLU/WHT
S2
E_{P3}
P1
S4
E_{S4}
E_{S3}

16X RESOLVER (SEE NOTE 11)


S3
BLK
RED
S1
A
E_{S3}
INTERNALLY CONNECTED TO P3 OF 16X
P3
YEL
BLU
S2
INTERNALLY CONNECTED TO P1 OF 16X
P1
S4
E_{S4}

1X RESOLVER

10. PRIOR TO INSPECTION AND ACCEPTANCE TESTS UNITS SHALL BE TEMPERATURE CYCLED TWICE IN THE FOLLOWING MANNER:

ROOM TEMP TO -50°C ±5°C	2 HRS
-50°C ±5°C	4 HRS
-50°C TO ROOM TEMP	2 HRS
ROOM TEMP	4 HRS
ROOM TEMP TO +93°C ±3°C	2 HRS
+93°C ±3°C	4 HRS
+93°C ±3°C TO ROOM TEMP	2 HRS
ROOM TEMP	4 HRS

DETAILED PERFORMANCE CHARACTERISTICS OF PS 1012066 PARA. 3.5.1 PRIOR TO AND AFTER SPECIAL COND. SHALL BE INCLUDED WITH EACH UNIT.

MASTER MASTER

11. GROUND CONNECTIONS IN SCHEMATIC ILLUSTRATE PHASE ROTATION ONLY.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN THENO 6-13-64
CHECKED CKL 12 Aug 64
APPROVED RJ Thurston 8-4-64
APPROVED
APPROVED MIT 12 Aug 64
APPROVED MSC 8/12/64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

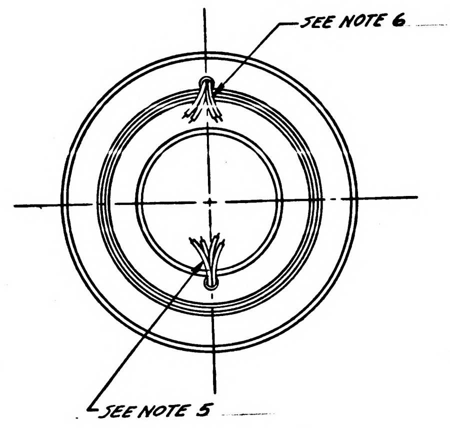
RESOLVER
MULTIPLE SPEED
(16X & 1X)
SPECIFICATION CONTROL DRAWING

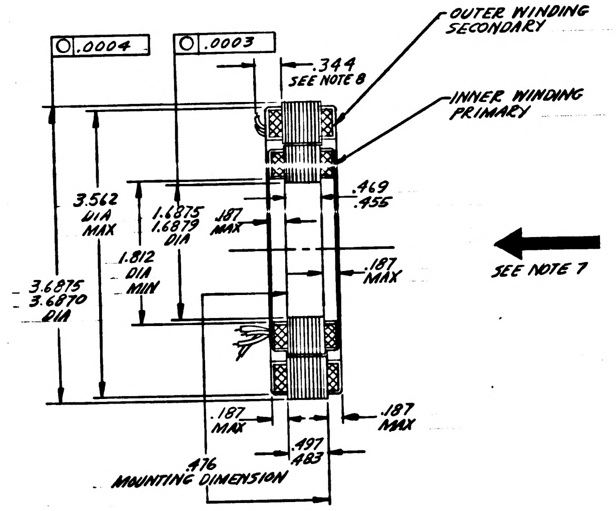
CODE IDENT NO. 80230
SIZE D
DRAWING NO. 1012066
SCALE FULL
SHEET 1 OF 1

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 1540

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED


SEE NOTE 6
SEE NOTE 5


◎ .0004
◎ .0003
.344
SEE NOTE 8
OUTER WINDING SECONDARY
INNER WINDING PRIMARY
3.562 DIA MAX
1.6875 1.6879 DIA
.187 MAX
1.812 DIA MIN
3.6875 3.6870 DIA
.469 .455
SEE NOTE 7
.187 MAX
.187 MAX
.187 MAX
.497 .483
.476 MOUNTING DIMENSION

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. RESOLVERS SHALL BE AT ELECTRICAL ZERO WITHIN ±2° WHEN LEADS ARE POSITIONED AS SHOWN.
3. LEADS TO BE 18 INCHES MINIMUM LENGTH PER MIL-W-16878 TYPE E28.
4. PART MUST CONFORM TO SPEC PS-1012066.
5. LEADS TO EXIT THRU A .156 DIA HOLE LOCATED ON A 1.000 R.
6. LEADS TO EXIT THRU A .156 DIA HOLE LOCATED ON A 1.450 R.
7. A POSITIVE RESOLVER ANGLE "A" RESULTS WHEN THE INNER RESOLVER WINDING IS ROTATED CLOCKWISE FROM ELECTRICAL ZERO AS VIEWED IN THE DIRECTION INDICATED BY THE ORIENTATION ARROW IN SECTIONAL VIEW. POLARITY IS SUCH THAT THE FOLLOWING CONDITIONS ARE SATISFIED:

   FOR 16X:

   $$E_{S3} = K[E_{P3} \cos 16A + E_{P4} \sin 16A]$$

   $$E_{S4} = K[E_{P4} \cos 16A - E_{P3} \sin 16A]$$

   WHERE K IS THE 16X TRANSFORMATION RATIO.

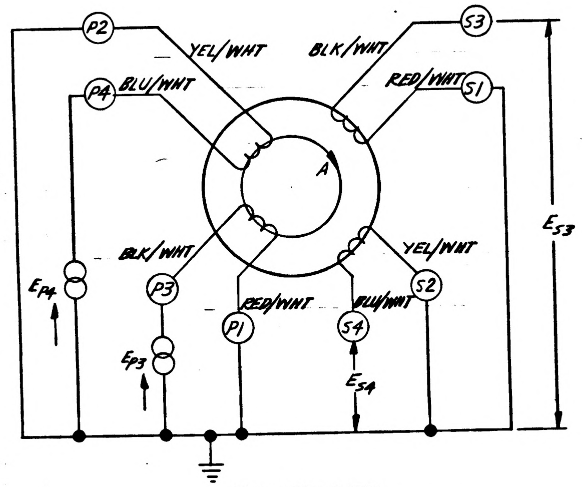
   FOR 1X:

   $$E_{S3}' = K' E_{P3} \cos A$$

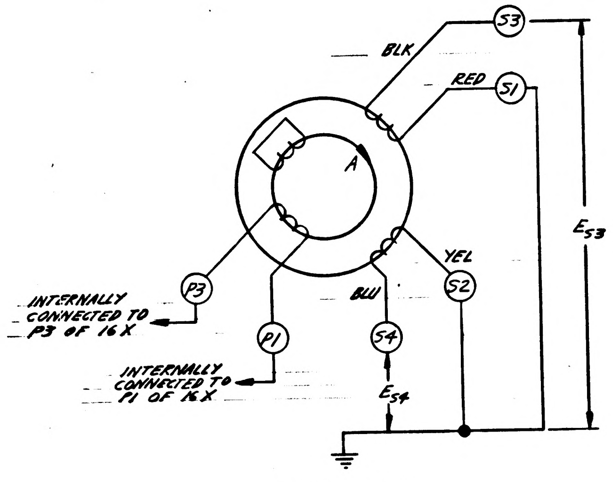
   $$E_{S4}' = -K' E_{P3} \sin A$$

   WHERE K' IS THE 1X TRANSFORMATION RATIO.
8. LEAD DRESS TO BE SUFFICIENT TO ALLOW INDICATED BEND.
9. LEAD PULL TEST: UNITS SHALL WITHSTAND A 4 LB. AXIAL PULL FOR 10 SECONDS. APPLY GRADUALLY.
10. UNITS SHALL BE TEMPERATURE CYCLED AT A SLOW RATE FROM ROOM AMBIENT TO +93°±3°C THEN TO -50°±5°C AND BACK TO ROOM AMBIENT.

PROCURE ONLY FROM APPROVED SOURCES LISTED IN NO 1002034 FOR THIS DRAWING


P2
YEL/WHT
BLK/WHT
S3
P4
BLU/WHT
RED/WHT
S1
A
BLK/WHT
YEL/WHT
E_{P4}
P3
RED/WHT
BLU/WHT
S2
P1
S4
E_{P3}
E_{S4}
E_{S3}

16X RESOLVER


S3
BLK
RED
S1
A
YEL
P3
BLU
S2
INTERNALLY CONNECTED TO P3 OF 16X
P1
S4
INTERNALLY CONNECTED TO P1 OF 16X
E_{S4}
E_{S3}

1X RESOLVER

MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

		DATE
DRAWN	THENO	6-15-64
CHECKED	CKL	12 Aug 64
APPROVED	R.J. Thurston	8-4-64
APPROVED		
APPROVED MIT	W. Nagler	16 Aug 64
APPROVED MSC	W. Nickel	8/16/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESOLVER
MULTIPLE SPEED
(16X & 1X)
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE D
DRAWING NO. 1012066
SCALE FULL
SHEET 1 OF 1

1012066

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

Apollo G&N Specification
PS-1012066 8/12/64
Class A Release
TDRR 11538

PROCUREMENT SPECIFICATION

RESOLVER, MULTIPLE SPEED (16X and 1X)

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA

This specification consists of page i to iii and 1 to 6 inclusive.

The purpose of this document is to establish the requirements for the procurement of the Multiple Speed (16X and 1X) Resolver for use in the Apollo Guidance and Navigation Equipment.

12 Aug 64
MIT/IL DATE

8/12/64
NASA/MSC DATE

PROCUREMENT SPECIFICATION

RESOLVER, MULTIPLE SPEED (16X and 1X)

1. SCOPE

1.1 This specification establishes the requirements for the procurement of the Multiple Speed Resolver (16X and 1X), hereinafter called the dual resolver unit.

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on the date of invitation for bids form a part of this specification to the extent specified herein.

SPECIFICATIONS

Apollo G&N

ND-1002013	Resolvers, Electrical, AC, General Specification for

DRAWINGS

Apollo G&N

1012066	Resolver, Multiple Speed (16X and 1X), Specification Control Drawing

3. REQUIREMENTS

3.1 GENERAL

3.1.1 Sixteen Speed Resolver. The sixteen speed resolver of the dual resolver unit shall conform to the requirements of Specification ND-1002013 with the following exceptions or additions:

a. Color coding of lead wire shall be as specified except with white tracer (i.e. S1 - RD/WHT, S2 - YEL/WHT, etc.)

b. The resolver shall be tested as an RX only with P3 (BLK/WHT) excited high and P1 (RD/WHT) grounded. P2 (YEL/WHT) shall be commoned with P4 (BLU/WHT) but ungrounded. S4 (BLU/WHT) shall be commoned with S1 (RD/WHT) and grounded.

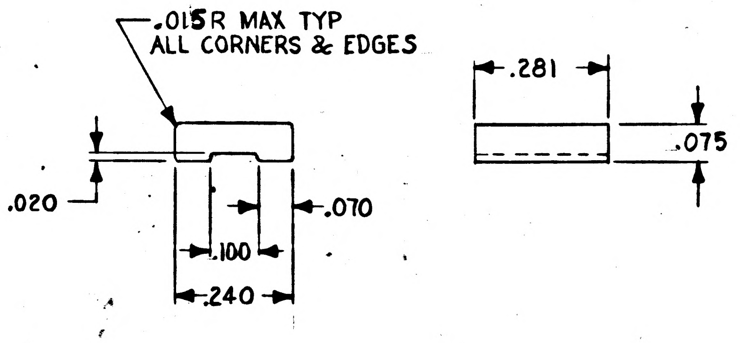
c. Accuracy determination shall be made with rated excitation and rated loads on both resolvers of the dual resolver unit. Rated load on the sixteen speed resolver is 15K ohms, resistive ±10 percent on both secondary windings, matched within 0.25 percent. The rated load on the one speed resolver is as specified in 3.1.2b.

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

8112101

REVISIONS TDRR 08461				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. MATERIAL: POTTING COMPOUND PER ND 1002009 METHOD "C"
3. IDENTIFY IN ACCORDANCE WITH ND 1002019, NASA PART NO. REV LETTER & MFRS SYM.



MASTER

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1011906	1011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± [illegible]	±.010	± [illegible]

DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN 26386900070
DRAWN A.L. Rhodes DATE 2-25-64
CHECKED M. Fanell
APPROVAL N. Brunelle/VA.
APPROVAL E. Thomp 5/12/64
NASA APPROVAL W J Rhine 5-14-64
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
GROMMET
HALF

CODE IDENT NO.
SIZE C
NASA NUMBER 1012118
SCALE 4:1
WEIGHT CALC ACTUAL
SHEET 1 OF 1

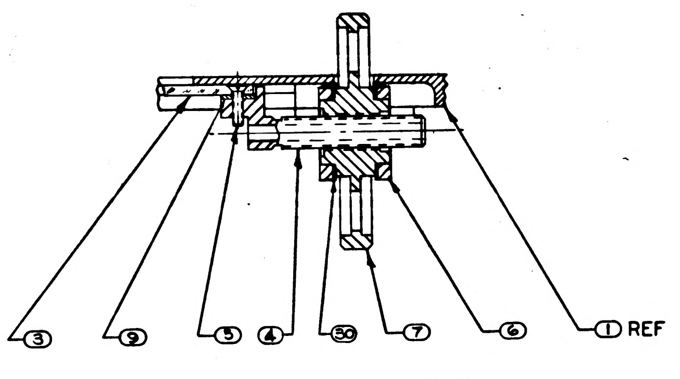
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1012136 A

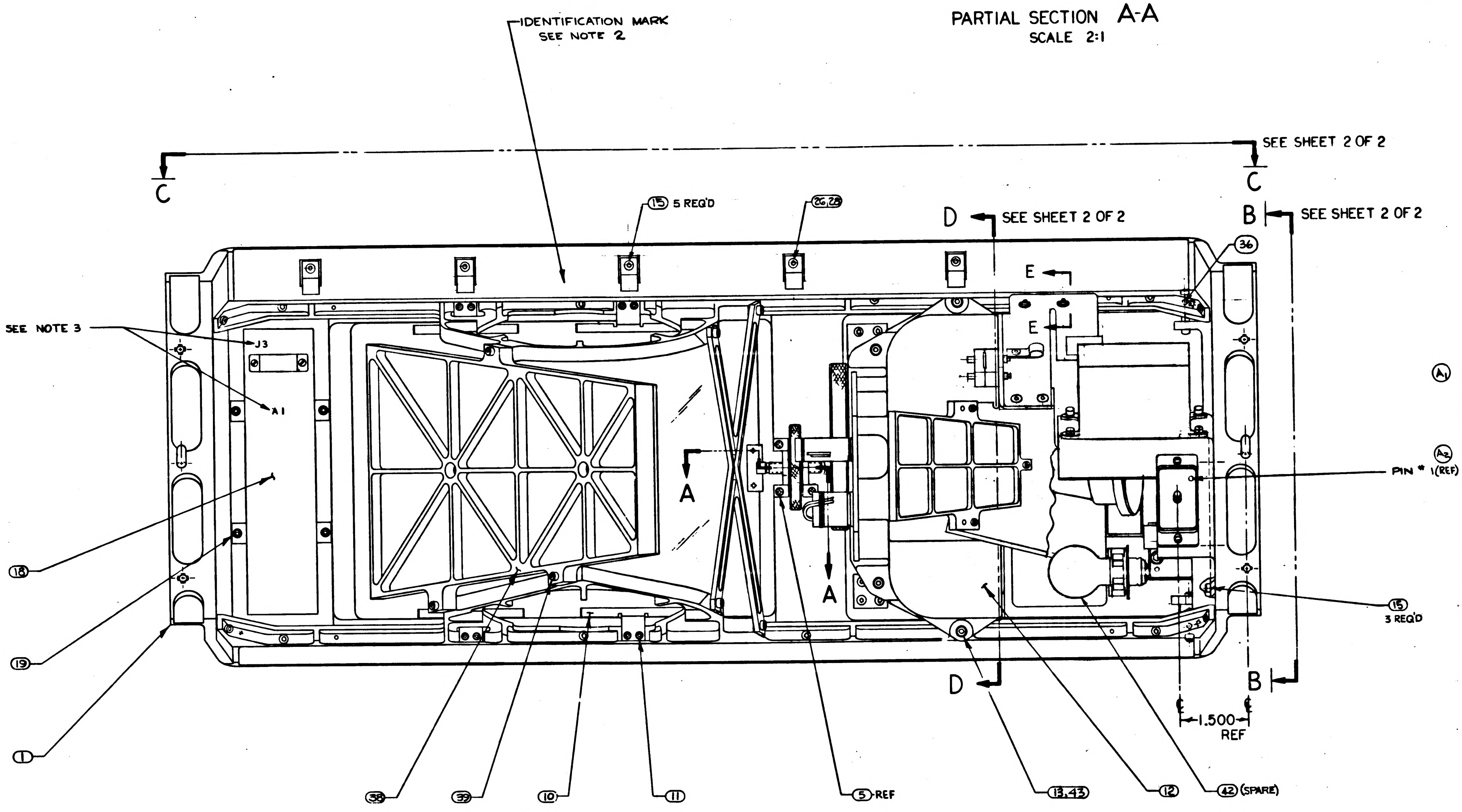
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS 10503				
A3		REVISED PER TDRR NO. 11295	11 AUG 64	

NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA PART NO, REVISION LETTER & MANUFACTURERS SYMBOL PER ND1002019, AND SERIALIZE PER ND1002023
3. MARK CHARACTERS IN APPROX LOCATION SHOWN IN ACCORDANCE WITH ND1002019.
4. ALL SCREWS WHICH ARE NOT SECURED BY LOCKING DEVICES SHALL BE SECURED USING ITEM 51 PER ND1002211.
5. ASSEMBLE AND TEST IN ACCORDANCE WITH ATP 1012136
6. BOND ITEM 8 TO ITEM 1 USING ITEM 44 PER ND 1002219

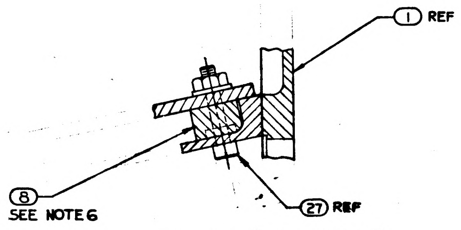


PARTIAL SECTION A-A
SCALE 2:1



REFERENCE:

1. SYSTEM SCHEMATIC DIAGRAM 1012167



PARTIAL SECTION E-E
SCALE 2/1

* PURCHASE ITEM: SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
57	1		1012219	52387000520		MIRROR, CONCAVE			
56	4		MS35649-44			NUT, PLAIN, HEX			
55	1		1011361	58387000020		MIRROR, SMALL			
54	1		1011470	85387000100		SUPPORT, MIRROR ASSY OF			
53	4	*	1010630-14			SCREW, FLAT HEAD, 100° HEX SOCKET			
52	1		1012187	87387000110		GUIDE, ASSY			
51	AR		MIL-S-22473, GRADE C			SEALING COMPOUND, RETAINING			
50	3		NAS1352C02LL4			SCREW CAP HEX SOC HD SELF LOCKING			
49	1		1011546			SHIELD			
48	4	*	1011750-4			NUT, SELF LOCKING HEX			
47	2	*	1011625-13			SCREW, CAP SOCKET HD SELF LOCKING			
46	3		NAS1352C044			SCREW, CAP, SOCKET HEAD			
45	2	*	1010630-2			SCREW FLAT HEAD 100°			
44	AR		1011541			ADHESIVE, EPOXY			
43	A/R		1011525			SPACER, SHIM			
42	2	*	1011413			LAMP, PROJECTION			
41	4		1014503			SCREW, CAPTIVE			
40	1		1011420			MAGAZINE, ASSY OF			
39	3		NAS1352C04LL8	74455157015		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING			
38	1		1011360			MIRROR, LARGE			
37	2	*	1011466			COLLAR, SHAFT			
36	2		MS51029-9			SETSCREW, HEXAGON, SOC HD, FLAT POINT			
35	2		MS16555-645			PIN, DOWEL			
34	1		1011473			ACCESS DOOR ASSY OF			
33	1	*	1011368			SWITCH, TOGGLE			
32	2		1011539			SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING (MOD.)			
31	2		MS24671-2			SCREW, CAP, SOC HD, FLAT CSUNK 82°			
30	2		1011544-1			WASHER, SLIP			
29	10		NAS1352C04LL6	74455157014		SCREW, CAP, HEXAGON, SOC HD SELF-LOCKING			
28	8	*	1011918-1			WASHER, CABLE CLAMP			
27	2		NAS1352C04LL10			SCREW, CAP, SOCKET HEAD			
26	6	*	1000220-5			CLAMP, CABLE			
25	1	*	1000220-2			CLAMP, CABLE			
24	1		1012163			WIRING HARNESSA, BRANCHED			
23	1	*	1000220-6			CLAMP, CABLE			
22	9	*	1011750-8			NUT, SELF-LOCKING, HEXAGON			
21	1		NAS1352C04-6			SCREW, CAP, HEXAGON, SOC HD			
20	1		1012166			BRACKET, SUPPORT			
19	4		1011625-26			SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING			
18	1	*	1011375			INDICATOR, INTEGRATED READOUT			
17	2		MS15795-304			WASHER, FLAT			
16	1		1014630			AMPLIFIER AND SWITCH ASSY OF			
15	10		NAS1352C04LL4	74455157013		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING			
14	1		1011549			BRACKET, CONNECTOR, ASSY OF			
13	4		NAS1352C06LL6	74455157019		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING			
12	1		1012200			GEAR BOX, ASSY OF			
11	8		1011625-8			SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING			
10	4		1011380			SPRING, RETAINER			
9	A/R		1011519			SHIM, VIEWSCREEN			
8	1		1012202	52387000400		PAD, BRACKET			
7	1		1011459			KNOB AND INSERT-ASSY OF			
6	2		1011383			BLOCK, BEARING			
5	6		NAS1189C02P-4L			SCREW, SELF LOCKING, 100° FLAT HD			
4	1		1011388			SCREW, SCREEN ADJUST			
3	1		1011377			SCREEN, VIEW			
2									
1	1		1011537			HOUSING, MACHINING ASSEMBLY			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL ~
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN
DRAWN Ja Lima DATE 28 APR 64
CHECKED
APPROVAL M. Campbell 6/2/64
APPROVAL
NASA APPROVAL
MIT APPROVAL 23 64

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
MAP & DATA VIEWER
ASSEMBLY OF

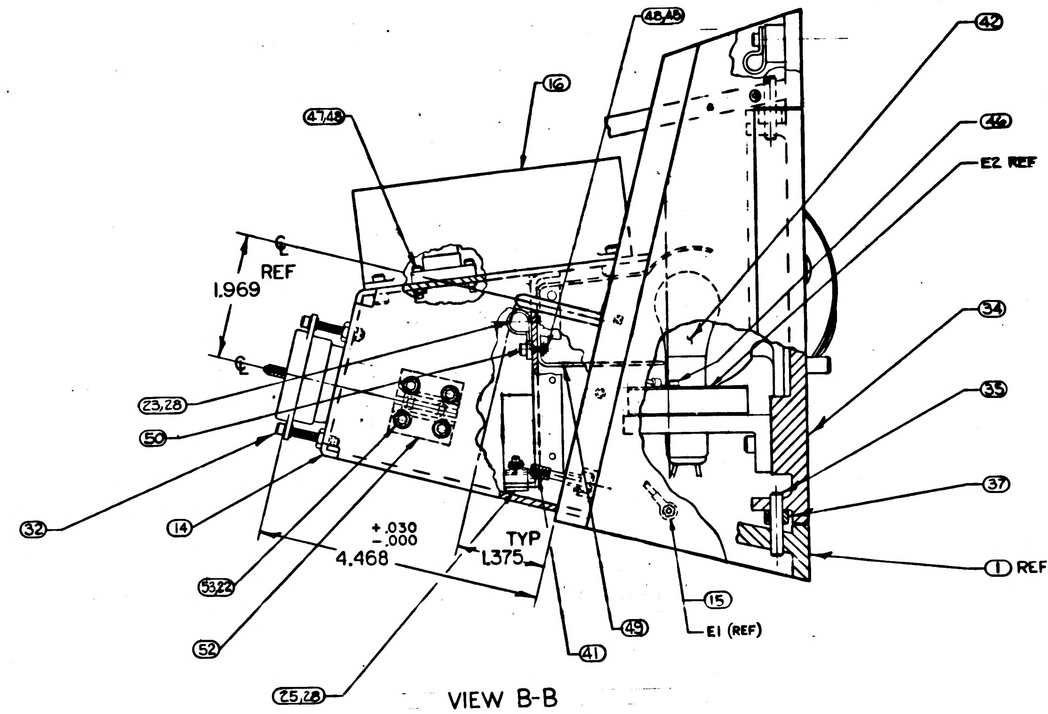
CODE IDENT NO. | SIZE E | NASA NUMBER 1012136
SCALE 1:1 | WEIGHT CALC ACTUAL | SHEET 1 OF 2

1012136 A

1012136 A

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS				
A3		REVISED PER TDRR NO. 11295	11 [illegible] 64	

NOTES
SEE SHEET 1 OF 2



48,49
47,48
16
42
46
E2 REF
℄
REF
1.969
℄
23,28
50
32
14
53,22
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25,28
+.030
-.000
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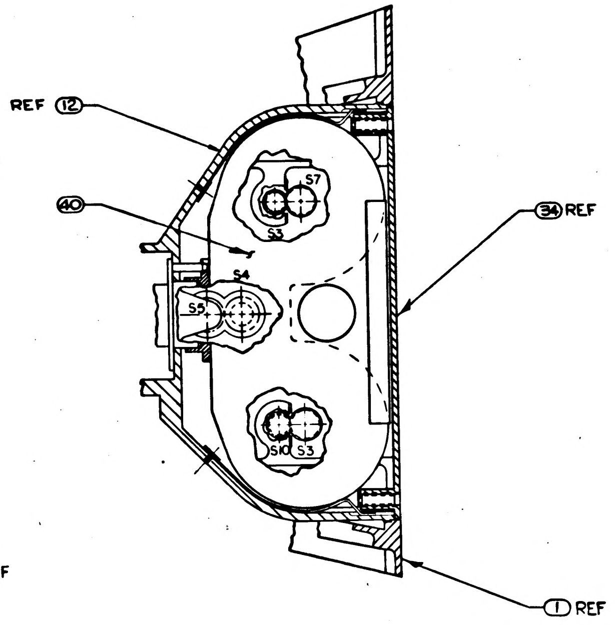
TYP
1.375
49
41
15
E1 (REF)
34
35
37
1 REF

VIEW B-B
SEE SHEET 1 OF 2



REF 12
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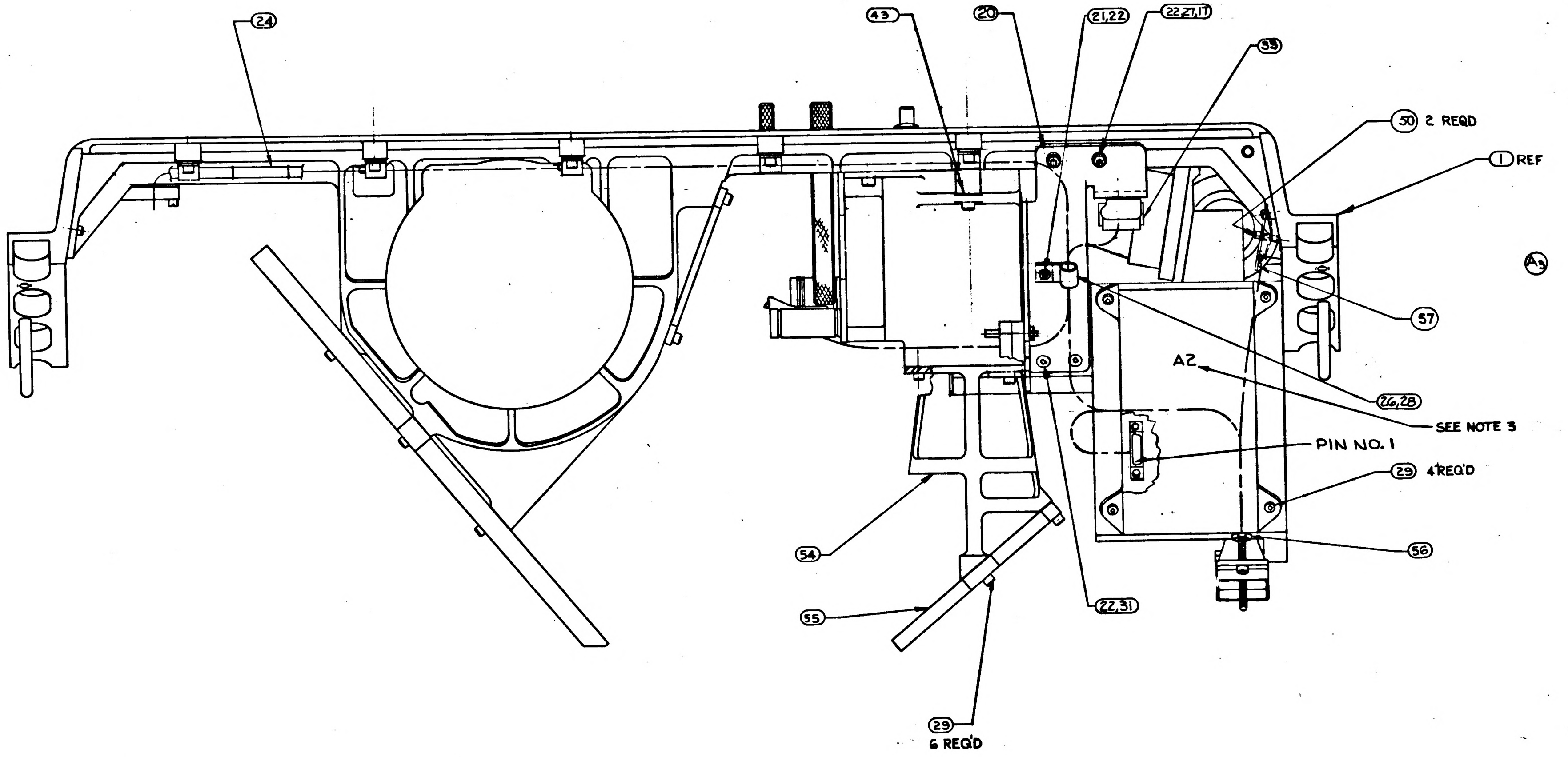
34 REF
S7
S3
S4
S5
S10
S3
1 REF

PARTIAL SECTION D-D
SEE SHEET 1 OF 2



24
43
20
21,22
22,27,17
33
50 2 REQD
1 REF
57
A2
26,28
SEE NOTE 3
PIN NO. 1
29 4 REQ'D
56
54
55
22,31
29
6 REQ'D
A3

VIEW C-C
SEE SHEET 1 OF 2

FOR LIST OF FIND NO SEE SHEET 1 OF 2

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL ~
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN
DRAWN J.A. LIMA DATE 28 APR 64
CHECKED [illegible] 1 June '64
APPROVAL [illegible] 6/3/64
APPROVAL
NASA APPROVAL [illegible]
MIT APPROVAL [illegible] 6/2/64

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
MAP & DATA VIEWER
ASSEMBLY OF

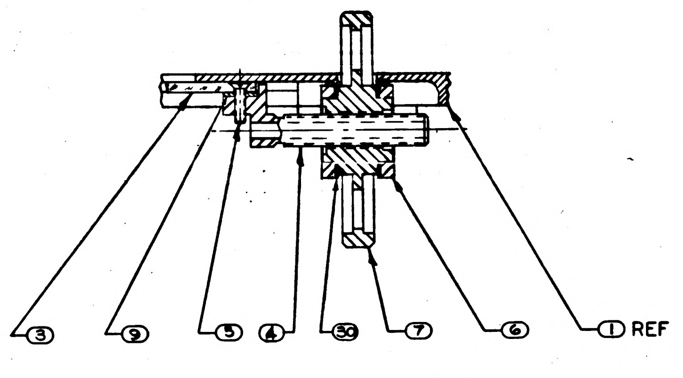
CODE IDENT NO.
SIZE E
NASA NUMBER 1012136
SCALE 1:1
WEIGHT CALC ACTUAL
SHEET 2 OF 2

B 1012136

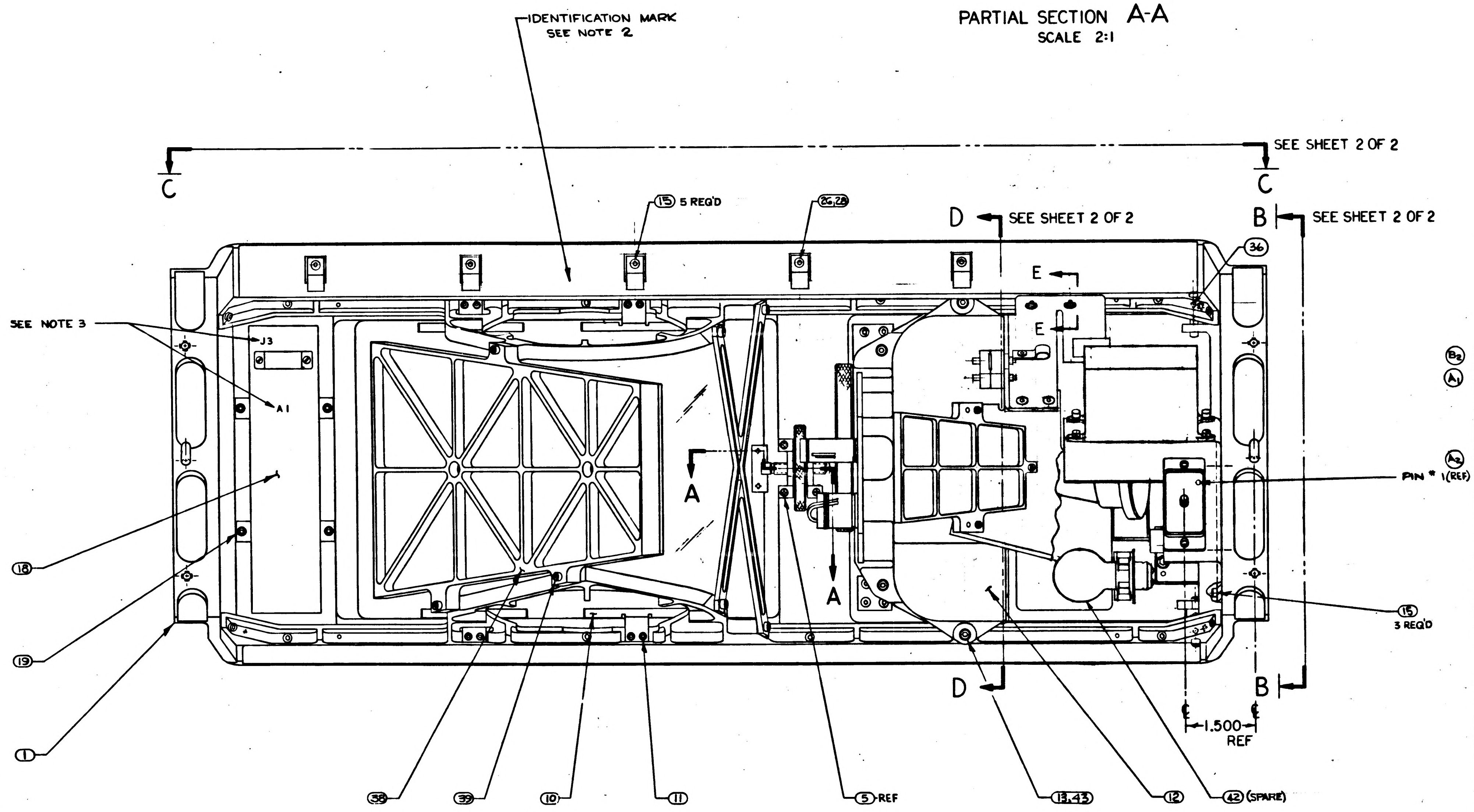
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO. 11295	11 AUG 64	
B2		REVISED PER TDRR NO. 12124	SEPT 64	WK

REVISIONS 10503

NOTES
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA PART NO, REVISION LETTER & MANUFACTURERS SYMBOL PER ND1002019, AND SERIALIZE PER ND1002023
3. MARK CHARACTERS IN APPROX LOCATION SHOWN IN ACCORDANCE WITH ND1002019.
4. ALL SCREWS WHICH ARE NOT SECURED BY LOCKING DEVICES SHALL BE SECURED USING ITEM 51 PER ND1002211.
5. ASSEMBLE AND TEST IN ACCORDANCE WITH ATP 1012136
6. BOND ITEM 8 TO ITEM 1 USING ITEM 44 PER ND 1002219
7.
(B2) 8. SOLDER PER MSFC-PROC-158 USING ITEM 58 AND 59

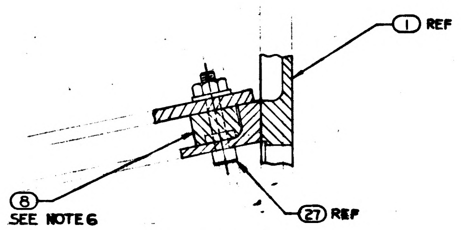


PARTIAL SECTION A-A
SCALE 2:1



REFERENCE:

1. SYSTEM SCHEMATIC DIAGRAM 1012167



PARTIAL SECTION E-E
SCALE 2/1

* PURCHASE ITEM: SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
(B2) 59	AR		[illegible]			SOLDER			
58	AR		MIL-F-14256			FLUX			
(A1) 57	1		1012219	52387000520		MIRROR, CONCAVE			
56	4		MS35649-44			NUT, PLAIN, HEX			
55	1		1011361	58387000020		MIRROR, SMALL			
54	1		1011470	85387000100		SUPPORT, MIRROR, ASSY OF			
53	4	*	1010630-14			SCREW, FLAT HEAD, 100° HEX SOCKET			
52	1		1012187	87387000110		GUIDE, ASSY			
51	AR		MIL-S-22473 GRADE C			SEALING COMPOUND, RETAINING			
(A2) 50	3		NAS1352C02LL6			SCREW CAP HEX SOC HD SELF LOCKING			
49	1		1011346			SHIELD			
48	4	*	1011750-4			NUT, SELF LOCKING HEX			
47	2	*	1011625-13			SCREW, CAP SOCKET HD SELF LOCKING			
46	3		NAS1352C044			SCREW, CAP, SOCKET HEAD			
45	2	*	1010630-2			SCREW FLAT HEAD 100°			
44	AR		1011541			ADHESIVE, EPOXY			
43	A/R		1011525			SPACER, SHIM			
42	2	*	1011413			LAMP, PROJECTION			
41	4		1014503			SCREW, CAPTIVE			
40	1		1011420			MAGAZINE, ASSY OF			
39	3		NAS1352C04LL8	74455157015		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING			
38	1		1011360			MIRROR, LARGE			
37	2	*	1011466			COLLAR, SHAFT			
36	2		MS51029-9			SETSCREW, HEXAGON, SOC HD, FLAT POINT			
35	2		MS16555-645			PIN, DOWEL			
34	1		1011473			ACCESS DOOR ASSY OF			
33	1	*	1011368			SWITCH, TOGGLE			
32	2		1011539			SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING (MOD.)			
31	2		MS24671-2			SCREW, CAP, SOC HD, FLAT CSUNK 82°			
30	2		1011544-1			WASHER, SLIP			
29	10		NAS1352C04LL6	74455157014		SCREW, CAP, HEXAGON, SOC HD SELF-LOCKING			
28	8	*	1011918-1			WASHER, CABLE CLAMP			
27	2		NAS1352C04LL10			SCREW, CAP, SOCKET HEAD			
26	6	*	1000220-5			CLAMP, CABLE			
25	1	*	1000220-2			CLAMP, CABLE			
24	1		1012163			WIRING HARNESSA, BRANCHED			
23	1	*	1000220-6			CLAMP, CABLE			
22	9	*	1011750-8			NUT, SELF-LOCKING, HEXAGON			
21	1		NAS1352C04-6			SCREW, CAP, HEXAGON, SOC HD			
20	1		1012166			BRACKET, SUPPORT			
19	4		1011625-26			SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING			
18	1	*	1011375			INDICATOR, INTEGRATED READOUT			
17	2		MS15795-304			WASHER, FLAT			
16	1		1014630			AMPLIFIER AND SWITCH ASSY OF			
15	10		NAS1352C04LL4	74455157013		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING			
14	1		1011549			BRACKET, CONNECTOR, ASSY OF			
13	4		NAS1352C06LL6	74455157019		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING			
12	1		1012200			GEAR BOX, ASSY OF			
11	8		1011625-8			SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING			
10	4		1011380			SPRING, RETAINER			
9	A/R		1011519			SHIM, VIEWSCREEN			
8	1		1012202	52387000400		PAD, BRACKET			
7	1		1011459			KNOB AND INSERT-ASSY OF			
6	2		1011383			BLOCK, BEARING			
5	6		NAS1189C02P-4L			SCREW, SELF LOCKING, 100° FLAT HD			
4	1		1011388			SCREW, SCREEN ADJUST			
3	1		1011377			SCREEN, VIEW			
2									
1	1		1011537			HOUSING, MACHINING ASSEMBLY			

LIST OF PARTS AND MATERIALS

1012136 B

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL ~
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN
DRAWN Ja Lima DATE 28 APR 64
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
MAP & DATA VIEWER
ASSEMBLY OF

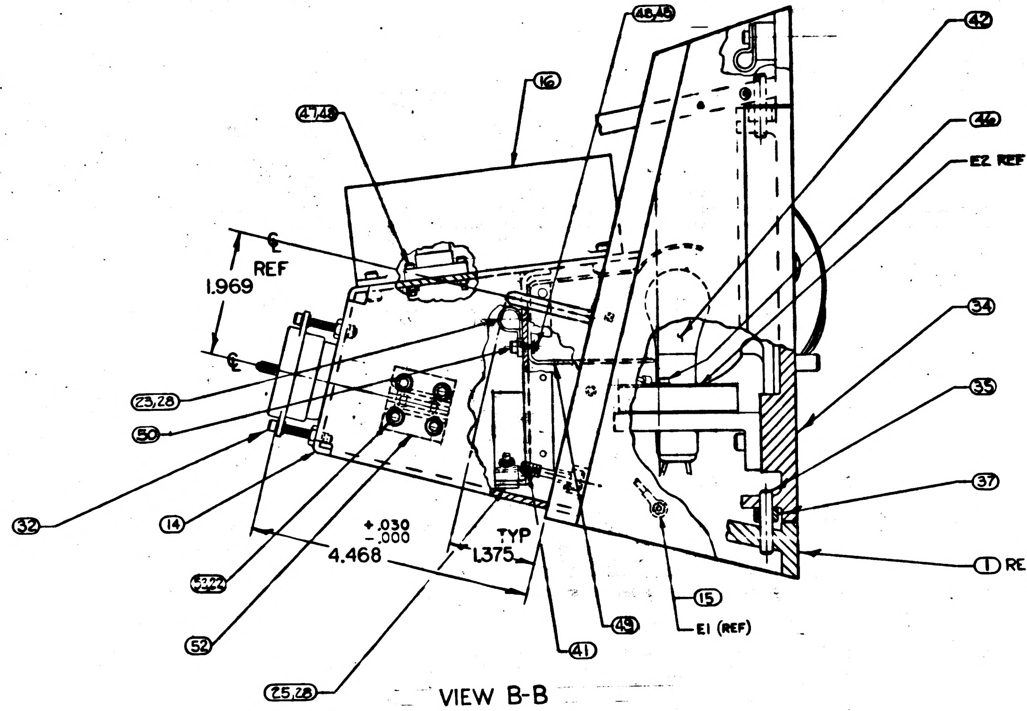
CODE IDENT NO.
SIZE E
NASA NUMBER 1012136
SCALE 1:1
WEIGHT CALC ACTUAL
SHEET 1 OF 2

B	1012136

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO. 11295	11 AUG 64	
B2		SEE SHEET 1 FOR REVISIONS	1 SEPT 64	WK

REVISIONS 10503

NOTES
SEE SHEET 1 OF 2



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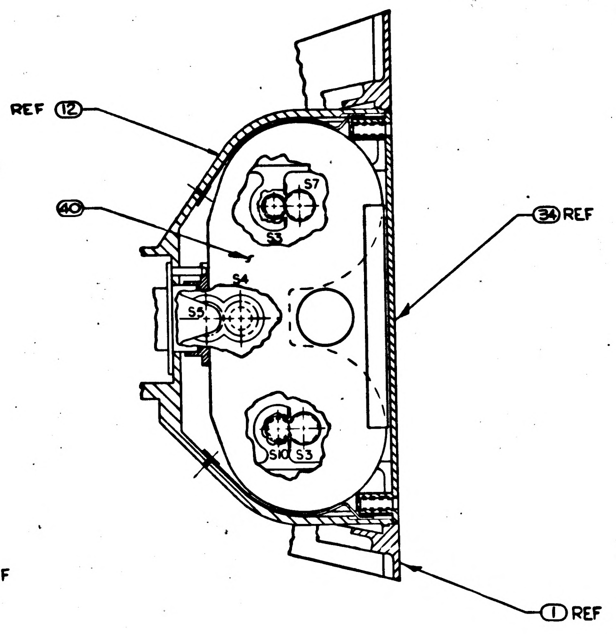
41
25,28

VIEW B-B
SEE SHEET 1 OF 2



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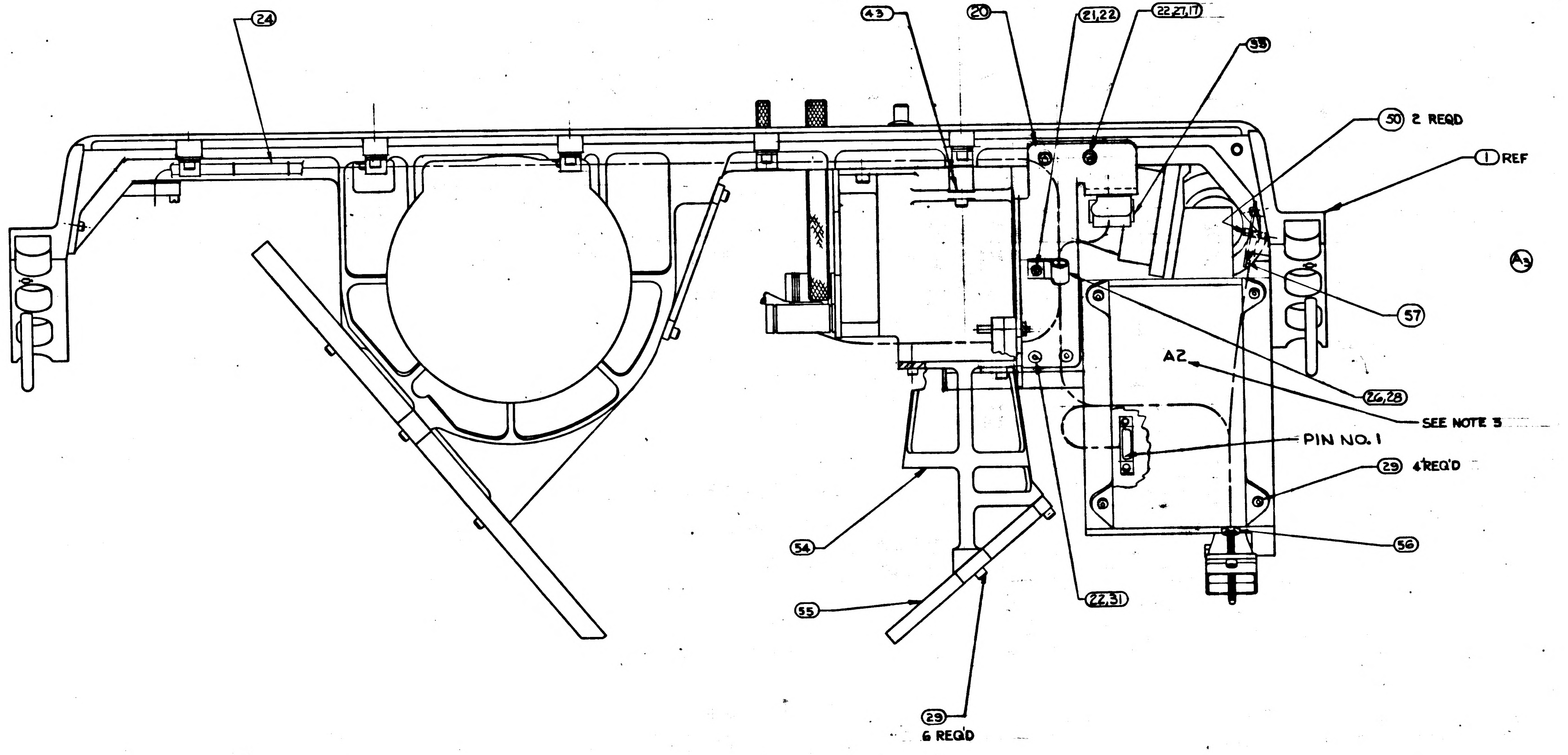
PARTIAL SECTION D-D
SEE SHEET 1 OF 2



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29 4 REQ'D
56
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55
22,31
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6 REQ'D

VIEW C-C
SEE SHEET 1 OF 2

FOR LIST OF FIND NO SEE SHEET 1 OF 2

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC
PN
DRAWN J.J. Lima DATE 28 APR 64
CHECKED 1 June 64
APPROVAL 6/2/64
APPROVAL
NASA APPROVAL
UNIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TITLE
MAP & DATA VIEWER
ASSEMBLY OF

CODE IDENT NO. | SIZE E | NASA NUMBER 1012136
SCALE 1:1 | WEIGHT | CALC ACTUAL | SHEET 2 OF 2

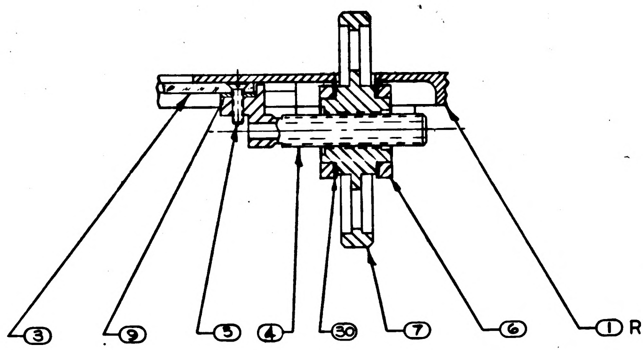
NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA PART NO, REVISION LETTER & MANUFACTURERS SYMBOL PER ND1002019, AND SERIALIZE PER ND1002023
3. MARK CHARACTERS IN APPROX LOCATION SHOWN IN ACCORDANCE WITH ND1002019.
4. ALL SCREWS WHICH ARE NOT SECURED BY LOCKING DEVICES SHALL BE SECURED USING ITEM 51 PER ND1002211.
5. ASSEMBLE AND TEST IN ACCORDANCE WITH ATP 1012136
6. BOND ITEM 8 TO ITEM 1 USING ITEM 44 PER ND 1002219
7.
8.

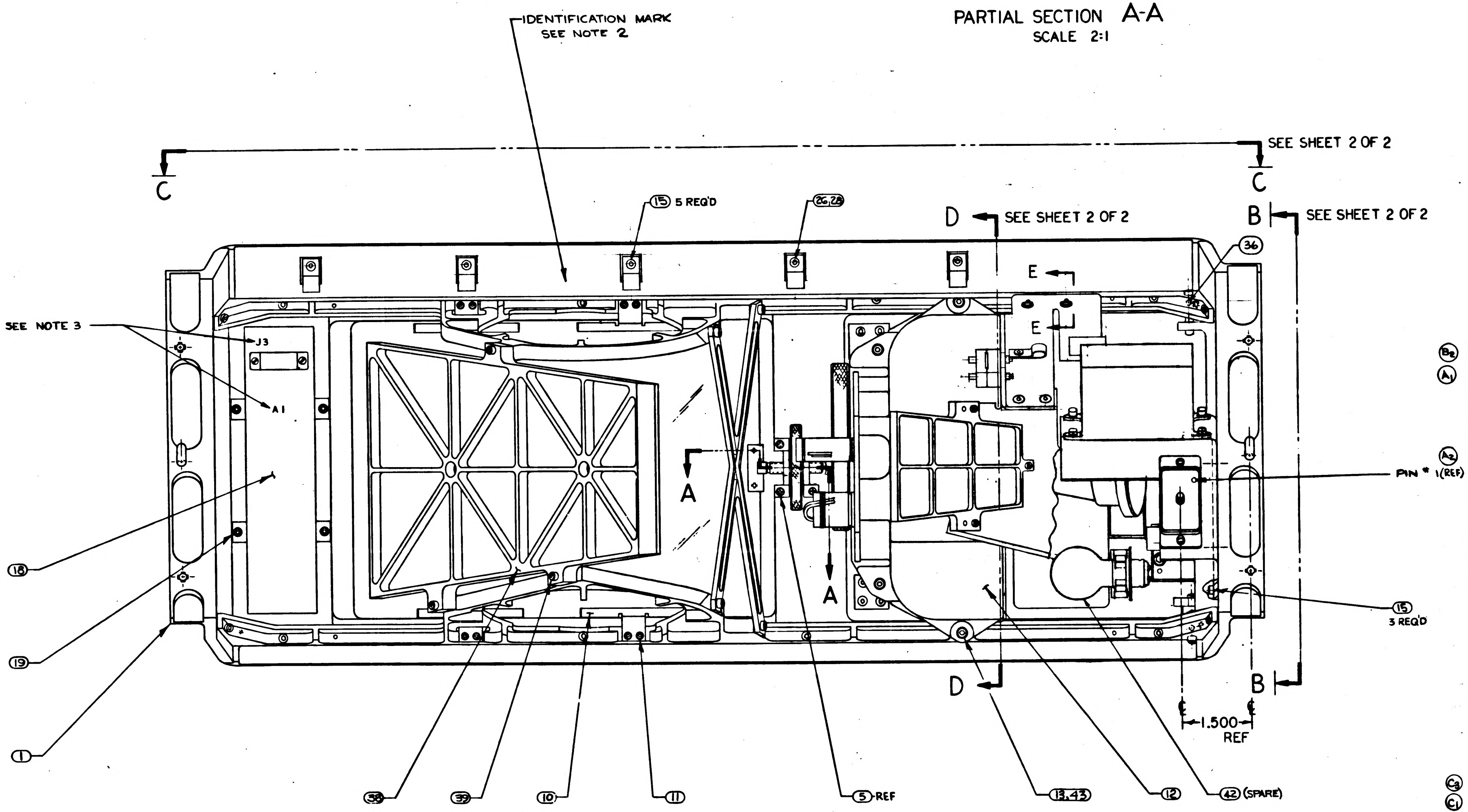
(B1) (C2)

REVISIONS 10503

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A3		REVISED PER TDRR NO. 11295	11 AUG 64	
B2		REVISED PER TDRR NO. 12124	SEPT 64	WK
C4		REVISED PER TDRR NO 12863	29 SEPT 64	



PARTIAL SECTION A-A
SCALE 2:1



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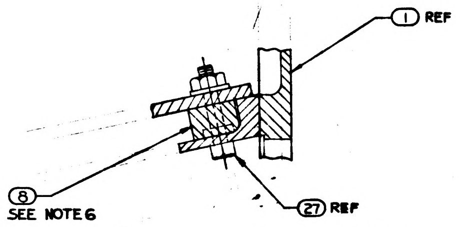
1. SYSTEM SCHEMATIC DIAGRAM 1012167



PARTIAL SECTION E-E
SCALE 2/1

* PURCHASE ITEM: SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

(B2) (A1) (A2) (C3) (C1)

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
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58									
57	1		1012219	52387000520		MIRROR, CONCAVE			
56	4		MS35649-44			NUT, PLAIN, HEX			
55	1		1011361	58387000020		MIRROR, SMALL			
54	1		1011470	85387000100		SUPPORT, MIRROR, ASSY OF			
53	4	*	1010630-14			SCREW, FLAT HEAD, 100° HEX SOCKET			
52	1		1012187	87387000110		GUIDE, ASSY			
51	AR		MIL-S-22473 GRADE C			SEALING COMPOUND, RETAINING			
50	3		NAS1352C02LL6			SCREW CAP HEX SOC HD SELF LOCKING			
49	1		1011546			SHIELD			
48	4	*	1011750-4			NUT, SELF LOCKING HEX			
47	2	*	1011625-13			SCREW, CAP SOCKET HD SELF LOCKING			
46	3		NAS1352C044			SCREW, CAP, SOCKET HEAD			
45	2	*	1010630-2			SCREW FLAT HEAD 100°			
44	AR		1011541			ADHESIVE, EPOXY			
43	A/R		1011525			SPACER, SHIM			
42	2	*	1011413			LAMP, PROJECTION			
41	4		1014503			SCREW, CAPTIVE			
40	1		1011420			MAGAZINE, ASSY OF			
39	3		NAS1352C04LL8	74455157015		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING			
38	1		1011360			MIRROR, LARGE			
37	2	*	1011466			COLLAR, SHAFT			
36	2		MS51029-9			SETSCREW, HEXAGON, SOC HD, FLAT POINT			
35	2		MS16555-645			PIN, DOWEL			
34	1		1011473			ACCESS DOOR ASSY OF			
33									
32	2		1011539			SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING (MOD.)			
31	2		MS24671-2			SCREW, CAP, SOC HD, FLAT CSUNK 82°			
30	2		1011544-1			WASHER, SLIP			
29	10		NAS1352C04LL6	74455157014		SCREW, CAP, HEXAGON, SOC HD SELF-LOCKING			
28	7	*	1011918-1			WASHER, CABLE CLAMP			
27	2		NAS1352C04LL10			SCREW, CAP, SOCKET HEAD			
26	5	*	1000220-5			CLAMP, CABLE			
25	1	*	1000220-2			CLAMP, CABLE			
24	1		1012163			WIRING HARNESSA, BRANCHED			
23	1	*	1000220-6			CLAMP, CABLE			
22	8	*	1011750-8			NUT, SELF-LOCKING, HEXAGON			
21									
20									
19	4		1011625-26			SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING			
18	1	*	1011375			INDICATOR, INTEGRATED READOUT			
17	2		MS15795-304			WASHER, FLAT			
16	1		1014630			AMPLIFIER AND SWITCH ASSY OF			
15	10		NAS1352C04LL4	74455157013		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING			
14	1		1011549			BRACKET, CONNECTOR, ASSY OF			
13	4		NAS1352C06LL6	74455157019		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING			
12	1		1012200			GEAR BOX, ASSY OF			
11	8		1011625-8			SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING			
10	4		1011380			SPRING, RETAINER			
9	A/R		1011519			SHIM, VIEWSCREEN			
8	1		1012202	52387000400		PAD, BRACKET			
7	1		1011459			KNOB AND INSERT-ASSY OF			
6	2		1011383			BLOCK, BEARING			
5	6		NAS1189C02P4L			SCREW, SELF LOCKING, 100° FLAT HD			
4	1		1011388			SCREW, SCREEN ADJUST			
3	1		1011377			SCREEN, VIEW			
2									
1	1		1011537			HOUSING, MACHINING ASSEMBLY			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOL ON	FRACTIONS	DECIMALS	ANGLES
	± ~	± ~	± ~

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CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN
DRAWN J a Lima DATE 28 APR 64
CHECKED
APPROVAL W. Campbell 6/3/64
APPROVAL
NASA APPROVAL
MIT APPROVAL 23 64

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

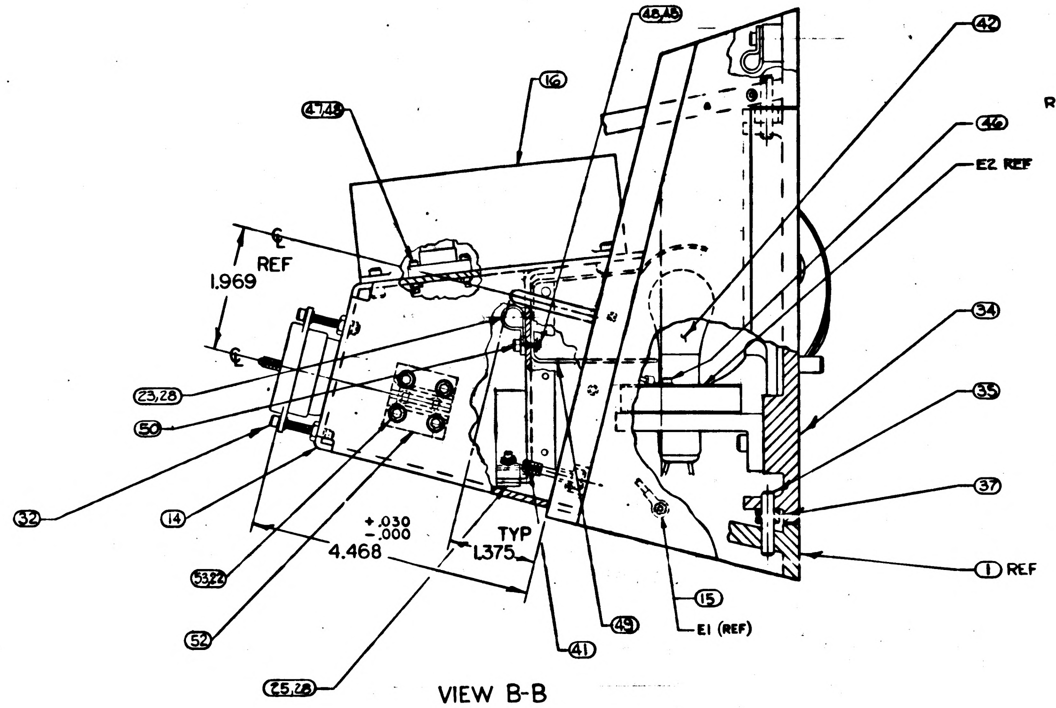
TITLE
MAP & DATA VIEWER
ASSEMBLY OF

CODE IDENT NO.
SIZE E
NASA NUMBER 1012136
SCALE 1:1
WEIGHT CALC ACTUAL
SHEET 1 OF 2

1012136 C

SYM	ZONE	DESCRIPTION	DATE	APPROVAL
REVISIONS				
A3		REVISED PER TDRR NO. 11295	11 JUL 64	
B2		SEE SHEET 1 FOR REVISIONS	SEPT 64	
C4		REVISED PER TDRR NO. 12363	29 SEPT 64	

NOTES
SEE SHEET 1 OF 2



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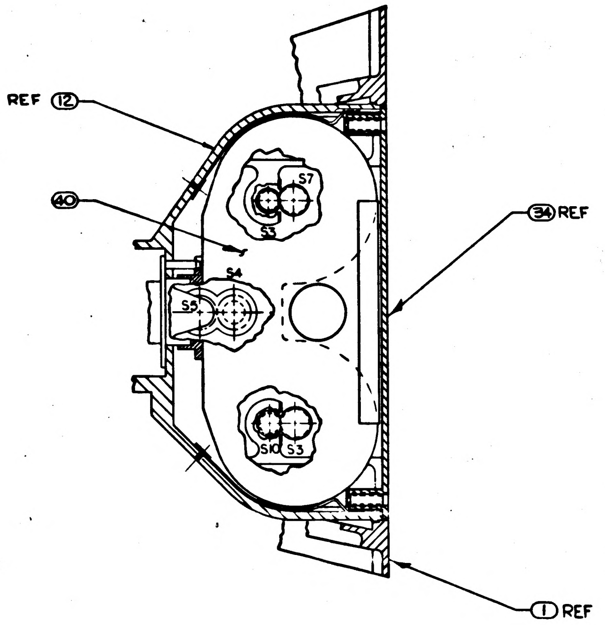
VIEW B-B
SEE SHEET 1 OF 2



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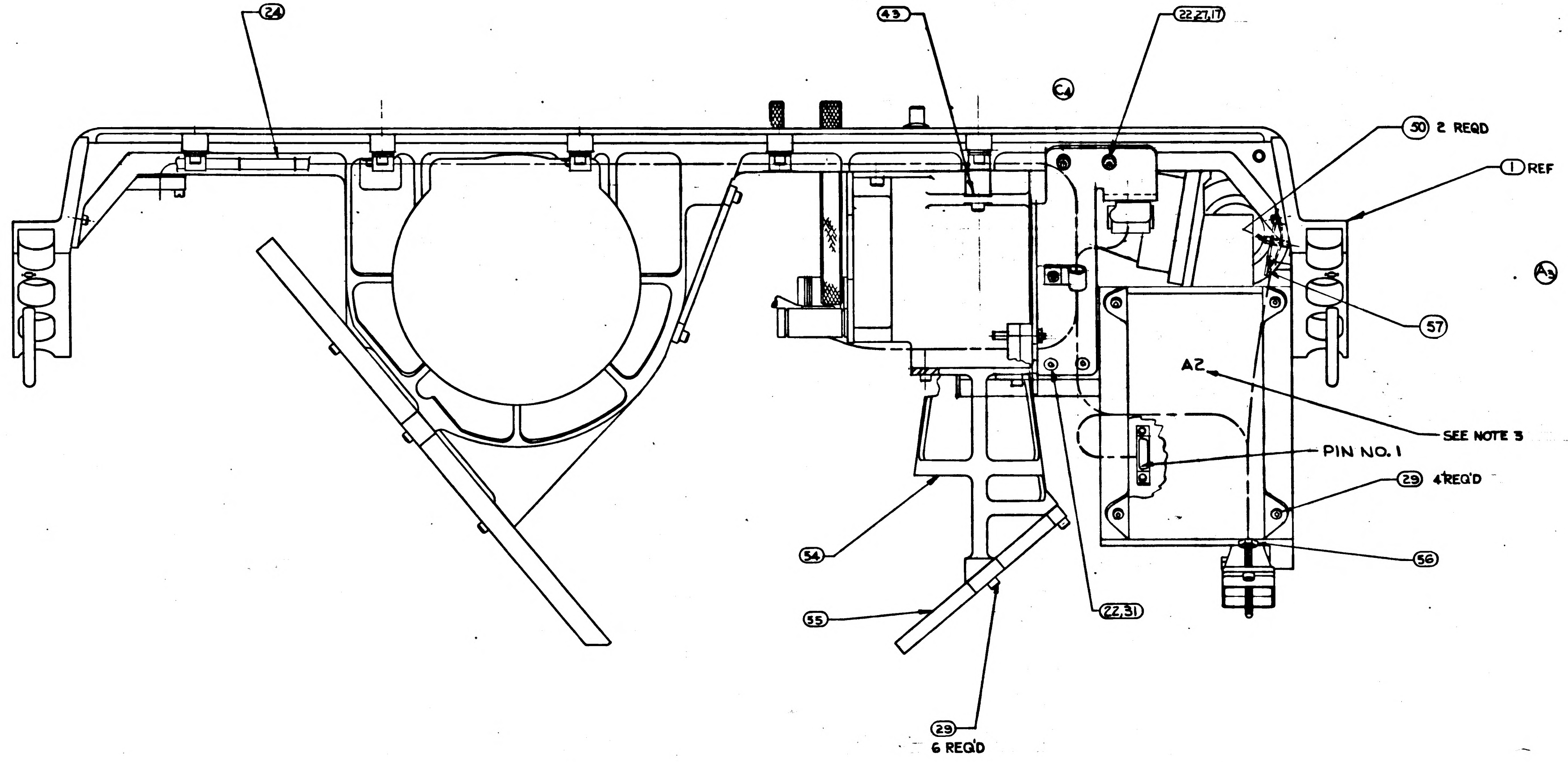
PARTIAL SECTION D-D
SEE SHEET 1 OF 2



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SEE NOTE 3
PIN NO. 1
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54
55
22,31
29
6 REQ'D

VIEW C-C
SEE SHEET 1 OF 2

FOR LIST OF FIND NO SEE SHEET 1 OF 2

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
LIST OF PARTS AND MATERIALS									

NEXT ASSY | USED ON
APPLICATION

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DIMENSIONS ARE IN INCHES
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MATERIAL ~
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC PN
DRAWN J. A. LIMA DATE 28 APR 64
CHECKED Fred Kreuter 1 June 64
APPROVAL 6/2/64
APPROVAL
NASA APPROVAL
MIT APPROVAL 6/2/64

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

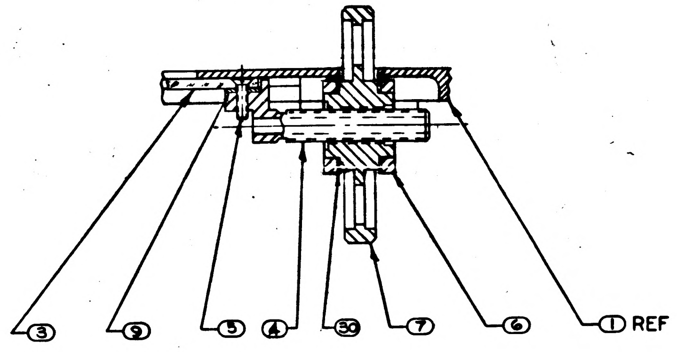
TITLE
MAP & DATA VIEWER
ASSEMBLY OF

CODE IDENT NO. | SIZE E | NASA NUMBER 1012136
SCALE 1:1 | WEIGHT CALC ACTUAL | SHEET 2 OF 2

1012136

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327.
2. IDENTIFY USING NASA PART NO, REVISION LETTER & MANUFACTURERS SYMBOL PER ND1002019, AND SERIALIZE PER ND1002023
3. MARK CHARACTERS IN APPROX LOCATION SHOWN IN ACCORDANCE WITH ND1002019.
4. ALL SCREWS WHICH ARE NOT SECURED BY LOCKING DEVICES SHALL BE SECURED USING ITEM 51 PER ND1002211.
5. ASSEMBLE AND TEST IN ACCORDANCE WITH ATP 1012136
6. [illegible] ITEM 8 TO ITEM 1 USING ITEM 44 PER ND 1002219



PARTIAL SECTION A-A
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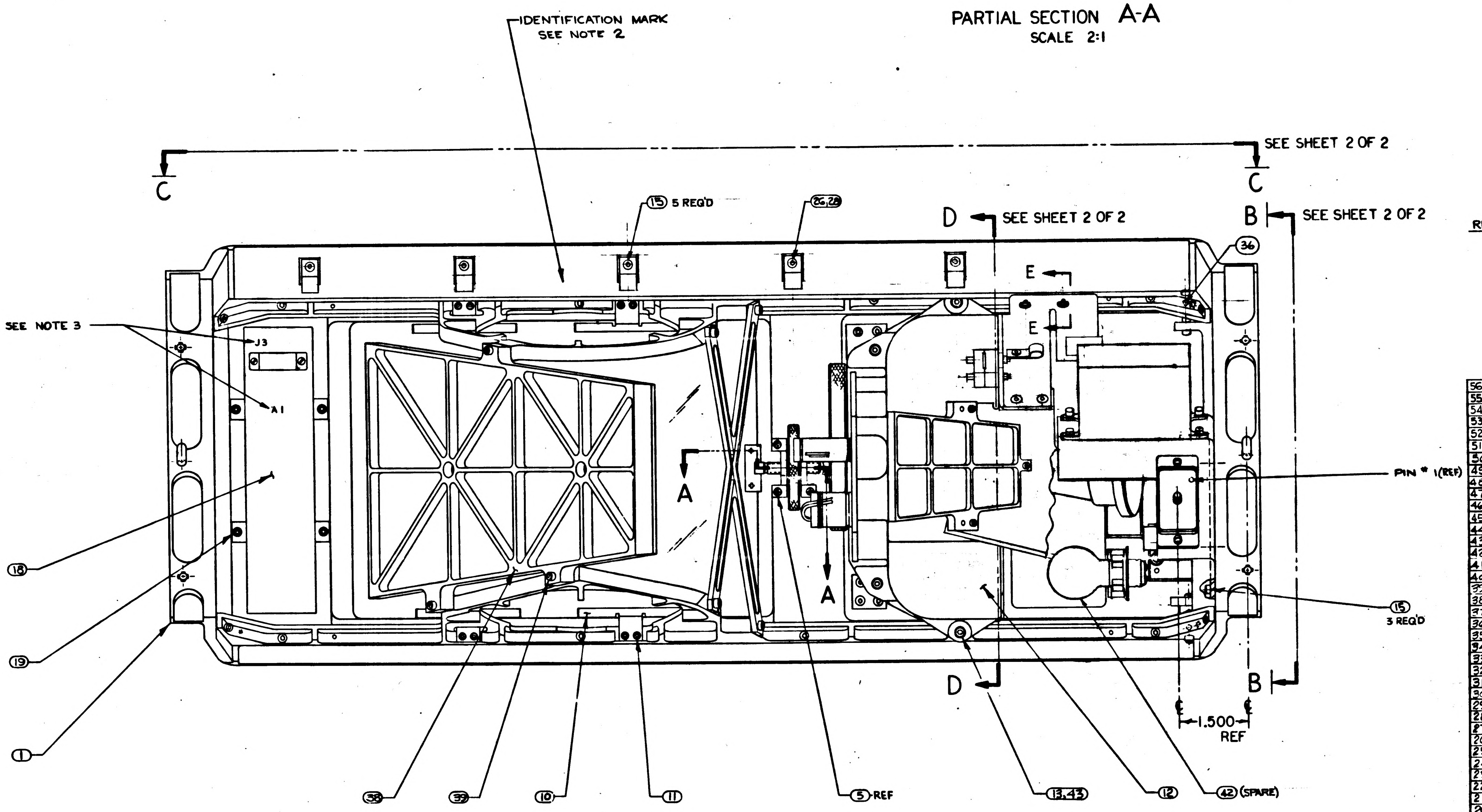

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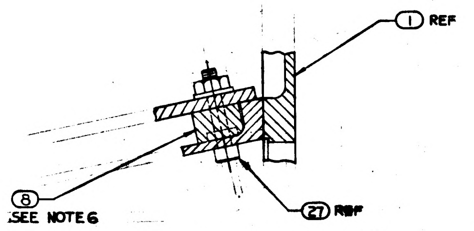

PARTIAL SECTION E-E
SCALE 2/1

* PURCHASE ITEM: SEE SPECIFICATION CONTROL DRAWING BEFORE ORDERING

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT
56	4		MS35649-44			NUT, PLAIN, HEX			
55	1		1011361	58387000020		MIRROR, SMALL			
54	1		1011470	85387000100		SUPPORT, MIRROR, ASSY OF			
53	4	*	1010630-14			SCREW, FLAT HEAD, 100° HEX SOCKET			
52	1		1012187	87387000110		GUIDE, ASSY			
51	AR		MIL-S-22473, GRADE C			SEALING COMPOUND, RETAINING			
50	1		NAS1352C02LL4			SCREW CAP HEX SOC HD SELF LOCKING			
49	1		1011546			SHIELD			
48	4	*	1011750-4			NUT, SELF LOCKING HEX			
47	2	*	1011625-13			SCREW, CAP SOCKET HD SELF LOCKING			
46	8		NAS1352C044			SCREW, CAP, SOCKET HEAD			
45	2	*	1010630-2			SCREW FLAT HEAD 100°			
44	AR		1011541			ADHESIVE, EPOXY			
43	A/R		1011525			SPACER, SHIM			
42	2	*	1011413			LAMP, PROJECTION			
41	4		1014503			SCREW, CAPTIVE			
40	1		1011420			MAGAZINE, ASSY OF			
39	3		NAS1352C04LL8	74455157015		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING			
38	1		1011360			MIRROR, LARGE			
37	2	*	1011466			COLLAR, SHAFT			
36	2		MS51029-9			SETSCREW, HEXAGON, SOC HD, FLAT POINT			
35	2		MS16555-645			PIN, DOWEL			
34	1		1011473			ACCESS DOOR ASSY OF			
33	1	*	1011368			SWITCH, TOGGLE			
32	2		1011539			SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING (MOD.)			
31	2		MS24671-2			SCREW, CAP, SOC HD, FLAT CSUNK 82°			
30	2		1011544-1			WASHER, SLIP			
29	10		NAS1352C04LL6	74455157014		SCREW, CAP, HEXAGON, SOC HD SELF-LOCKING			
28	8	*	1011918-1			WASHER, CABLE CLAMP			
27	2		NAS1352C04LL10			SCREW, CAP, SOCKET HEAD			
26	6	*	1000220-5			CLAMP, CABLE			
25	1	*	1000220-2			CLAMP, CABLE			
24	1		1012163			WIRING HARNESSA, BRANCHED			
23	1	*	1000220-6			CLAMP, CABLE			
22	8	*	1011750-8			NUT, SELF-LOCKING, HEXAGON			
21	1		NAS1352C04-6			SCREW, CAP, HEXAGON, SOC HD			
20	1		1012166			BRACKET, SUPPORT			
19	4		1011625-26			SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING			
18	1	*	1011375			INDICATOR, INTEGRATED READOUT			
17	2		MS15795-304			WASHER, FLAT			
16	1		1014630			AMPLIFIER AND SWITCH ASSY OF			
15	10		NAS1352C04LL4	74455157013		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING			
14	1		1011549			BRACKET, CONNECTOR, ASSY OF			
13	4		NAS1352C06LL6	74455157019		SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING			
12	1		1012200			GEAR BOX, ASSY OF			
11	8		1011625-8			SCREW, CAP, HEXAGON, SOC HD, SELF LOCKING			
10	4		1011380			SPRING, RETAINER			
9	A/R		1011519			SHIM, VIEWSCREEN			
8	1		1012202	52387000400		PAD, BRACKET			
7	1		1011433			KNOB AND INSERT-ASSY OF			
6	2		1011383			BLOCK, BEARING			
5	6		NAS1189MP-4L			SCREW, SELF LOCKING, 100° FLAT HD			
4	1		1011388			SCREW, SCREEN ADJUST			
3	1		1011377			SCREEN, VIEW			
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1	1		1011537			HOUSING, MACHINING ASSEMBLY			

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON: FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING
MATERIAL ~
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC
PN
DRAWN J. a Lima DATE 28 APR 64
CHECKED
APPROVAL W. Campbell 6/3/64
APPROVAL
NASA APPROVAL
UNIT APPROVAL 23 64

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

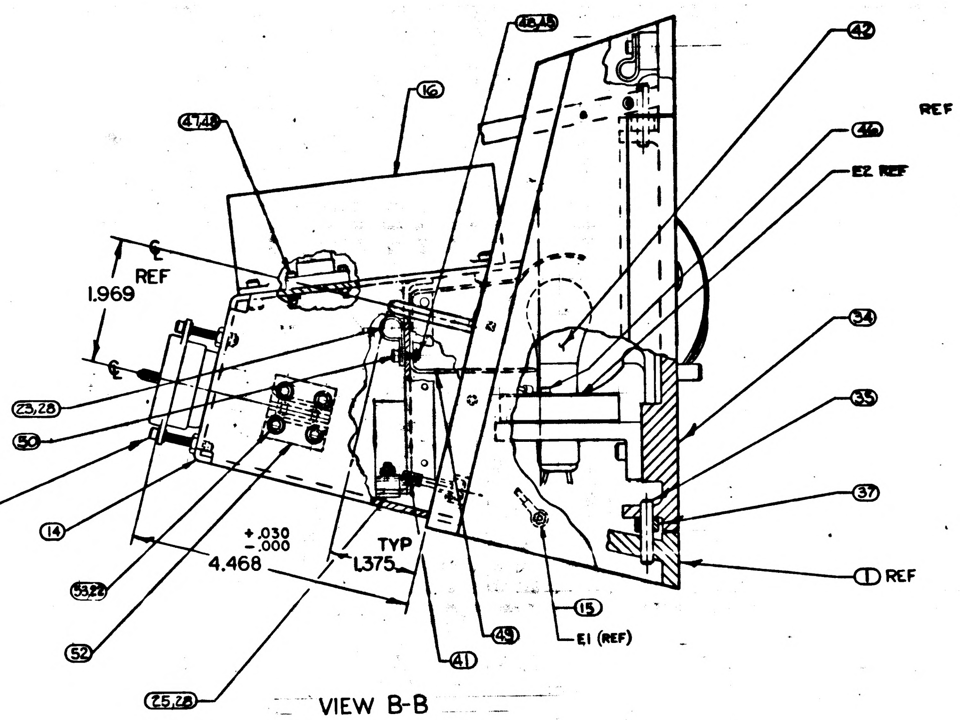
TITLE
MAP & DATA VIEWER
ASSEMBLY OF

CODE IDENT NO. | SIZE E | NASA NUMBER 1012136
SCALE 1:1 | WEIGHT CALC ACTUAL | SHEET 1 OF 2

1012136

REVISIONS 10503				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL

NOTES
SEE SHEET 1 OF 2



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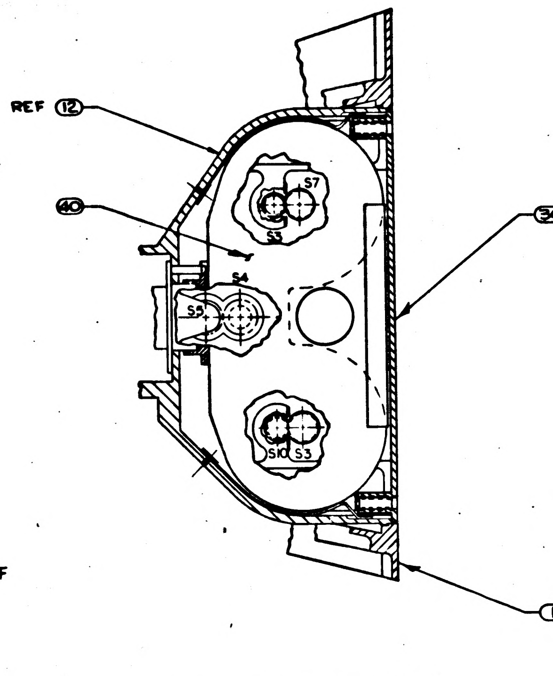
VIEW B-B
SEE SHEET 1 OF 2



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S5
S10
S3
34 REF
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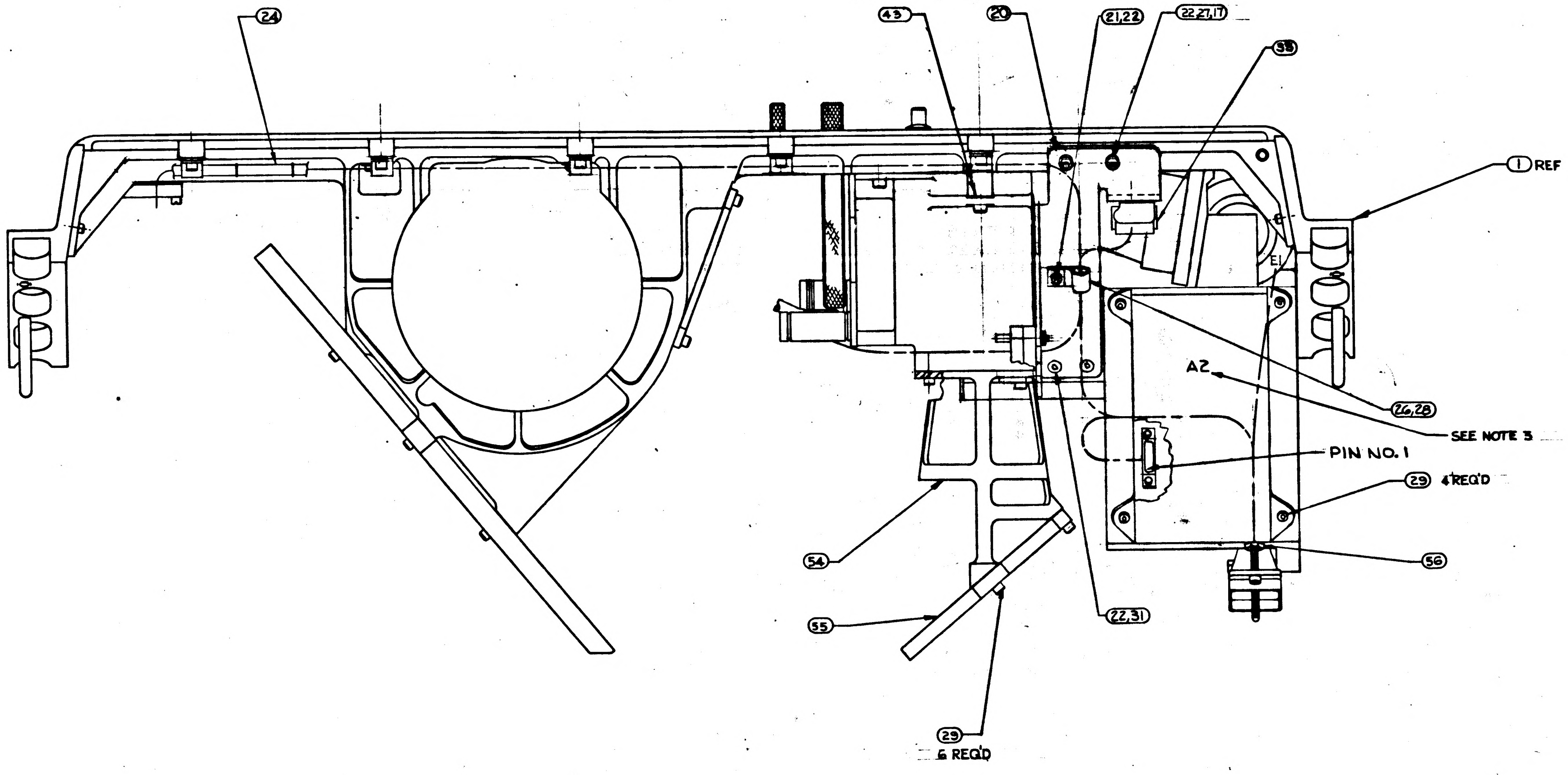
PARTIAL SECTION D-D
SEE SHEET 1 OF 2



24
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SEE NOTE 3
PIN NO. 1
29 4 REQ'D
56
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22,31
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29
6 REQ'D

VIEW C-C
SEE SHEET 1 OF 2

FOR LIST OF FIND NO SEE SHEET 1 OF 2

ITEM NO.	QTY REQD	SYM	GOVERNMENT/NASA NO.	KOLLSMAN PART NO.	CODE IDENT	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	UNIT WT

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

KOLLSMAN INSTRUMENT CORPORATION
ELMHURST NEW YORK
KIC
PN
DRAWN J. A. Lima DATE 28 APR 64
CHECKED Ed Kranta 1 June 64
APPROVAL W. Ganfeld 6/2/64
APPROVAL
NASA APPROVAL
UNIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS
TITLE
MAP & DATA VIEWER
ASSEMBLY OF
CODE IDENT NO.
SIZE E
NASA NUMBER 1012136
SCALE 1:1
WEIGHT
CALC ACTUAL
SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER: AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

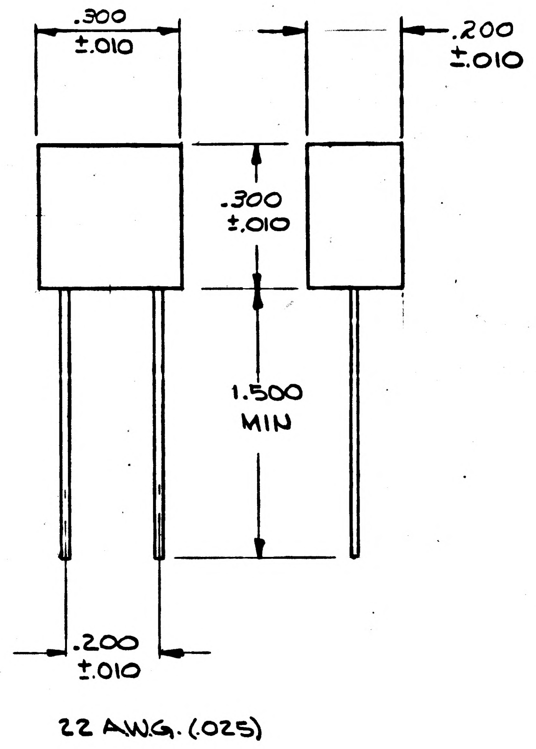
REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
	—	INITIAL RELEASE CLASS A PER TDRR 13465			10/14/64	
A		REVISED PER TDRR 15524			1/19/65	

REQUIREMENTS:

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002045 UNLESS MODIFIED OR AMENDED BY BY DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH REQUIREMENTS SPECIFIED IN ND 1002215, CLASS I.

2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS
     1. DIMENSIONS PER OUTLINE.
     2. MARKING: EACH CAPACITOR SHALL BE PERMANENTLY IDENTIFIED WITH THE NASA PART NUMBER, LATEST REVISION LETTER AND THE MANUFACTURER'S NAME OR SYMBOL, CAPACITANCE VALUE AND TOLERANCE PER ND 1002019.
   - B. ELECTRICAL REQUIREMENTS
     1. CAPACITANCE: PER TABLE I AT +25°C, 1 KC.
     2. CAPACITANCE TOLERANCE: ±10% AT +25°C, 1 KC.
     3. DIELECTRIC WITHSTANDING VOLTAGE: CAPACITORS SHALL WITHSTAND 400VDC FOR 2 SECONDS WITHOUT DAMAGE, ARCING OR BREAKDOWN.
     4. INSULATION RESISTANCE: 10K MEGOHMS MIN AT 25°C.

3. DESIGN REQUIREMENTS
   - A. DC WORKING VOLTAGE: 200 V AT 85°C.
   - B. OPERATING TEMPERATURE RANGE: -55°C TO +85°C.
   - C. DISSIPATION FACTOR: 2% MAX.
   - D. CAPACITANCE CHANGE VS TEMPERATURE: CAPACITANCE SHALL NOT DEVIATE BY MORE THAN ±15% OVER OPERATING TEMPERATURE RANGE.
   - E. LEAD DATA: DUMET, GOLD PLATED PER ND 1015401. A CERTIFICATE OF COMPLIANCE SHALL ACCOMPANY EACH SHIPMENT.
   - F. ENVIRONMENTAL:
     1. REDUCED PRESSURE: UNIT SHALL BE OPERATIVE DURING AND AFTER AND SHALL SUSTAIN NO DAMAGE AS A RESULT OF EXPOSURE TO 10^{-4} MM OF MERCURY FOR 96 HOURS.



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

NEXT ASSY	USED ON
APPLICATION	

KIC NO 69190471001

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN M. MENZORIO 8-13-64
CHECKED S. Zafcaluk 8-13-64
APPROVED D. A. Koso 10-14-64
APPROVED

APPROVED MIT L. Hagl 10/14/64
APPROVED MSC W J Rh 10-14-64 DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CAPACITOR, FIXED, CERAMIC DIELECTRIC
SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	DRAWING NO.
	C	1012141
SCALE ~		SHEET 1 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
	—	INITIAL RELEASE CLASS A PER TDRR 13465			10/14/64	
A		REVISED PER TDRR 15524			1/5/65	

4. SPECIAL CONDITIONING BY SUPPLIER

A. BURN-IN: ALL CAPACITORS SHALL BE SUBJECTED TO 225 VDC AT +85°C FOR A MINIMUM OF 100 HOURS.

B. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN AT +25° ±2°C:

CAPACITANCE
DISSIPATION FACTOR
INSULATION RESISTANCE

C. THE BURN-IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOLLOWING BURN-IN, SHALL NOT BE ACCEPTABLE.

LIMITS:		
	CAPACITANCE	+10% OF INITIAL READING
	DISSIPATION FACTOR:	3% MAXIMUM
	INSULATION RESISTANCE:	5K MEGOHM MINIMUM WHEN TESTED IN ACCORDANCE WITH MIL-C-11015.

TABLE 1

CAPACITANCE .2 MFD

MASTER

NEXT ASSY	USED ON
APPLICATION	

KIC NO 69190471001

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN N Menzorio 8-13-64
CHECKED S Zalealuk 8-13-64
APPROVED D Koss 10-14-64
APPROVED
APPROVED MIT L. Hafel 10/14/64
APPROVED MSC W J Rhine 10-14-64 DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CAPACITOR, FIXED,
CERAMIC DIELECTRIC
SPECIFICATION CONTROL DWG

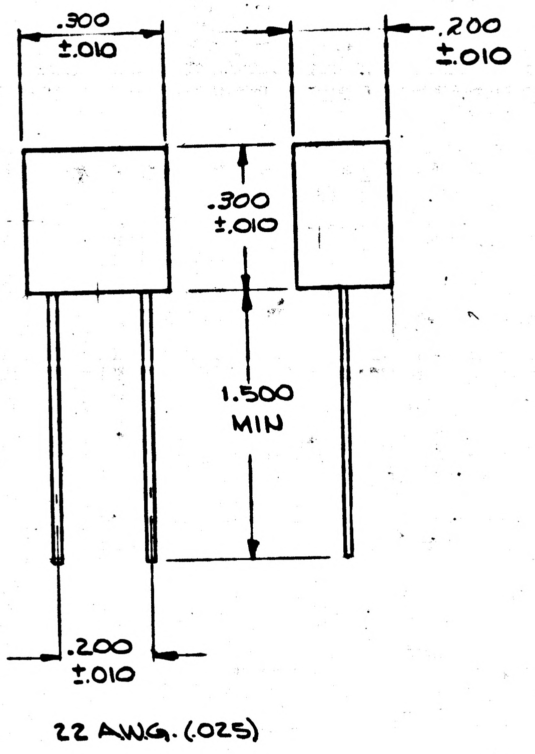
CODE IDENT NO.
SIZE C
DRAWING NO. 1012141
SCALE
SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
	—	INITIAL RELEASE CLASS A PER TDRR 13465			10/14/64	

REQUIREMENTS:

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002045 UNLESS MODIFIED OR AMENDED BY BY DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH REQUIREMENTS SPECIFIED IN ND 1002215, CLASS 1.
2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS
     - 1. DIMENSIONS PER OUTLINE.
     - 2. MARKING: EACH CAPACITOR SHALL BE PERMANENTLY IDENTIFIED WITH THE NASA PART NUMBER, LATEST REVISION LETTER AND THE MANUFACTURER'S NAME OR SYMBOL, CAPACITANCE VALUE AND TOLERANCE PER ND 1002019.
   - B. ELECTRICAL REQUIREMENTS
     - 1. CAPACITANCE: PER TABLE I AT +25°C, 1 KC.
     - 2. CAPACITANCE TOLERANCE: ±10% AT +25°C, 1 KC.
     - 3. DIELECTRIC WITHSTANDING VOLTAGE: CAPACITORS SHALL WITHSTAND 450 VDC FOR 2 SECONDS WITHOUT DAMAGE, ARCING OR BREAKDOWN.
     - 4. INSULATION RESISTANCE: 10K MEGOHMS MIN AT 25°C.
3. DESIGN REQUIREMENTS
   - A. DC WORKING VOLTAGE: 200 V AT 85°C.
   - B. OPERATING TEMPERATURE RANGE: -55°C TO +85°C.
   - C. DISSIPATION FACTOR: 2% MAX.
   - D. CAPACITANCE CHANGE VS TEMPERATURE: CAPACITANCE SHALL NOT DEVIATE BY MORE THAN ±15% OVER OPERATING TEMPERATURE RANGE.
   - E. LEAD DATA: DUMET, GOLD PLATED PER ND 1015401. A CERTIFICATE OF COMPLIANCE SHALL ACCOMPANY EACH SHIPMENT.
   - F. ENVIRONMENTAL:
     - 1. REDUCED PRESSURE: UNIT SHALL BE OPERATIVE DURING AND AFTER AND SHALL SUSTAIN NO DAMAGE AS A RESULT OF EXPOSURE TO 10^{-4} MM OF MERCURY FOR 96 HOURS.



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

KIC NO 69190471001

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN M. MENZORIO 8-13-64
CHECKED S. Zakaluk 8-13-64
APPROVED A. A. Koso 8-14-64
APPROVED

APPROVED MIT L. Hagel 10/14/64
APPROVED MSC 10-14-64 DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CAPACITOR, FIXED,
CERAMIC DIELECTRIC
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
DRAWING NO. 1012141
SCALE ~
SHEET 1 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
	—	INITIAL RELEASE CLASS A PER TDRR 13465			10/14/64	DW

4. SPECIAL CONDITIONING BY SUPPLIER

   A. BURN-IN: ALL CAPACITORS SHALL BE SUBJECTED TO 225 VDC AT +85°C FOR A MINIMUM OF 100 HOURS.

   B. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN AT +25° ±2°C:

      CAPACITANCE
      DISSIPATION FACTOR
      INSULATION RESISTANCE

   C. THE BURN-IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOLLOWING BURN-IN, SHALL NOT BE ACCEPTABLE.

LIMITS:		
	CAPACITANCE	+10% OF INITIAL READING
	DISSIPATION FACTOR:	2% MAXIMUM
	INSULATION RESISTANCE:	10K MEGOHM MINIMUM WHEN TESTED IN ACCORDANCE WITH MIL-C-11015.

TABLE 1

CAPACITANCE .2 MFD

MASTER

KIC NO 69190471001	QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS				

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN N Menzorio 8-13-64
CHECKED S Zalenluk 8-13-64
APPROVED Dakoss 10-14-64
APPROVED

APPROVED MIT L. Hafel 10/14/64
APPROVED MSC W J Rhine 10-14-64 DATE

CAPACITOR, FIXED,
CERAMIC DIELECTRIC
SPECIFICATION CONTROL DWG

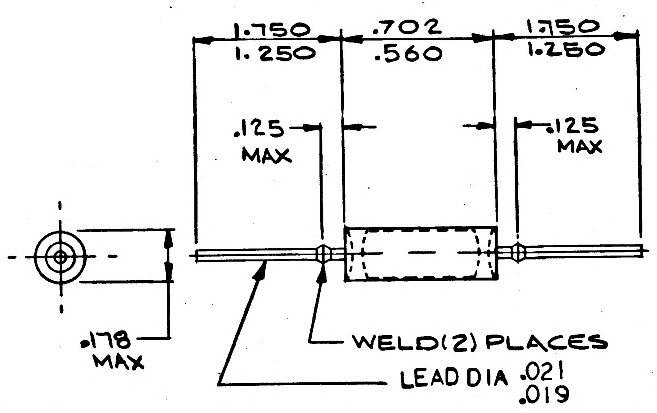
CODE IDENT NO.	SIZE	DRAWING NO.
	C	1012141
SCALE		SHEET 2 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
Ⓜ —		INITIAL RELEASE CLASS A PER TDRR 11519			8/12/64	WK
A		REVISED PER TDRR 14040			11-12-64	WK



REQUIREMENTS

1. GENERAL:
   - A. UNITS SHALL MEET ALL THE GENERAL REQUIREMENTS OF MIL-C-3965 EXCEPT AS SPECIFIED HEREIN.
   - B. INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH THE GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.
   - C. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - D. PARTS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND 1002044 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS OF THIS DRAWING.
   - E. UNIT PACKAGING AND PACKING SHALL BE IN SUCH A MANNER AS TO INSURE THE FOLLOWING:
     1. EACH INDIVIDUAL PART SHALL BE SEPARATED FROM ALL OTHERS AND PACKED SECURELY TO PREVENT CONTACT DURING TRANSIT.
     2. LEADS SHALL BE SECURED AGAINST WHIPPING OR VIBRATION DURING TRANSIT.
     3. BODY MOUNTING SHALL BE SUCH THAT CAPACITORS CAN BE GRIPPED BY THE BODY AND REMOVED FROM THE PACKAGE. HANDLING OF LEADS IS TO BE HELD TO A MINIMUM.
   - F. MAKE ALL ELECTRICAL MEASUREMENTS PER MIL-C-3965
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS
     1. DIMENSIONS AS SHOWN.
     2. LEAD DATA: NICKEL ALLOY PER ND 1015400.
     3. MARKING: MARK UNITS PER MIL-STD-130 WITH MANUFACTURER'S NAME AND/OR SYMBOL, NASA DRAWING NUMBER, DASH NUMBER AND REVISION LETTER AND SERIAL NUMBER TO SIGNIFY COMPLETION OF SPECIAL TEMPERATURE CYCLING. IF SPACE PERMITS, MANUFACTURER'S TYPE NUMBER, CAPACITANCE VALUE AND TOLERANCE AND VOLTAGE RATING MAY ALSO BE MARKED ON PART.
     4. MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL INCLUDE NASA DRAWING NUMBER, DASH NUMBER AND REVISION LETTER.

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING

MASTER

K.I.C. NO. 69030464001

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN M. Menzorio 6-10-64
CHECKED Szakaluk 6-10-64
APPROVED DA Koso 8-7-64
APPROVED
APPROVED MIT W 12 Aug 64
APPROVED MSC K Mihash 8/12/64 DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CAPACITOR, FIXED
TANTALUM, ELECTROLYTIC
(ETCHED FOIL, N.P.)
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
DRAWING NO. 1012142
SCALE ~
SHEET 1 OF 2

1012142 A

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
–		INITIAL RELEASE CLASS A PER TDRR 11519			8/12/64	WR
A		REVISED PER TDRR 14040			11-12-64	WR

2. INSPECTION AND ACCEPTANCE: (CONTINUED)

   B. ELECTRICAL REQUIREMENTS:

      1. DC LEAKAGE CURRENT (MAXIMUM) AT 25°C, PER TABLE I.
      2. WORKING VOLTAGE: PER TABLE I.
      3. IMPEDANCE (AT -55°C): PER TABLE I.
      4. CAPACITANCE: PER TABLE I.
      5. CAPACITANCE TOLERANCE: PER TABLE I.

3. DESIGN REQUIREMENTS:

   A. STORAGE LIFE: 10 YEARS MINIMUM AT 25°C.

   B. CONSTRUCTION:

      1. CASE: SEALED METAL CAN WITH SUPPLEMENTARY EXTERIOR INSULATION.
      2. CAPACITANCE ELEMENT: ETCHED TANTALUM FOIL.
      3. POLARITY: NON-POLARIZED.

   C. MAX CHANGE DUE TO LIFE TEST:

      1. CAPACITANCE: ± 25% OF INITIAL VALUE.
      2. SERIES RESISTANCE: +30% OF INITIAL REQUIREMENT.

   D. AMBIENT OPERATING TEMPERATURE RANGE: FROM -55°C TO +85°C.

4. SPECIAL CONDITIONING BY SUPPLIER:

   A. CAPACITORS SHALL BE TEMPERATURE CYCLED IN ACCORDANCE WITH METHOD 102 OF MIL-STD 202.

   B. FOLLOWING THE TEMPERATURE CYCLING, CAPACITORS SHALL BE SUBJECTED TO A VACUUM OF 7 INCHES OF Hg.

   (1.) VACUUM SHALL BE MAINTAINED ON THE CAPACITORS FOR 15 MINUTES FOLLOWING THE ABOVE, THERE SHALL BE NO EVIDENCE OF ELECTROLYTE LEAKAGE UNDER 2X MAGNIFICATION.

   C. CAPACITORS NOT MEETING THIS REQUIREMENT SHALL NOT BE ACCEPTABLE.

   D. BURN-IN: ALL CAPACITORS SHALL BE BURNED IN FOR 250 HOURS MIN. AT THE RATED DC WORKING VOLTAGE AT A TEMPERATURE OF +85°C. POLARITY TO BE REVERSED AT THE END OF 125 HOURS.

TABLE I

CAPACITANCE AT 25°C:	.18 MFD
CAPACITANCE TOLERANCE:	+30% -15%
VOLTAGE RATING:	150 VDC
D.C. LEAKAGE CURRENT AT 25°C:	2 MICRO AMPS MAX
D.C. LEAKAGE CURRENT AT 85°C:	4 MICRO AMPS MAX
IMPEDANCE AT -55°C, 120 CPS:	18600 OHMS MAX
POWER FACTOR AT 25°C, 120 CPS:	15
POWER FACTOR AT 85°C, 129 CPS:	20

D. BURN-IN (CONTINUED)

THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:

CAPACITANCE
DC LEAKAGE
POWER FACTOR

THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL CAPACITOR WITH THE INITIAL TEST READING, THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. HISTOGRAMS SHALL BE PLOTTED TO SHOW THE FREQUENCY DISTRIBUTION OF THE ABSOLUTE VALUE OF EACH CHARACTERISTIC AND TO SHOW THE FREQUENCY DISTRIBUTION OF THE PERCENT CHANGE OF EACH CHARACTERISTIC FROM ITS INITIAL READING. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS, OR WHICH EXCEED THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN-IN, SHALL NOT BE ACCEPTABLE.

PARAMETRIC CHANGE LIMITS:

CAPACITANCE:	±10% OF INITIAL VALUE
D.C. LEAKAGE:	INITIAL REQUIREMENTS
POWER FACTOR:	INITIAL REQUIREMENTS

MASTER

K.I.C. NO. 69030464001

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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APPLICATION	

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DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN M Nevrozio 6-10-64
CHECKED B Szakalik 6-10-64
APPROVED D Koso 8-7-64
APPROVED
APPROVED MIT W Goffe 12 Aug 64
APPROVED MSC 8/12/64
DATE

CAPACITOR, FIXED
TANTALUM, ELECTROLYTIC
(ETCHED FOIL, N.P.)
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
DRAWING NO. 1012142
SCALE
SHEET 2 OF 2

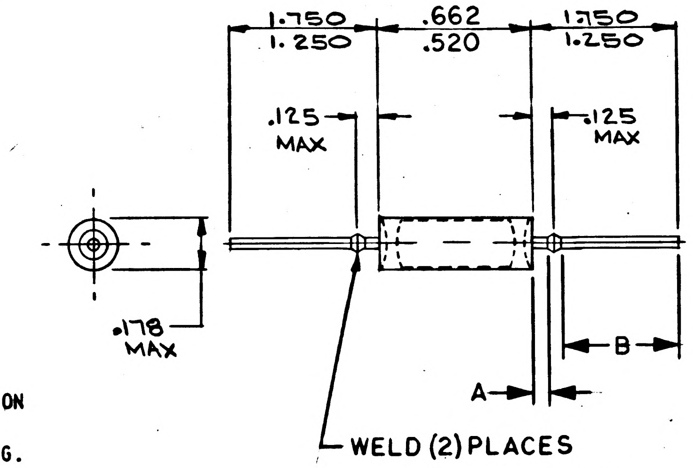
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 11519			8/12/64	WK
A		REVISED PER TDRR 14040			11-12-64	WK
B		REVISED PER TDRR 20704			8/12/65	WK

REQUIREMENTS

1. GENERAL:
   - A. UNITS SHALL MEET ALL THE GENERAL REQUIREMENTS OF MIL-C-3965 EXCEPT AS SPECIFIED HEREIN.
   - B. INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH THE GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.
   - C. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - D. PARTS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND 1002044 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS OF THIS DRAWING.
   - E. UNIT PACKAGING AND PACKING SHALL BE IN SUCH A MANNER AS TO INSURE THE FOLLOWING:
     - 1. EACH INDIVIDUAL PART SHALL BE SEPARATED FROM ALL OTHERS AND PACKED SECURELY TO PREVENT CONTACT DURING TRANSIT.
     - 2. LEADS SHALL BE SECURED AGAINST WHIPPING OR VIBRATION DURING TRANSIT.
     - 3. BODY MOUNTING SHALL BE SUCH THAT CAPACITORS CAN BE GRIPPED BY THE BODY AND REMOVED FROM THE PACKAGE. HANDLING OF LEADS IS TO BE HELD TO A MINIMUM.
   - F. MAKE ALL ELECTRICAL MEASUREMENTS PER MIL-C-3965
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS
     - 1. DIMENSIONS AS SHOWN.
     - 2. LEAD DATA: NICKEL ALLOY PER ND 1015400.
     - 3. MARKING: MARK UNITS PER MIL-STD-130 WITH MANUFACTURER'S NAME AND/OR SYMBOL, NASA DRAWING NUMBER, DASH NUMBER AND REVISION LETTER AND SERIAL NUMBER TO SIGNIFY COMPLETION OF SPECIAL TEMPERATURE CYCLING. IF SPACE PERMITS, MANUFACTURER'S TYPE NUMBER, CAPACITANCE VALUE AND TOLERANCE AND VOLTAGE RATING MAY ALSO BE MARKED ON PART.
     - 4. MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL INCLUDE NASA DRAWING NUMBER, DASH NUMBER AND REVISION LETTER.



LEAD DIA AT "A" = $\frac{.021}{.019}$

LEAD DIA AT "B" = $\frac{.026}{.024}$

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING

MASTER

NEXT ASSY	USED ON
APPLICATION	

K.I.C. NO. 69030464001

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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CAPACITOR VALUES ARE IN µf
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FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
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MATERIAL

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INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN M. Menzorio 6-10-64
CHECKED Szakaluk 6-10-64
APPROVED D A Koso 8-7-64
APPROVED
APPROVED MIT W Cuffe 12 Aug 64
APPROVED MSC K Michael 8/12/64 DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CAPACITOR, FIXED TANTALUM, ELECTROLYTIC (ETCHED FOIL, N.P.) SPECIFICATION CONTROL DWG

CODE IDENT NO. 80230
SIZE C
DRAWING NO. 1012142
SCALE ~
SHEET 1 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER: AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 11519			8/12/64	W/
A		REVISED PER TDRR 14040			11-12-64	WK
B		REVISED PER TDRR 20704			8/10/65	WK

2. INSPECTION AND ACCEPTANCE: (CONTINUED)
   - B. ELECTRICAL REQUIREMENTS:
     1. DC LEAKAGE CURRENT (MAXIMUM) AT 25°C, PER TABLE I.
     2. WORKING VOLTAGE: PER TABLE I.
     3. IMPEDANCE (AT -55°C): PER TABLE I.
     4. CAPACITANCE: PER TABLE I.
     5. CAPACITANCE TOLERANCE: PER TABLE I.

3. DESIGN REQUIREMENTS:
   - A. STORAGE LIFE: 10 YEARS MINIMUM AT 25°C.
   - B. CONSTRUCTION:
     1. CASE: SEALED METAL CAN WITH SUPPLEMENTARY EXTERIOR INSULATION.
     2. CAPACITANCE ELEMENT: ETCHED TANTALUM FOIL.
     3. POLARITY: NON-POLARIZED.
   - C. MAX CHANGE DUE TO LIFE TEST:
     1. CAPACITANCE: ± 25% OF INITIAL VALUE.
     2. SERIES RESISTANCE: +30% OF INITIAL REQUIREMENT.
   - D. AMBIENT OPERATING TEMPERATURE RANGE: FROM -55°C TO +85°C.

4. SPECIAL CONDITIONING BY SUPPLIER:
   - A. CAPACITORS SHALL BE TEMPERATURE CYCLED IN ACCORDANCE WITH METHOD 102 OF MIL-STD 202.
   - B. FOLLOWING THE TEMPERATURE CYCLING, CAPACITORS SHALL BE SUBJECTED TO A VACUUM OF 7 INCHES OF Hg.
   - (1.) VACUUM SHALL BE MAINTAINED ON THE CAPACITORS FOR 15 MINUTES FOLLOWING THE ABOVE, THERE SHALL BE NO EVIDENCE OF ELECTROLYTE LEAKAGE UNDER 2X MAGNIFICATION.
   - C. CAPACITORS NOT MEETING THIS REQUIREMENT SHALL NOT BE ACCEPTABLE.
   - D. BURN-IN: ALL CAPACITORS SHALL BE BURNED IN FOR 250 HOURS MIN. AT THE RATED DC WORKING VOLTAGE AT A TEMPERATURE OF +85°C. POLARITY TO BE REVERSED AT THE END OF 125 HOURS.

TABLE I

CAPACITANCE AT 25°C:	.18 MFD
CAPACITANCE TOLERANCE:	+30% -15%
VOLTAGE RATING:	150 VDC
D.C. LEAKAGE CURRENT AT 25°C:	2 MICRO AMPS MAX
D.C. LEAKAGE CURRENT AT 85°C:	4 MICRO AMPS MAX
IMPEDANCE AT -55°C, 120 CPS:	18600 OHMS MAX
POWER FACTOR AT 25°C, 120 CPS:	15
POWER FACTOR AT 85°C, 129 CPS:	20

D. BURN-IN (CONTINUED)

THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:

CAPACITANCE
DC LEAKAGE
POWER FACTOR

THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL CAPACITOR WITH THE INITIAL TEST READING, THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. HISTOGRAMS SHALL BE PLOTTED TO SHOW THE FREQUENCY DISTRIBUTION OF THE ABSOLUTE VALUE OF EACH CHARACTERISTIC AND TO SHOW THE FREQUENCY DISTRIBUTION OF THE PERCENT CHANGE OF EACH CHARACTERISTIC FROM ITS INITIAL READING. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS, OR WHICH EXCEED THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN-IN, SHALL NOT BE ACCEPTABLE.

PARAMETRIC CHANGE LIMITS:

CAPACITANCE:	±10% OF INITIAL VALUE
D.C. LEAKAGE:	INITIAL REQUIREMENTS
POWER FACTOR:	INITIAL REQUIREMENTS

MASTER

NEXT ASSY	USED ON

APPLICATION

K.I.C. NO. 69030464001

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
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MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN M. Navrozio 6-10-64
CHECKED B Szakaluk 6-10-64
APPROVED D.A. Koso 8-7-64
APPROVED
APPROVED MIT W. Gruffer 12 Aug 64
APPROVED MSC 8/12/64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CAPACITOR, FIXED
TANTALUM, ELECTROLYTIC
(ETCHED FOIL, N.P)
SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1012142

SCALE

SHEET 2 OF 2

1012142 B

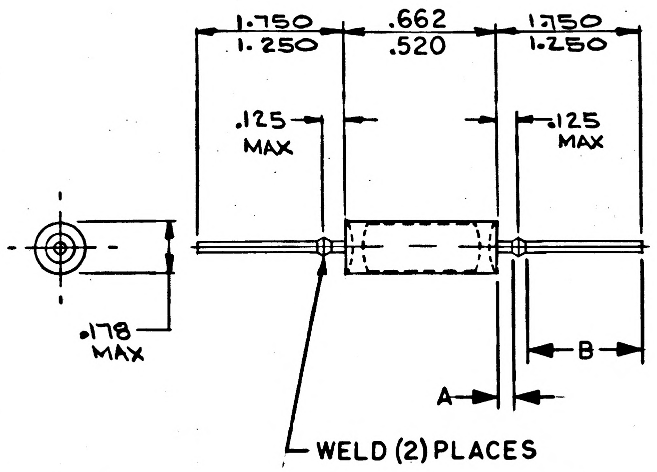
NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 11519			8/12/64	WK
A		REVISED PER TDRR 14040			11-12-64	WK
B		REVISED PER TDRR 20704			8/10/65	WK
C		REVISED PER TDRR 21785			8-27-65	WK

REQUIREMENTS

1. GENERAL:
   - A. UNITS SHALL MEET ALL THE GENERAL REQUIREMENTS OF MIL-C-3965 EXCEPT AS SPECIFIED HEREIN.
   - B. INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH THE GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.
   - C. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - D. PARTS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND 1002044 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS OF THIS DRAWING.
   - E. UNIT PACKAGING AND PACKING SHALL BE IN SUCH A MANNER AS TO INSURE THE FOLLOWING:
     1. EACH INDIVIDUAL PART SHALL BE SEPARATED FROM ALL OTHERS AND PACKED SECURELY TO PREVENT CONTACT DURING TRANSIT.
     2. LEADS SHALL BE SECURED AGAINST WHIPPING OR VIBRATION DURING TRANSIT.
     3. BODY MOUNTING SHALL BE SUCH THAT CAPACITORS CAN BE GRIPPED BY THE BODY AND REMOVED FROM THE PACKAGE. HANDLING OF LEADS IS TO BE HELD TO A MINIMUM.
   - F. MAKE ALL ELECTRICAL MEASUREMENTS PER MIL-C-3965
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS
     1. DIMENSIONS AS SHOWN.
     2. LEAD DATA: NICKEL ALLOY PER ND 1015400.
     3. MARKING: MARK UNITS PER MIL-STD-130 WITH MANUFACTURER'S NAME AND/OR SYMBOL, NASA DRAWING NUMBER, DASH NUMBER AND REVISION LETTER AND SERIAL NUMBER TO SIGNIFY COMPLETION OF SPECIAL TEMPERATURE CYCLING. IF SPACE PERMITS, MANUFACTURER'S TYPE NUMBER, CAPACITANCE VALUE AND TOLERANCE AND VOLTAGE RATING MAY ALSO BE MARKED ON PART.
     4. MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL INCLUDE NASA DRAWING NUMBER, DASH NUMBER AND REVISION LETTER.



LEAD DIA AT "A" = .021 / .019

LEAD DIA AT "B" = .026 / .024

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING

MASTER

NEXT ASSY	USED ON
APPLICATION	

K.I.C. NO. 69030464001

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN M. Menzorio 6-10-64
CHECKED R. Szakaluk 6-10-64
APPROVED D.A. Koso 8-7-64
APPROVED
APPROVED MIT W. Crafford 12 Aug 64
APPROVED MSC K. Mihalek DATE 8/12/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CAPACITOR, FIXED
TANTALUM, ELECTROLYTIC
(ETCHED FOIL, N.P.)
SPECIFICATION CONTROL DWG

CODE IDENT NO. 80230
SIZE C
DRAWING NO. 1012142
SCALE ~
SHEET 1 OF 2

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
–		INITIAL RELEASE CLASS A PER TDRR 11519			8/12/64	WK
A		REVISED PER TDRR 14040			11-12-64	WK
B		REVISED PER TDRR 20704			8/10/65	WK
C		REVISED PER TDRR 21785			8-27-65	WK

2. INSPECTION AND ACCEPTANCE: (CONTINUED)
   B. ELECTRICAL REQUIREMENTS:
      1. DC LEAKAGE CURRENT (MAXIMUM) AT 25°C, PER TABLE I.
      2. WORKING VOLTAGE: PER TABLE I.
      3. IMPEDANCE (AT -55°C): PER TABLE I.
      4. CAPACITANCE: PER TABLE I.
      5. CAPACITANCE TOLERANCE: PER TABLE I.

3. DESIGN REQUIREMENTS:
   A. STORAGE LIFE: 10 YEARS MINIMUM AT 25°C.
   B. CONSTRUCTION:
      1. CASE: SEALED METAL CAN WITH SUPPLEMENTARY EXTERIOR INSULATION.
      2. CAPACITANCE ELEMENT: ETCHED TANTALUM FOIL.
      3. POLARITY: NON-POLARIZED.
   C. MAX CHANGE DUE TO LIFE TEST:
      1. CAPACITANCE: ± 25% OF INITIAL VALUE.
      2. SERIES RESISTANCE: +30% OF INITIAL REQUIREMENT.
   D. AMBIENT OPERATING TEMPERATURE RANGE: FROM -55°C TO +85°C.
   E. UNITS SHALL BE CAPABLE OF WITHSTANDING 1.5 LB LEAD PULL MAX

4. SPECIAL CONDITIONING BY SUPPLIER:
   A. CAPACITORS SHALL BE TEMPERATURE CYCLED IN ACCORDANCE WITH METHOD 102 OF MIL-STD 202.
   B. FOLLOWING THE TEMPERATURE CYCLING, CAPACITORS SHALL BE SUBJECTED TO A VACUUM OF 7 INCHES OF Hg.
   (1.) VACUUM SHALL BE MAINTAINED ON THE CAPACITORS FOR 15 MINUTES FOLLOWING THE ABOVE, THERE SHALL BE NO EVIDENCE OF ELECTROLYTE LEAKAGE UNDER 2X MAGNIFICATION.
   C. CAPACITORS NOT MEETING THIS REQUIREMENT SHALL NOT BE ACCEPTABLE.
   D. BURN-IN: ALL CAPACITORS SHALL BE BURNED IN FOR 250 HOURS MIN. AT THE RATED DC WORKING VOLTAGE AT A TEMPERATURE OF +85°C. POLARITY TO BE REVERSED AT THE END OF 125 HOURS.

TABLE I

CAPACITANCE AT 25°C:	.18 MFD
CAPACITANCE TOLERANCE:	+30% -15%
VOLTAGE RATING:	150 VDC
D.C. LEAKAGE CURRENT AT 25°C:	2 MICRO AMPS MAX
D.C. LEAKAGE CURRENT AT 85°C:	4 MICRO AMPS MAX
IMPEDANCE AT -55°C, 120 CPS:	18600 OHMS MAX
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D. BURN-IN (CONTINUED)

THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:

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DC LEAKAGE
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PARAMETRIC CHANGE LIMITS:

CAPACITANCE:	±10% OF INITIAL VALUE
D.C. LEAKAGE:	INITIAL REQUIREMENTS
POWER FACTOR:	INITIAL REQUIREMENTS

MASTER

K.I.C. NO. 69030464001

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN M. Monzorio 6-10-64
CHECKED B Szakaluk 6-10-64
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APPROVED
APPROVED MIT W Crafton 12 Aug 64
APPROVED MSC 8/12/64
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MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CAPACITOR, FIXED
TANTALUM, ELECTROLYTIC
(ETCHED FOIL, N.P.)
SPECIFICATION CONTROL DWG

CODE IDENT NO. 80230
SIZE C
DRAWING NO. 1012142
SCALE
SHEET 2 OF 2

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SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
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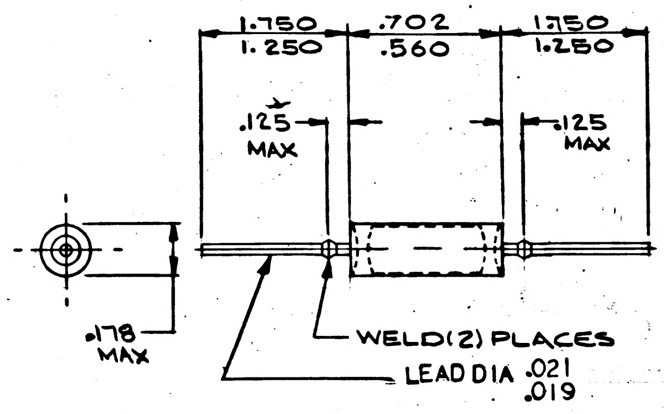

REQUIREMENTS

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   - B. INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH THE GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.
   - C. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - D. PARTS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND 1002044 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS OF THIS DRAWING.
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MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

K.I.C. NO. 69030464001

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DRAWN M. Menzorio 6-10-64
CHECKED Szakaluk 6-10-64
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APPROVED

APPROVED MIT W. Gaffney 12 Aug 64
APPROVED MSC K. Michaels 8/12/64 DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CAPACITOR, FIXED
TANTALUM, ELECTROLYTIC
(ETCHED FOIL, N.P.)
SPECIFICATION CONTROL DWG

CODE IDENT NO.
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SHEET 1 OF 2

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SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
–		INITIAL RELEASE CLASS A PER TDRR 1519			8/12/64	

2. INSPECTION AND ACCEPTANCE: (CONTINUED)

B. ELECTRICAL REQUIREMENTS:

1. DC LEAKAGE CURRENT (MAXIMUM) AT 25°C, PER TABLE I.
2. WORKING VOLTAGE: PER TABLE I.
3. IMPEDANCE (AT -55°C): PER TABLE I.
4. CAPACITANCE: PER TABLE I.
5. CAPACITANCE TOLERANCE: PER TABLE I.

3. DESIGN REQUIREMENTS:

A. STORAGE LIFE: 10 YEARS MINIMUM AT 25°C.

B. CONSTRUCTION:

1. CASE: SEALED METAL CAN WITH SUPPLEMENTARY EXTERIOR INSULATION.
2. CAPACITANCE ELEMENT: ETCHED TANTALUM FOIL.
3. POLARITY: NON-POLARIZED.

C. MAX CHANGE DUE TO LIFE TEST:

1. CAPACITANCE: ± 25% OF INITIAL VALUE.
2. SERIES RESISTANCE: +30% OF INITIAL REQUIREMENT.

D. AMBIENT OPERATING TEMPERATURE RANGE: FROM -55°C TO +85°C.

4. SPECIAL CONDITIONING BY SUPPLIER:

A. CAPACITORS SHALL BE TEMPERATURE CYCLED IN ACCORDANCE WITH METHOD 102 OF MIL-STD 202.

B. FOLLOWING THE TEMPERATURE CYCLING, CAPACITORS SHALL BE SUBJECTED TO A VACUUM OF 7 INCHES OF Hg.

(1.) VACUUM SHALL BE MAINTAINED ON THE CAPACITORS FOR 15 MINUTES FOLLOWING THE ABOVE, THERE SHALL BE NO EVIDENCE OF ELECTROLYTE LEAKAGE UNDER 2X MAGNIFICATION.

C. CAPACITORS NOT MEETING THIS REQUIREMENT SHALL NOT BE ACCEPTABLE.

D. BURN-IN: ALL CAPACITORS SHALL BE BURNED IN FOR 250 HOURS MIN. AT THE RATED DC WORKING VOLTAGE AT A TEMPERATURE OF +85°C. POLARITY TO BE REVERSED AT THE END OF 125 HOURS.

TABLE I

CAPACITANCE AT 25°C:	.18 MFD
CAPACITANCE TOLERANCE:	+30% -15%
VOLTAGE RATING:	150 VDC
D.C. LEAKAGE CURRENT AT 25°C:	2 MICRO AMPS MAX
D.C. LEAKAGE CURRENT AT 85°C:	4 MICRO AMPS MAX
IMPEDANCE AT -55°C,120 CPS:	18600 OHMS MAX
POWER FACTOR AT 25°C, 120 CPS:	15
POWER FACTOR AT 85°C, 129 CPS:	20

D. BURN-IN (CONTINUED)

THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:

CAPACITANCE
DC LEAKAGE
POWER FACTOR

THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL CAPACITOR WITH THE INITIAL TEST READING, THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. HISTOGRAMS SHALL BE PLOTTED TO SHOW THE FREQUENCY DISTRIBUTION OF THE ABSOLUTE VALUE OF EACH CHARACTERISTIC AND TO SHOW THE FREQUENCY DISTRIBUTION OF THE PERCENT CHANGE OF EACH CHARACTERISTIC FROM ITS INITIAL READING. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS, OR WHICH EXCEED THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN-IN, SHALL NOT BE ACCEPTABLE.

PARAMETRIC CHANGE LIMITS:

CAPACITANCE:	±10% OF INITIAL VALUE
D.C. LEAKAGE:	INITIAL REQUIREMENTS
POWER FACTOR:	INITIAL REQUIREMENTS

MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

K.I.C. NO. 69030464001

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN M Mevzorio 6-10-64
CHECKED B Szakaluk 6-10-64
APPROVED D L Koso 8-7-64
APPROVED
APPROVED MIT W Kupfer 12 Aug 64
APPROVED MSC 8/12/64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CAPACITOR, FIXED
TANTALUM, ELECTROLYTIC
(ETCHED FOIL, N.P.)
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
DRAWING NO. 1012142
SCALE
SHEET 2 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

4 3 2 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

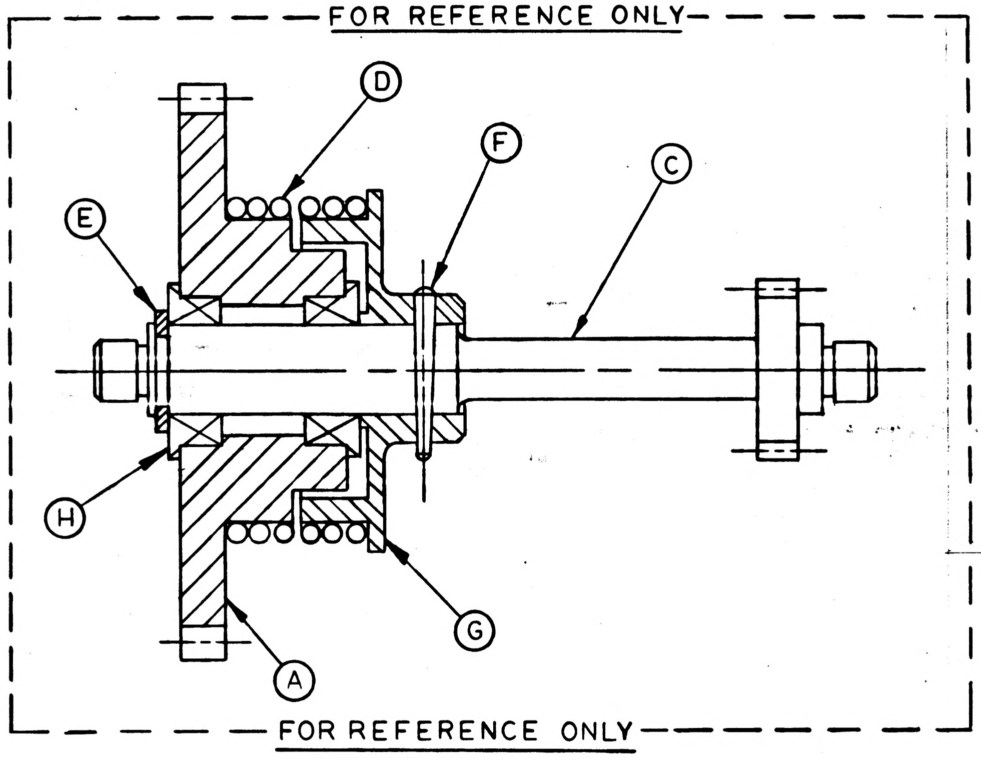
1012143 A

1620

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 11228	7/28/64	WK
A	REVISED PER TDRR 14633	12-8-69	WK

REQUIREMENTS

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS OF ND 1015404, CLASS 2.
   - C. UNITS SHALL BE PACKAGED FOR SHIPMENT IN HEAT SEALED BAGS PER ND 1002215, CLASS I



2. INSPECTION AND ACCEPTANCE:
   - A. DIMENSIONS AS SHOWN.
   - B. UNITS SHALL BE IDENTIFIED WITH NASA DRAWING NO. AND DASH NO., LATEST DRAWING REVISION LETTER AND MANUFACTURER'S IDENTIFICATION PER ND 1002019. CONTRACTOR SHALL MARK SERIAL NO. ON ALL UNITS IN ACCORDANCE WITH ND 1002023.
     1. NASA NO. 1012143-1: GEAR "A" IS FREE WHEELING IN COUNTERCLOCKWISE DIRECTION WHEN VIEWED FROM END INDICATED ON DRAWING, AND DRIVES WHEN DIRECTION OF ROTATION IS REVERSED.
     2. NASA NO. 1012143-2: GEAR "A" IS FREE WHEELING IN CLOCKWISE DIRECTION WHEN VIEWED FROM END INDICATED ON DRAWING, AND DRIVES WHEN DIRECTION OF ROTATION IS REVERSED.
   - C. FREE WHEELING TORQUE OF CLUTCH 0.10 MAX. IN-OZ
   - D. THE OUTPUT TORQUE OF CLUTCH IN DRIVING DIRECTION SHALL BE 100% OF INPUT TORQUE THROUGHOUT THE INPUT TORQUE RANGE FROM 0 (ZERO) TO 0.5 IN.-LB. (AT RATED SPEED, 0-2500 RPM)
   - E. ALL UNITS SHALL MEET INSPECTION AND ACCEPTANCE REQUIREMENTS AFTER SPECIAL CONDITIONING REQUIREMENTS SPECIFIED IN SECTION 4.

1012143-2	NOTE 2B.2
1012143-1	NOTE 2B.1
NASA NO.	DIR. OF ROT.

3. DESIGN REQUIREMENTS
   - A. MATERIALS:
     1. GEARSHAFT Ⓒ: CRES 303, QQ-S-763
     2. SPRING Ⓓ: CRES 302, QQ-W-423
     3. LOCKING RING Ⓔ: CRES 302, QQ-S-763

K.I.C. NO. 75011000601 THRU 0602

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN M.P. NEILL DATE 5-21-64
CHECKED S. Zalabak RZ 5-22-64
APPROVAL M. Warner KK 6-22-64
APPROVAL M. Campbell 7-21-64
NASA APPROVAL
MIT APPROVAL W 28 Jul 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CLUTCH, OVERRUNNING
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1012143
SCALE ~
WT
SHEET 1 OF 3

4 3 2 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1012143 A

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 11228	7/23/64	wk
A	REVISED PER TDRR 14633	12-8-64	WK

4. TAPER PIN Ⓕ: CRES 416, QQ-S-763

5. MANDREL Ⓖ: CRES 416, QQ-S-763

6. BALL BEARING Ⓗ: BALLS AND RINGS; CRES 440C, PER QQ-S-763 TO BE R_C56 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243. RETAINER; CRES 410, PER QQ-S-763.

7. GEAR "A" Ⓐ: CRES 416, QQ-S-763

B. FINISH: ALL CRES PARTS SHALL BE PASSIVATED PER MIL-S-5002.

C. BALL BEARING LUBRICATION: ND 1002077.

D. RATED TORQUE OF CLUTCH: 0.5 IN. LB.

E. RATED SPEED: 2500 RPM

F. ENVIRONMENTAL REQUIREMENTS:

   1. HUMIDITY: IN ACCORDANCE WITH MIL-STD-810, METHOD 507. CONTINUOUS CYCLES SHALL BE 5 FOR A TOTAL TEST TIME OF NOT LESS THAN 120 HOURS.

   2. ACCELERATION: 20g ± 5% FOR 3 MINUTES ALONG EACH AXIS.

   3. VIBRATION: 20g ± 5% (0 TO PEAK) 5 TO 2000 TO 5 CPS AT 1 MINUTE PER OCTAVE, LOGARITHMIC SWEEP ONCE ALONG EACH MAJOR AXIS.

   4. SHOCK: IN ACCORDANCE WITH MIL-STD-810, METHOD 516-1, PROCEDURE V, 50g ± 5% SHOCK PULSE.

   5. ENDURANCE: MECHANICAL CYCLING 200 HOURS MIN AT 300 RPM ± 10 RPM AT 25°C ± 5°C, REVERSING DIRECTION EVERY 15 MINUTES, AT RATED TORQUE.

G. OPERATIONAL TEMPERATURE RANGE: 0° TO 150°F

H. SHELL LIFE

   1. IN UNOPENED CONTAINER: 2 YEARS
   2. IN OPENED CONTAINER: 1 YEAR

4. SPECIAL CONDITIONING (BY SUPPLIER):

   A. RUN IN 10 HOURS AT ROOM TEMPERATURE (25°C ± 5°C) AT 300 ± 10% RPM. REVERSE DIRECTIONS TO BRAKE EVERY 15 MINUTES. AT RATED TORQUE

   B. TORQUE TO BE TESTED BEFORE AND AT COMPLETION OF RUN IN (FREE WHEELING AND DRIVE TORQUE)

   C. DATA TO BE SUBMITTED FOR EACH UNIT WITH EVERY SHIPMENT

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

K.I.C NO. 75011000601 THRU-0602	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

NEXT ASSY	USED ON		
APPLICATION			

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT

DRAWN M.P.NEILL DATE 5-21-64
CHECKED S. Zakaluk RZ 5-22-64
APPROVAL M. Werner KJC 6-22-64
APPROVAL M. Campbell 7-21-64
NASA APPROVAL
MIT APPROVAL W Kupfer 28 July 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CLUTCH, OVERRUNNING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1012143
SCALE ~
WT
SHEET 2 OF 3

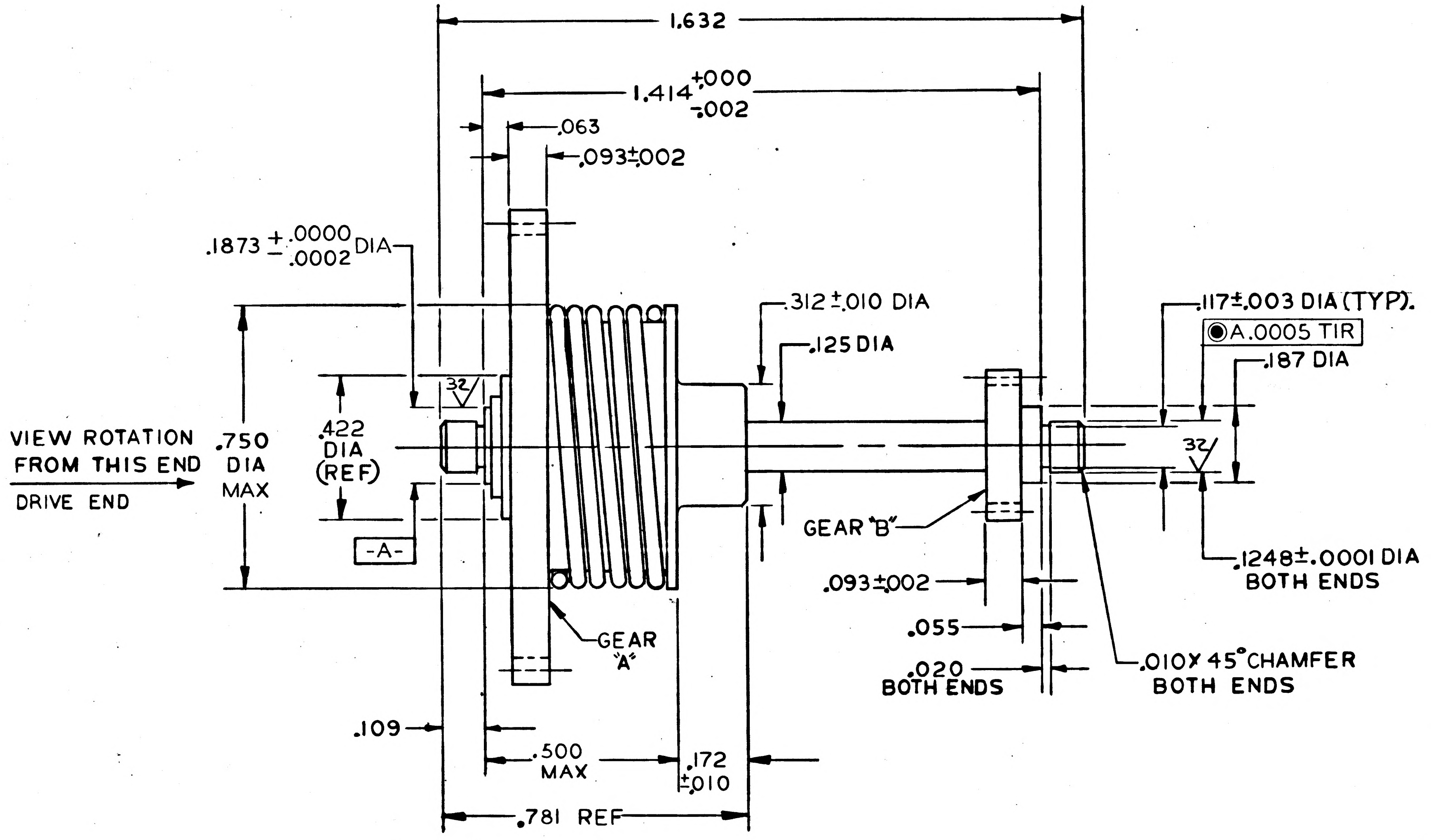
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1012143 A

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 11228	7/28/64	WK
A	REVISED PER TDRR 14633	12-8-64	WK



1.632
1.414 +.000 -.002
.063
.093±.002
.1873 +.0000 -.0002 DIA
.312±.010 DIA
.125 DIA
.117±.003 DIA (TYP).
◉A.0005 TIR
.187 DIA
VIEW ROTATION FROM THIS END
DRIVE END
.750 DIA MAX
.422 DIA (REF)
32
-A-
GEAR "B"
.093±.002
.055
.020 BOTH ENDS
.1248±.0001 DIA BOTH ENDS
.010×45° CHAMFER BOTH ENDS
GEAR "A"
.109
.500 MAX
.172 ±.010
.781 REF

GEAR DATA

	GEAR "A"	GEAR "B"
NO. OF TEETH	55	22
DIAMETRAL PITCH	48	64
PRESSURE ANGLE	20°	20°
PITCH DIAMETER	1.14583	.34375
OUTSIDE DIAMETER	1.1875 +.0000 -.0030	.3750 +.0000 -.0030
AGMA CLASS	PREC ID	PREC ID
TOOTH FINISH	32√	32√

MASTER

K.I.C. 75011000601
NO. THRU 0602

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ±1°
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 3A
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT

DRAWN M.P. NEILL DATE 5-20-64
CHECKED S. Zakahi 5-22-64
APPROVAL M. Werner KIC 6-22-64
APPROVAL G. Campbell, 7-21-64
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CLUTCH, OVERRUNNING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1012143
SCALE 4:1
WT
SHEET 3 OF 3

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

—	1012143

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 11228	7/28/64	WII

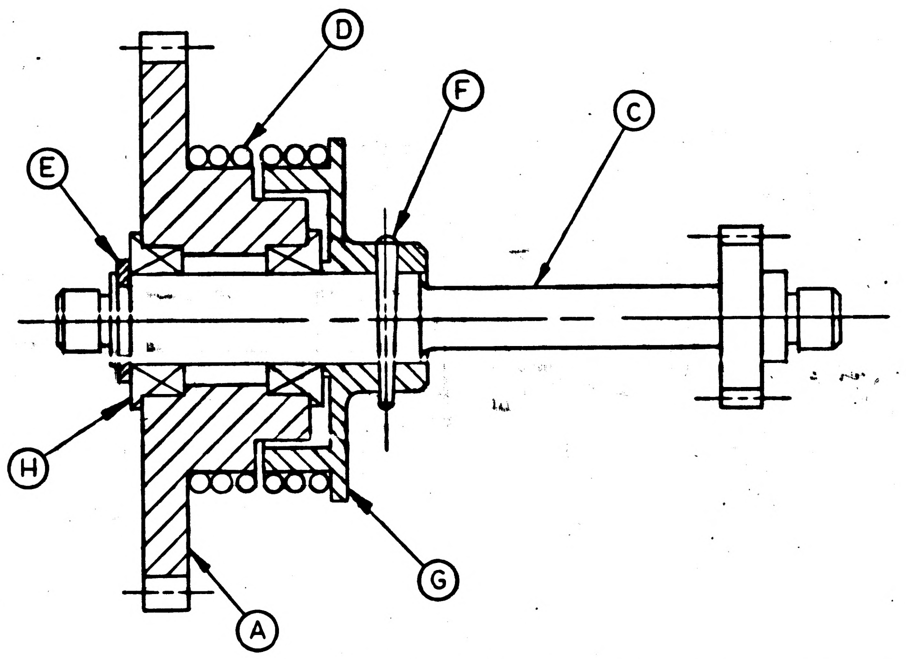
REQUIREMENTS

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS OF ND 1015404, CLASS 2.
   - C. UNITS SHALL BE PACKAGED FOR SHIPMENT IN HEAT SEALED BAGS PER ND 1002215, CLASS I

2. INSPECTION AND ACCEPTANCE:
   - A. DIMENSIONS AS SHOWN.
   - B. UNITS SHALL BE IDENTIFIED WITH NASA DRAWING NO. AND DASH NO., LATEST DRAWING REVISION LETTER AND MANUFACTURER'S IDENTIFICATION PER ND 1002019. CONTRACTOR SHALL MARK SERIAL NO. ON ALL UNITS IN ACCORDANCE WITH ND 1002023.
     1. NASA NO. 1012143-1: GEAR "A" IS FREE WHEELING IN COUNTERCLOCKWISE DIRECTION WHEN VIEWED FROM END INDICATED ON DRAWING, AND DRIVES WHEN DIRECTION OF ROTATION IS REVERSED.
     2. NASA NO. 1012143-2: GEAR "A" IS FREE WHEELING IN CLOCKWISE DIRECTION WHEN VIEWED FROM END INDICATED ON DRAWING, AND DRIVES WHEN DIRECTION OF ROTATION IS REVERSED.
   - C. FREE WHEELING TORQUE OF CLUTCH 0.10 MAX. IN-OZ
   - D. THE DRIVE TORQUE OF CLUTCH IN DRIVING DIRECTION SHALL BE WITHIN 100% OF INPUT TORQUE THROUGHOUT THE INPUT TORQUE RANGE FROM 0 (ZERO) TO 0.5 IN.-LB.(AT RATED SPEED, 0-5000 RPM)
   - E. ALL UNITS SHALL MEET INSPECTION AND ACCEPTANCE REQUIREMENTS AFTER SPECIAL CONDITIONING REQUIREMENTS SPECIFIED IN SECTION 4.

3. DESIGN REQUIREMENTS
   - A. MATERIALS:
     1. GEARSHAFT Ⓒ: CRES 303, QQ-S-763
     2. SPRING Ⓓ: CRES 302, QQ-W-423
     3. LOCKING RING Ⓔ: CRES 302, QQ-S-763

FOR REFERENCE ONLY



FOR REFERENCE ONLY

NASA NO.	DIR. OF ROT.
1012143-2	NOTE 2B.2
1012143-1	NOTE 2B.1

K.I.C. NO. 75011000601 THRU 0602	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN M.P. NEILL DATE 5-21-64
CHECKED S. Zalak R 5-22-64
APPROVAL M. Warner KK 6-22-64
APPROVAL M. Campbell 7-21-64
NASA APPROVAL
MIT APPROVAL WII 7-28-64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CLUTCH, OVERRUNNING
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. | SIZE C | NASA DRAWING NO. 1012143
SCALE ~ | WT | SHEET 1 OF 3

MASTER

INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

— 1012143

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 11228	7/28/64	WK

4. TAPER PIN Ⓕ: CRES 416, QQ-S-763

5. MANDREL Ⓖ: CRES 416, QQ-S-763

6. BALL BEARING Ⓗ: BALLS AND RINGS; CRES 440C, PER QQ-S-763 TO BE R_C56 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243. RETAINER; CRES 410, PER QQ-S-763.

7. GEAR "A"Ⓐ: CRES 416, QQ-S-763

B. FINISH: ALL CRES PARTS SHALL BE PASSIVATED PER MIL-S-5002.

C. BALL BEARING LUBRICATION: ND 1002077.

D. RATED TORQUE OF CLUTCH: 0.5 IN. LB.

E. RATED SPEED: 5,000 RPM

F. ENVIRONMENTAL REQUIREMENTS:

  1. HUMIDITY: IN ACCORDANCE WITH MIL-STD-810, METHOD 507. CONTINUOUS CYCLES SHALL BE 5 FOR A TOTAL TEST TIME OF NOT LESS THAN 120 HOURS.
  2. ACCELERATION: 20g ± 5% FOR 3 MINUTES ALONG EACH AXIS.
  3. VIBRATION: 20g ± 5% (0 TO PEAK) 5 TO 2000 TO 5 CPS AT 1 MINUTE PER OCTAVE, LOGARITHMIC SWEEP ONCE ALONG EACH MAJOR AXIS.
  4. SHOCK: IN ACCORDANCE WITH MIL-STD-810, METHOD 516-1, PROCEDURE V, 50g ± 5% SHOCK PULSE.
  5. ENDURANCE: MECHANICAL CYCLING 200 HOURS MIN AT 300 RPM ± 10 RPM AT 25°C ± 5°C, REVERSING DIRECTION EVERY 15 MINUTES, AT RATED TORQUE.

G. OPERATIONAL TEMPERATURE RANGE: 0° TO 150°F

H. SHELL LIFE

  1. IN UNOPENED CONTAINER: 2 YEARS
  2. IN OPENED CONTAINER: 1 YEAR

4. SPECIAL CONDITIONING (BY SUPPLIER):

  A. RUN IN 10 HOURS AT ROOM TEMPERATURE (25°C ± 5°C) AT 300 ± 10% RPM. REVERSE DIRECTIONS TO BRAKE EVERY 15 MINUTES. AT RATED TORQUE
  B. TORQUE TO BE TESTED BEFORE AND AT COMPLETION OF RUN IN (FREE WHEELING AND DRIVE TORQUE)
  C. DATA TO BE SUBMITTED FOR EACH UNIT. WITH EVERY SHIPMENT

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

K.I.C 75011000601
NO. THRU-0602

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN M.P.NEILL DATE 5-21-64
CHECKED S.Zakalik RS 5-22-64
APPROVAL M. Werner KJC 6-22-64
APPROVAL M. Campbell 7-21-64
NASA APPROVAL
MIT APPROVAL W Kupfer 28 Jul 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CLUTCH, OVERRUNNING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1012143
SCALE ~
WT
SHEET 2 OF 3

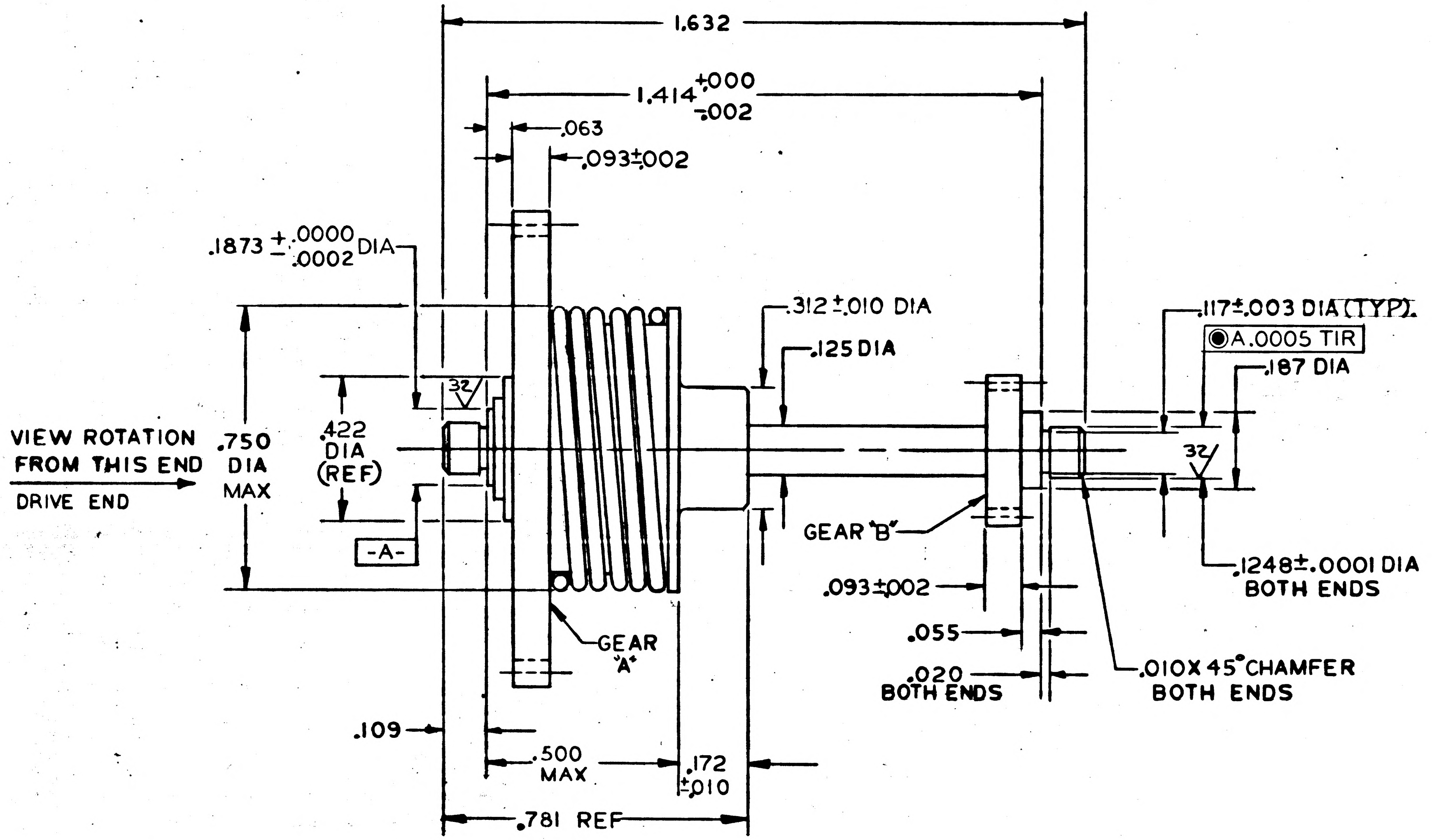
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

— 1012143

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 11228	7/25/64	WK


1.632
1.414 +.000 -.002
.063
.093±.002
.1873 +.0000 -.0002 DIA
.312±.010 DIA
.125 DIA
.117±.003 DIA (TYP).
◉A .0005 TIR
.187 DIA
32
VIEW ROTATION FROM THIS END
DRIVE END
.750 DIA MAX
.422 DIA (REF)
-A-
GEAR "B"
.093±.002
.055
.020 BOTH ENDS
.010 X 45° CHAMFER BOTH ENDS
.1248±.0001 DIA BOTH ENDS
GEAR "A"
.109
.500 MAX
.172 ±.010
.781 REF

GEAR DATA

	GEAR "A"	GEAR "B"
NO. OF TEETH	55	22
DIAMETRAL PITCH	48	64
PRESSURE ANGLE	20°	20°
PITCH DIAMETER	1.14583	.34375
OUTSIDE DIAMETER	1.1875 +.0000 -.0030	.3750 +.0000 -.0030
AGMA CLASS	PREC ID	PREC ID
TOOTH FINISH	32 ✓	32 ✓

MASTER

K.I.C. NO. 75011000601 THRU 0602

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ±— DECIMALS ±.005 ANGLES ±1°
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 3A
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN M.P. NEILL DATE 5-20-64
CHECKED S. Zelght 5-22-64
APPROVAL M. Werner KIC 6-22-64
APPROVAL G. Campbell, 7-21-64
NASA APPROVAL
MIT APPROVAL W Kupfer 8/6/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CLUTCH, OVERRUNNING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1012143
SCALE 4:1
WT
SHEET 3 OF 3

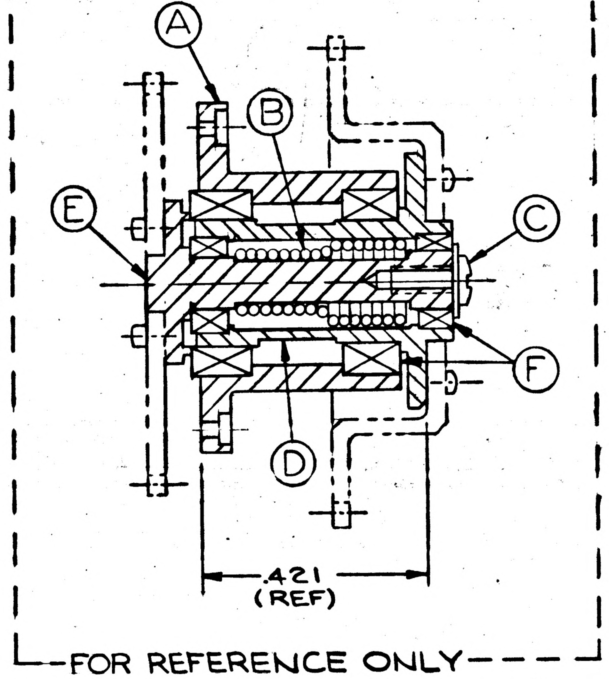
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1012144 A

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 11228			7/16/64	WK
A		REVISED PER TDRR 12812			[illegible]	WK

REVISIONS



REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS OF ND 1015404, CLASS 2.
   - C. UNITS SHALL BE PACKAGED FOR SHIPMENT IN HEAT SEALED BAGS PER ND 1002215; CLASS I CODE 3

2. INSPECTION AND ACCEPTANCE
   - A. DIMENSIONS AS SHOWN
     - 1. TOLERANCES, UNLESS OTHERWISE SPECIFIED:
       TWO PLACE DECIMALS ± .02
       THREE PLACE DECIMALS ± .005
       ANGLES ± 1°0'
   - B. UNITS SHALL BE IDENTIFIED WITH NASA DRAWING NO., DASH NO., LATEST DRAWING REVISION LETTER AND MANUFACTURER'S IDENTIFICATION PER ND 1002019. CONTRACTOR SHALL MARK SERIAL NO. ON ALL UNITS IN ACCORDANCE WITH ND 1002023.
   - C. SLIP TORQUE: 0.85 OZ-IN. ± 20% FROM 0-300 RPM.
   - D. ALL UNITS SHALL MEET INSPECTION AND ACCEPTANCE REQUIREMENTS AFTER SPECIAL CONDITIONING REQUIREMENTS SPECIFIED IN SECTION 4.

3. DESIGN REQUIREMENTS
   - A. MATERIALS
     - 1. HOUSING (A): CRES 303, QQ-S-763.
     - 2. SPRING (B): CRES 302, ~~QQ-W-423.~~
     - 3. SCREW (C): CRES 300 (SERIES) QQ-S-763.
     - 4. MANDREL (D): CRES 416, QQ-S-763.
     - 5. CORE (E): CRES 416. QQ-S-763.
     - 6. BALL BEARINGS (F): BALLS AND RINGS: CRES 440C, PER QQ-S-763 TO BE R_C56 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243. RETAINER: CRES 410 PER QQ-S-763.
   - B. FINISH: ALL CRES PARTS SHALL BE PASSIVATED PER MIL-S-5002.
   - C. BALL BEARING LUBRICATION: ND 1002077.
   - D. VIBRATION PROOF SCREWS WITH LOCKING-SEALING COMPOUND CONFORMING TO MIL-S-22473, GRADE 30.
   - E. SPEED RANGE: 0-5000 RPM
   - F. LIFE: OUTPUT TORQUE AFTER 500 HOURS MIN. CONTINUOUS SLIP (200 RPM–INPUT, 0 RPM–OUTPUT) SHALL BE WITHIN LIMITS SPECIFIED IN NOTE 2C
   - G. OPERATIONAL TEMPERATURE RANGE: 0°F TO 150°F
   - H. ENVIRONMENTAL REQUIREMENTS:
     - (1) HUMIDITY: IN ACCORDANCE WITH MIL-STD-810, METHOD 507. CONTINUOUS CYCLES SHALL BE 5 FOR A TOTAL TEST TIME OF NOT LESS THAN 120 HOURS.
     - (2) ACCELERATION: 20g ± 5% FOR 3 MINUTES ALONG EACH AXIS.
     - (3) VIBRATION: 20g ± 5% (0 TO PEAK) 5 TO 2000 TO 5 CPS AT 1 MINUTE PER OCTAVE, LOGARITHMIC SWEEP ONCE ALONG EACH MAJOR AXIS.
     - (4) SHOCK: IN ACCORDANCE WITH MIL-STD-810, METHOD 516-1, PROCEDURE V, 50g ± 5% SHOCK PULSE.
   - I SHELL LIFE
     - ① IN UNOPENED CONTAINER: 2 YEARS
     - ② IN OPENED CONTAINERS: 1 YEAR

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

KIC NO 75011000701

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
SEE NOTE 2 A1
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN M. MENZORIO 6-1-64
CHECKED A Corllo Rs 3 JUN64
APPROVED
APPROVED T. Campbell 7-21-64
APPROVED MIT W Kupfer 28 Jul 64
APPROVED MSC [illegible]
DATE

CLUTCH, SLIP
SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	DRAWING NO.
	C	1012144

SCALE ~ SHEET 1 OF 3

INCHES
0 1 2
PHOTOGRAPHIC SCALE

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1012144 A

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 11228			7/28/64	wk
A		REVISED PER TDRR 12812			9/28/64	wk

4. SPECIAL CONDITIONING (BY SUPPLIER)

A. RUN IN 10 HOURS CONTINUOUS UNDER SLIP CONDITIONS AT ROOM TEMPERATURE ($25^\circ C \pm 5^\circ C$) AT 200 ± 10% RPM. REVERSE DIRECTIONS EVERY 30 MINUTES. TEST FOR TORQUE SHALL BE RECORDED BEFORE AND AFTER RUN-IN. THIS DATA SHALL BE SUBMITTED FOR EACH UNIT WITH EVERY SHIPMENT AND SHALL BE WITHIN LIMITS SPECIFIED IN NOTE 2C

MASTER

K.I.C. NO. 75011000701

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN M. MENZORIO 6-2-64
CHECKED 3 JUN 64
APPROVED
APPROVED M. Campbell, 7-21-64
APPROVED MIT W Kupfer 28 July 64
APPROVED MSC DATE 7/28/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CLUTCH, SLIP
SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	DRAWING NO.
	C	1012144
SCALE		SHEET 2 OF 3

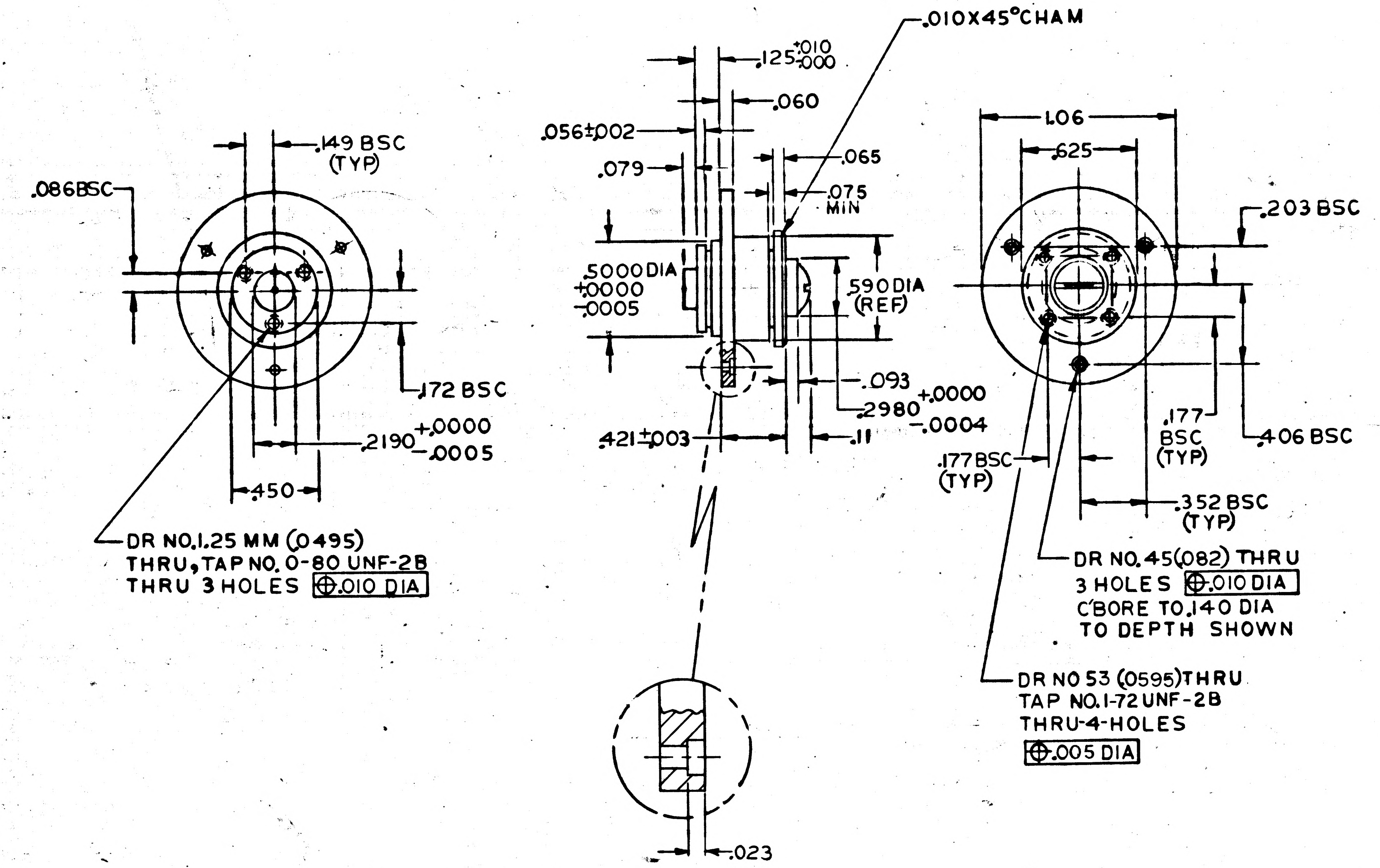
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1012144 A

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 11228			7/28/64	WK
A		REVISED PER TDRR 12812			9/29/64	WK


.010X45°CHAM
.125 +.010 -.000
.060
.056±.002
.079
.065
.075 MIN
.149 BSC (TYP)
.086BSC
.5000 DIA +.0000 -.0005
.590 DIA (REF)
.172 BSC
.2190 +.0000 -.0005
.450
.093
.2980 +.0000 -.0004
.421±.003
.11
1.06
.625
.203 BSC
.177 BSC (TYP)
.177 BSC (TYP)
.406 BSC
.352 BSC (TYP)
.023

DR NO.1.25 MM (.0495) THRU, TAP NO. 0-80 UNF-2B THRU 3 HOLES $\boxed{\oplus .010 \text{ DIA}}$

DR NO. 45 (.082) THRU 3 HOLES $\boxed{\oplus .010 \text{ DIA}}$ C'BORE TO .140 DIA TO DEPTH SHOWN

DR NO 53 (.0595) THRU TAP NO. 1-72 UNF-2B THRU 4 HOLES $\boxed{\oplus .005 \text{ DIA}}$

MASTER

K.I.C. NO. 75011000701

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN M. NEILL 5-28-64
CHECKED A. Cordts [illegible] 3 Jun 64
APPROVED
APPROVED M. Campbell 7-21-64
APPROVED MIT W. Kupfer [illegible]
APPROVED MSC [illegible] DATE [illegible]

CLUTCH, SLIP

SPECIFICATION CONTROL DWG.

CODE IDENT NO.	SIZE	DRAWING NO.
	C	1012144

SCALE SHEET 3 OF 3

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

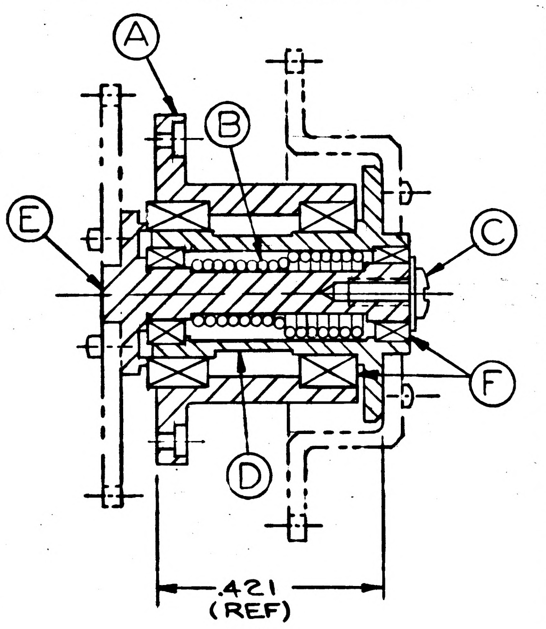
1012144 —

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 11228			7/28/64	WK

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS OF ND 1015404, CLASS 2.
   - C. UNITS SHALL BE PACKAGED FOR SHIPMENT IN HEAT SEALED BAGS PER ND 1002215; CLASS I CODE 3

FOR REFERENCE ONLY



FOR REFERENCE ONLY

2. INSPECTION AND ACCEPTANCE
   - A. DIMENSIONS AS SHOWN
     1. TOLERANCES, UNLESS OTHERWISE SPECIFIED:
        TWO PLACE DECIMALS ± .02
        THREE PLACE DECIMALS ± .005
        ANGLES ± 1°0'
   - B. UNITS SHALL BE IDENTIFIED WITH NASA DRAWING NO., DASH NO., LATEST DRAWING REVISION LETTER AND MANUFACTURER'S IDENTIFICATION PER ND 1002019. CONTRACTOR SHALL MARK SERIAL NO. ON ALL UNITS IN ACCORDANCE WITH ND 1002023.
   - C. SLIP TORQUE: 0.85 OZ-IN. ± 20% FROM 0-300 RPM.
   - D. ALL UNITS SHALL MEET INSPECTION AND ACCEPTANCE REQUIREMENTS AFTER SPECIAL CONDITIONING REQUIREMENTS SPECIFIED IN SECTION 4.

3. DESIGN REQUIREMENTS
   - A. MATERIALS
     1. HOUSING Ⓐ : CRES 303, QQ-S-763.
     2. SPRING Ⓑ : CRES 302~~, QQ-W-423.~~
     3. SCREW Ⓒ : CRES 300 (SERIES) QQ-S-763.
     4. MANDREL Ⓓ : CRES 416, QQ-S-763.
     5. CORE Ⓔ : CRES 416. QQ-S-763.
     6. BALL BEARINGS Ⓕ : BALLS AND RINGS: CRES 440C, PER QQ-S-763 TO BE R_C56 MIN AFTER HEAT TREATMENT WHEN TESTED IN ACCORDANCE WITH FED-STD-151, METHOD 243. RETAINER: CRES 410 PER QQ-S-763.
   - B. FINISH: ALL CRES PARTS SHALL BE PASSIVATED PER MIL-S-5002.
   - C. BALL BEARING LUBRICATION: ND 1002077.
   - D. VIBRATION PROOF SCREWS WITH LOCKING-SEALING COMPOUND CONFORMING TO MIL-S-22473, GRADE 30.
   - E. SPEED RANGE: 0-5000 RPM
   - F. LIFE: OUTPUT TORQUE AFTER 500 HOURS MIN. CONTINUOUS SLIP (200 RPM–INPUT, 0 RPM–OUTPUT) SHALL BE WITHIN LIMITS SPECIFIED IN NOTE 2C
   - G. OPERATIONAL TEMPERATURE RANGE: 0°F TO 150°F
   - H. ENVIRONMENTAL REQUIREMENTS:
     - (1) HUMIDITY: IN ACCORDANCE WITH MIL-STD-810, METHOD 507. CONTINUOUS CYCLES SHALL BE 5 FOR A TOTAL TEST TIME OF NOT LESS THAN 120 HOURS.
     - (2) ACCELERATION: 20g ± 5% FOR 3 MINUTES ALONG EACH AXIS.
     - (3) VIBRATION: 20g ± 5% (0 TO PEAK) 5 TO 2000 TO 5 CPS AT 1 MINUTE PER OCTAVE, LOGARITHMIC SWEEP ONCE ALONG EACH MAJOR AXIS.
     - (4) SHOCK: IN ACCORDANCE WITH MIL-STD-810, METHOD 516-1, PROCEDURE V, 50g ± 5% SHOCK PULSE.
   - I SHELL LIFE
     - ① IN UNOPENED CONTAINER: 2 YEARS
     - ② IN OPENED CONTAINERS: 1 YEAR

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

KIC NO 75011000701

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
SEE NOTE 2 A1
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN M. MENZORIO 6-1-64
CHECKED A. Cordts 3 JUN 64
APPROVED
APPROVED W. Campbell 7-21-64
APPROVED MIT W. Kupfer 28 Jul 64
APPROVED MSC J. Barnard 7/28/64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CLUTCH, SLIP

SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	DRAWING NO.
	C	1012144
SCALE ~		SHEET 1 OF 3

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

— 1012144

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 11228			7/28/64	WK

4. SPECIAL CONDITIONING (BY SUPPLIER)

   A. RUN IN 10 HOURS CONTINUOUS UNDER SLIP CONDITIONS AT ROOM TEMPERATURE (25°C ± 5°C) AT 200 ± 10% RPM. REVERSE DIRECTIONS EVERY 30 MINUTES. TEST FOR TORQUE SHALL BE RECORDED BEFORE AND AFTER RUN-IN. THIS DATA SHALL BE SUBMITTED FOR EACH UNIT WITH EVERY SHIPMENT AND SHALL BE WITHIN LIMITS SPECIFIED IN NOTE 2C

MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

K.I.C. NO. 75011000701

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN M. MENZORIO 6-2-64
CHECKED V. Corlett 3 JUN 64
APPROVED
APPROVED T. Campbell 7-21-64
APPROVED MIT W Kupfer 28 July 64
APPROVED MSC J Bernard DATE 7/28/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CLUTCH, SLIP

SPECIFICATION CONTROL DWG

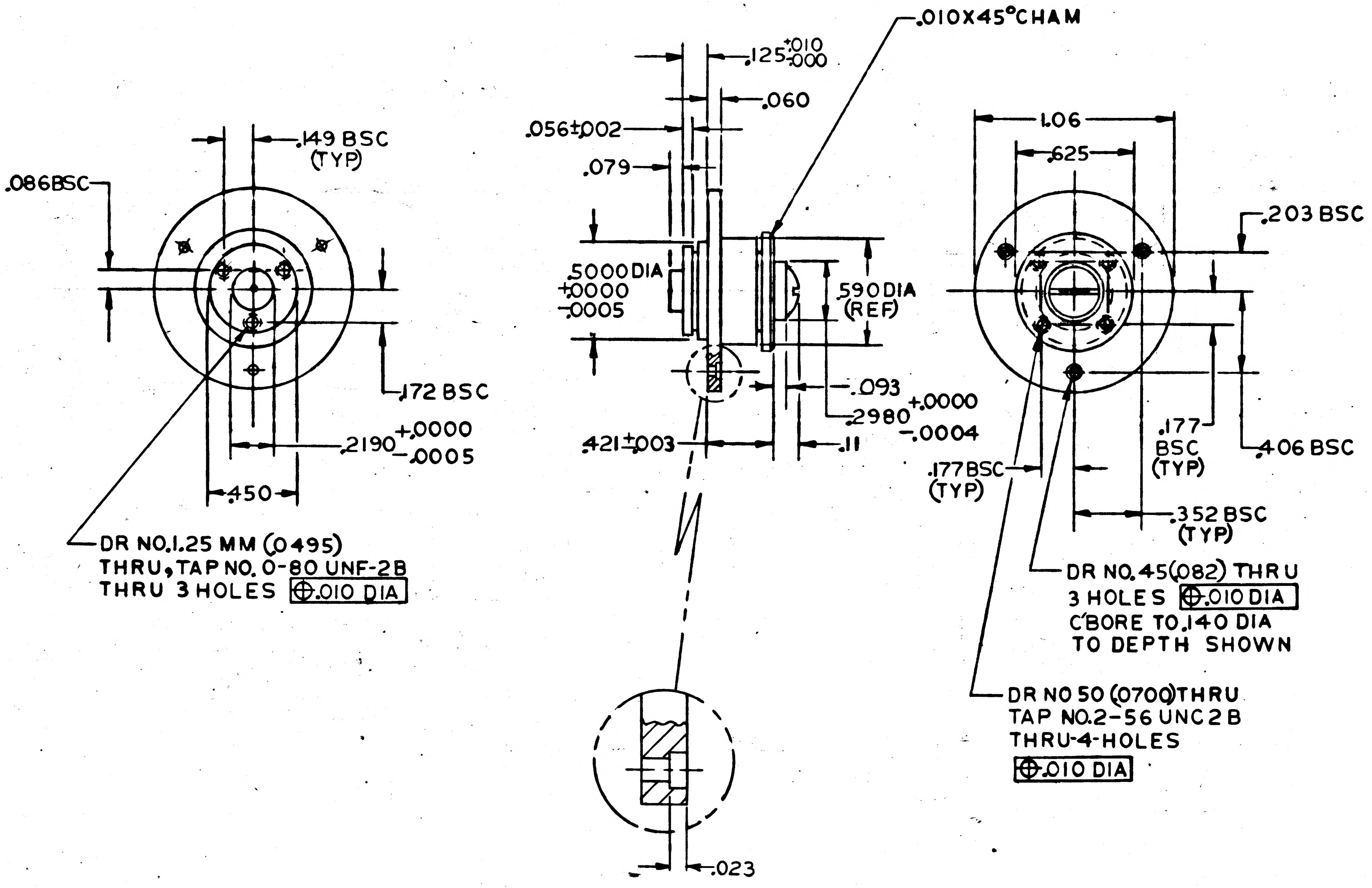
CODE IDENT NO.
SIZE C
DRAWING NO. 1012144
SCALE
SHEET 2 OF 3

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1012144 | —

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 11228			7/28/64	WK



.010X45°CHAM
.125 +.010 −.000
.060
.056±.002
.079
.149 BSC (TYP)
.086BSC
.5000 DIA +.0000 −.0005
.590 DIA (REF)
1.06
.625
.203 BSC
.172 BSC
.093
.2980 +.0000 −.0004
.2190 +.0000 −.0005
.421±.003
.11
.177 BSC (TYP)
.177 BSC (TYP)
.406 BSC
.352 BSC (TYP)
.450
.023
DR NO.1.25 MM (.0495) THRU, TAP NO. 0-80 UNF-2B THRU 3 HOLES ⊕.010 DIA
DR NO. 45(.082) THRU 3 HOLES ⊕.010 DIA C'BORE TO .140 DIA TO DEPTH SHOWN
DR NO 50 (.0700) THRU TAP NO.2-56 UNC 2B THRU-4-HOLES ⊕.010 DIA

MASTER

NEXT ASSY	USED ON
APPLICATION	

K.I.C. NO. 75011000701

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING

MATERIAL

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MIT
INSTRUMENTATION LAB
CAMBRIDGE. MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN M.NEILL 5-28-64
CHECKED A Cordts 3 Jun 64
APPROVED
APPROVED M. Campbell 7-21-64
APPROVED MIT W Kupfer
APPROVED MSC
DATE

CLUTCH, SLIP

SPECIFICATION CONTROL DWG.

CODE IDENT NO.
SIZE C
DRAWING NO. 1012144
SCALE
SHEET 3 OF 3

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

—	1012145

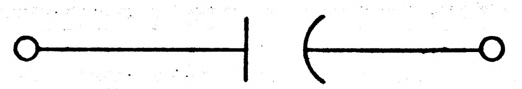
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 10062	6/9/64	WR

REQUIREMENTS

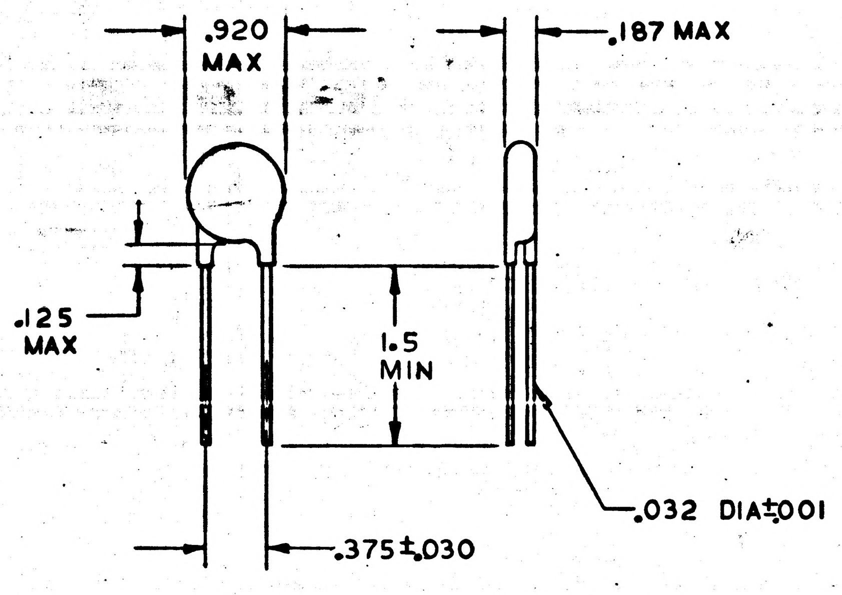
1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002045 UNLESS MODIFIED OR AMENDED BY DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-C-11015.

2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS:
     1. DIMENSIONS PER OUTLINE.
     2. MARKING: EACH CAPACITOR SHALL BE PERMANENTLY IDENTIFIED WITH THE NASA PART NUMBER, LATEST REVISION LETTER, AND THE MANUFACTURER'S NAME OR SYMBOL, CAPACITANCE VALUE AND TOLERANCE PER ND 1002019.
   - B. ELECTRICAL REQUIREMENTS:
     1. CAPACITANCE: PER TABLE I AT +25°C, 1 KC.
     2. CAPACITANCE TOLERANCE: $^{+80\%}_{-20\%}$ AT +25°C, 1 KC.
     3. DIELECTRIC WITHSTANDING VOLTAGE: CAPACITORS SHALL WITHSTAND 7000 VDC FOR 2 SECONDS WITHOUT DAMAGE, ARCING OR BREAKDOWN.
     4. INSULATION RESISTANCE: 10K MEGOHMS MIN AT 25°C.

3. DESIGN REQUIREMENTS
   - A. DC WORKING VOLTAGE: 4KV AT 85°C.
   - B. OPERATING TEMPERATURE RANGE: -55°C TO +85°C.
   - C. DISSIPATION FACTOR: 2% MAXIMUM.
   - D. CAPACITANCE CHANGE VS TEMPERATURE: CAPACITANCE SHALL NOT DEVIATE BY MORE THAN +22%, -56% OVER OPERATING TEMPERATURE RANGE.
   - E. LEAD DATA: DUMET, PER ND 1015401.
     A CERTIFICATE OF COMPLIANCE SHALL ACCOMPANY EACH SHIPMENT.



GRAPHICAL SYMBOL



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

K.I.C. NO. 69190462001	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± — DECIMALS ± — ANGLES ± — DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DWG. NO. CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
MATERIAL	DRAWN M.F.Neill DATE 5-2-64 CHECKED S. 5-26-64 APPROVAL M. Gorsten 6-5-64 APPROVAL 6-9-64	CAPACITOR, FIXED, CERAMIC DIELECTRIC (HIGH VOLTAGE) SPECIFICATION CONTROL DWG
HEAT TREATMENT	NASA APPROVAL	CODE IDENT NO. — SIZE C — NASA DRAWING NO. 1012145
FINAL FINISH	MIT APPROVAL 9 Jun 64	SCALE ~ — WT — SHEET 1 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

4 3 2 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

—	1012145

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR/006	6/9/64	

Ⓜ

DESIGN REQUIREMENTS: (CONTINUED)

E. ENVIRONMENTAL:

1. REDUCED PRESSURE: UNIT SHALL BE OPERATIVE DURING AND AFTER AND SHALL SUSTAIN NO DAMAGE AS A RESULT OF EXPOSURE TO 10^{-4} MM OF MERCURY FOR 96 HOURS.

4. SPECIAL CONDITIONING BY SUPPLIER

A. BURN IN: ALL CAPACITORS SHALL BE SUBJECTED TO 5.5 KVDC AT 85^{+0}_{-5}°C FOR A MINIMUM OF 100 HOURS.

B. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN AT +25 ± 2°C:

CAPACITANCE
DISSIPATION FACTOR
INSULATION RESISTANCE

C. THE BURN-IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOLLOWING BURN-IN, SHALL NOT BE ACCEPTABLE.

LIMITS:

CAPACITANCE: ±10% OF INITIAL READING
DISSIPATION FACTOR: 2% MAX.
INSULATION RESISTANCE: 10K MEGOHM MINIMUM WHEN TESTED IN ACCORDANCE WITH MIL-C-11015.

TABLE I

DASH NO.	CAPACITANCE IN MFDS
-1	.0047MFD

MASTER

K.I.C. NO. 69190462001	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN M.P.NEILL DATE 5-22-64
CHECKED 5-26-64
APPROVAL 6-9-64
APPROVAL 6-9-64
NASA APPROVAL
MIT APPROVAL 9 Jun 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CAPACITOR, FIXED, CERAMIC DIELECTRIC (HIGH VOLTAGE)
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1012145
SCALE ~
WT
SHEET 2 OF 2

4 3 2 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

—	1012146

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 10993				

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052.
   - D. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-C-8384.
   - E. PARTS SHALL BE PACKAGED FOR SHIPMENT PER ND 1002215, CLASS I, IN HEAT SEALED CONTAINERS

2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS
     1. PARTS SHALL BE IDENTIFIED WITH NASA DRAWING NUMBER, DASH NUMBER, LATEST REVISION LETTER AND MANUFACTURER'S IDENTIFICATION PER ND 1002019.
     2. MECHANICAL DIMENSIONS AS SHOWN.
     3. CONTACTS: 11 NO. 22 PINS (.030 ± .001 DIA).
     4. ALL PINS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.
     5. ENGAGEMENT: SCREWLOCKS, POLARIZED.
     6. THESE PARTS SHALL MATE WITH MATCHING PARTS ON NASA DRAWING 1012147 (REF).
     7. WIRE TERMINATION: SOLDER CUP TO ACCOMMODATE NO. 22 AWG STRANDED WIRE.
     8. INSERTION AND WITHDRAWAL FORCE: 2 TO 11 OUNCE/PIN WITH MATING CONNECTOR.
   - B. ELECTRICAL REQUIREMENTS
     1. INSULATION RESISTANCE: 1000 MEGOHMS MIN AT 1000 VDC.
     2. DIELECTRIC WITHSTANDING VOLTAGE (SEA LEVEL):
        - CONTACT TO CONTACT 1600 V RMS AC
        - CONTACT TO HARDWARE 1600 V RMS AC

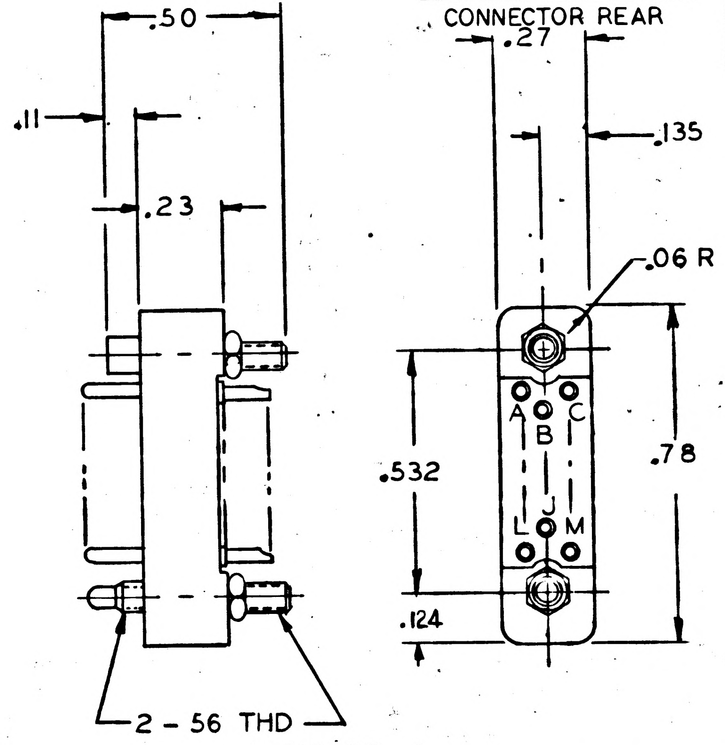


FIGURE 1

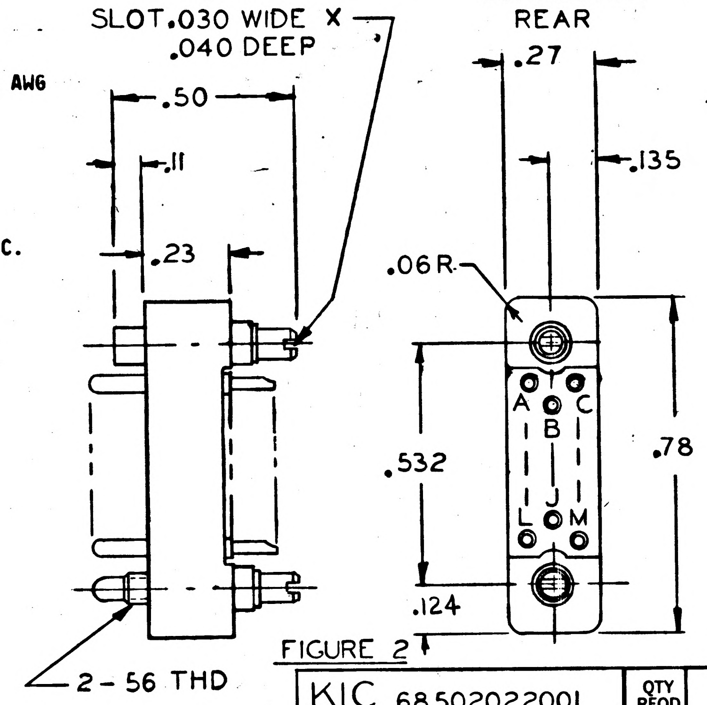


FIGURE 2

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

DASH NO.	MOUNTING
1012146—1	PANEL MOUNTED
1012146—2	CABLE

MASTER

KIC NO 68502022001 THRU 2002

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ±.XX = ±.01, ±.XXX = ±.005 ANGLES ~
DO NOT SCALE THIS DRAWING
MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN L. Nenzorio 6-9-64
CHECKED J.K/S. Szakaluk 6-10-64
APPROVED C. E. Costey 7/13/64
APPROVED [illegible] 7/14/64
APPROVED MIT W. [illegible] 14 July 64
APPROVED MSC W J Rhine 7-14-64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CONNECTOR, ELECTRICAL (RECTANGULAR, 11 NO. 22 PINS)
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
DRAWING NO. 1012146
SCALE ~
SHEET 1 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

— 1012146

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 10993				

3. DESIGN REQUIREMENTS

A. MOUNTING:

-1 (FIGURE 1)	PANEL
-2 (FIGURE 2)	CABLE

B. DIELECTRIC WITHSTANDING VOLTAGE (70,000 FEET):

CONTACT TO CONTACT	425 V RMS AC
CONTACT TO HARDWARE	425 V RMS AC

C. INSULATION (BODY): GLASS FILLED DIALLYL PHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN).

D. CONTACTS: PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204, TYPE II, CLASS 2. OVER COPPER

E. SCREWLOCKS: CRES, PASSIVATED

F. CONTACT RATING: 3 AMP

G. CREEPAGE BETWEEN CONTACTS: .070 MIN

H. AIR SPACE BETWEEN CONTACTS: .040 MIN

I. CONTACT RESISTANCE: 20 MV MAX AT 3 AMP

J. CONTACT RESISTANCE: 20 MV MAX AT 250 UA, AFTER MECHANICAL LIFE

MASTER

NEXT ASSY	USED ON
APPLICATION	

KIC NO 68502022001 THRU 2002

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN U Menzorio 6-9-64
CHECKED J.K.Szakalyk 6-10-64
APPROVED G.E. Costey 7/13/64
APPROVED E. Thomas 7/14/64
APPROVED MIT W Kupfer 14 July 64
APPROVED MSC W J Rhine 7-14-64 DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CONNECTOR, ELECTRICAL
(RECTANGULAR, 11 NO.22
PINS)
SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	DRAWING NO.
	C	1012146

SCALE

SHEET 2 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

— 1012147

REVISIONS							
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 10993				

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052.
   - D. PARTS SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-C-8384.
   - E. PARTS SHALL BE PACKAGED FOR SHIPMENT PER ND 1002215, CLASS I, IN HEAT SEALED CONTAINERS
2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS
     1. PARTS SHALL BE IDENTIFIED WITH NASA DRAWING NUMBER, DASH NUMBER, LATEST REVISION LETTER AND MANUFACTURER'S IDENTIFICATION PER ND 1002019.
     2. MECHANICAL DIMENSIONS AS SHOWN.
     3. CONTACTS: 11 NO. 22 SOCKETS TO ACCOMMODATE .030 ± .001 DIA PINS.
     4. ALL SOCKETS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.
     5. ENGAGEMENT: SCREWLOCKS, POLARIZED
     6. THESE PARTS SHALL MATE WITH MATCHING PARTS ON NASA DRAWING 1012146 (REF).
     7. WIRE TERMINATION: SOLDER CUPS TO ACCOMMODATE NO. 22 AWG STRANDED WIRE.
     8. INSERTION AND WITHDRAWAL FORCE: 2 TO 11 OUNCE/PIN WITH MATING CONNECTOR.
   - B. ELECTRICAL REQUIREMENTS
     1. INSULATION RESISTANCE: 1000 MEGOHMS MIN AT 1000 VDC.
     2. DIELECTRIC WITHSTANDING VOLTAGE (SEA LEVEL):
        - CONTACT TO CONTACT 1600 V RMS AC
        - CONTACT TO HARDWARE 1600 V RMS AC

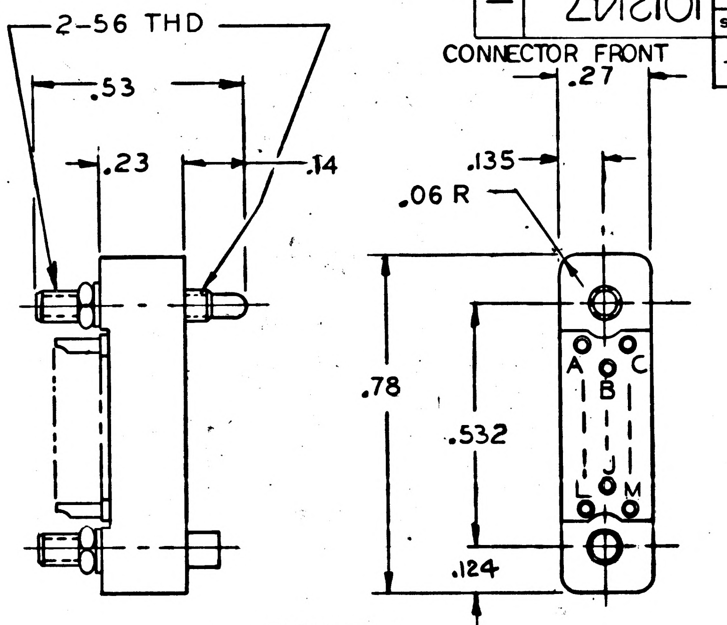


FIGURE 1

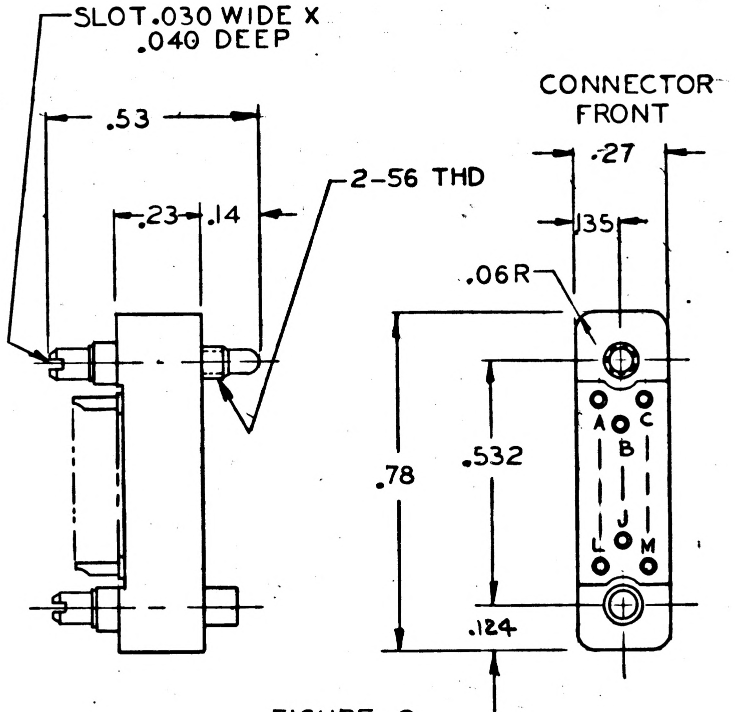


FIGURE 2

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

DASH NO.	MOUNTING
1012147-1	PANEL MOUNTED
1012147-2	CABLE

MASTER

NEXT ASSY	USED ON
APPLICATION	

KIC NO 68502022101 THRU 2102

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS				

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ±XX=±.01 ±XXX=±.005 ANGLES ~
DO NOT SCALE THIS DRAWING
MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN M MENZORIO 6-8-64
CHECKED J.K. Sokolnik 6-10-64
APPROVED G. F. Costa 7/13/64
APPROVED E. Thomas 7/14/64
APPROVED MIT W Kupfer 14 July 64
APPROVED MSC W J Rhine 7-14-64 DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CONNECTOR, ELECTRICAL, (RECTANGULAR, 11 NO.22 SOCKETS)
SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	DRAWING NO.
	C	1012147
SCALE ~		SHEET 1 OF 2

1012147 —

32030

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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1012147	–

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
		INITIAL RELEASE CLASS A PER TDRR 10993				

3. DESIGN REQUIREMENTS

A. MOUNTING:

-1	(FIGURE 1)	PANEL
-2	(FIGURE 2)	CABLE

B. DIELECTRIC WITHSTANDING VOLTAGE (70,000 FEET):

CONTACT TO CONTACT	425 V RMS AC
CONTACT TO HARDWARE	425 V RMS AC

C. INSULATION (BODY): GLASS FILLED DIALLYL PHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN).

D. CONTACTS: PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204, TYPE II, CLASS 2. OVER COPPER

E. SCREWLOCKS: CRES, PASSIVATED

F. CONTACT RATING: 3 AMP

G. CREEPAGE BETWEEN CONTACTS: .070 MIN

H. AIR SPACE BETWEEN CONTACTS: .040 MIN

I. CONTACT RESISTANCE: 20 MV MAX AT 3 AMP.

J. CONTACT RESISTANCE: 20 MV MAX AT 250 μA AFTER MECHANICAL LIFE

MASTER

KIC NO 68502022101 THRU 2102	QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS				

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ± ~ ANGLES ± ~
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN	M Menzorio	6-8-64
CHECKED	J.K. S. Zakaluk	6-10-64
APPROVED	C.E. Costey	7/13/64
APPROVED		7/14/64
APPROVED MIT	W Kupfer	14 July 64
APPROVED MSC	W J Rhine	7-14-64

CONNECTOR, ELECTRICAL
(RECTANGULAR 11 NO. 22
SOCKETS)
SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	DRAWING NO.
	C	1012147
SCALE ~		SHEET 2 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
-		INITIAL RELEASE CLASS A PER TDRR 15187			12-29-64	WK
A		REVISED PER TDRR 16996			[illegible]	WK

REQUIREMENTS

1. GENERAL

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. UNITS SHALL BE CAPABLE OF MEETING THE REQUIREMENTS OF MIL-T-27 WITH ADDITIONS AND EXCEPTIONS SPECIFIED HEREIN.

C. SUPPLIERS SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND1015404, CLASS 2.

D. UNITS SHALL MEET THE QUALIFICATION REQUIREMENTS OF ND1002047.

E. UNITS SHALL BE PACKAGED IN SUCH A MANNER AS TO INSURE THE FOLLOWING,

(1) EACH INDIVIDUAL PART SHALL BE SEPARATED FROM ALL OTHERS AND PACKED SECURELY TO PREVENT CONTACT DURING TRANSIT.

(2) LEADS SHALL BE SECURED AGAINST WHIPPING OR VIBRATION DURING TRANSIT.

2. INSPECTION & ACCEPTANCE

A. MECHANICAL, REQUIREMENTS.

(1) LEAD MATERIAL SHALL BE PER ND 1015400.
A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

(2) MARKING, UNITS SHALL BE PERMANENTLY & LEGIBLY MARKED PER REQUIREMENTS OF ND1002019 WITH NASA DWG NUMBER AND REVISION LETER, MANUFACTURER'S SERIAL AND/OR LOT CODE, AND LEAD IDENTIFICATION. MFGRS NAME AND/OR SYMBOL AND PART NUMBER MAY APPEAR ON PART AND PACKAGE. LETTER HEIGHT SHALL BE 1/16" MIN IF PART SIZE PROHIBITS LARGER.

(3) DIMENSIONS AND LEAD CONFIGURATION PER FIG. 1.

B. ELECTRICAL REQUIREMENTS

(1) UNITS SHALL MEET ALL REQUIREMENTS OF TABLE 1.

3. DESIGN REQUIREMENTS

A. UNITS SHALL MEET ALL REQUIREMENTS OF MIL-T-27 WITH THE FOLLOWING CLARIFICATIONS,

GRADE ------------ 3
CLASS ------------ S
LIFE EXPECTANCY ------ X, AT AN AMBIENT TEMPERATURE OF 71°C.

B. IMPREGNATION, UNITS SHALL BE VACUUM IMPREGNATED TO CONFORM TO GRADE 3 REQUIREMENTS OF MIL-T-27.

C. RATED CONDITIONS: TERMINAL 1-2, 2-3, 15 VDC SWITCHED

D. RATED WORKING VOLTS: WINDING 1-3, 30 VOLTS PEAK. WINDING 4-6 6.4 VOLTS PEAK. WINDING 7-8, 500 VOLTS PEAK.

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN CJ Papia 28Dec64
CHECKED A. Mark 12-28-64
APPROVED M Gorton
APPROVED DA Koso 12-28-64
APPROVED MIT W Kupfer 28Dec64
APPROVED MSC W J Rhine 12-29-64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSFORMER, POWER, STEPUP
SPECIFICATION CONTROL DWG

CODE IDENT NO. ——
SIZE C
DRAWING NO. 1012148
SCALE NONE
SHEET 1 OF 3

MASTER

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 15187			12-29-64	WK
A		REVISED PER TDRR 16996				WK

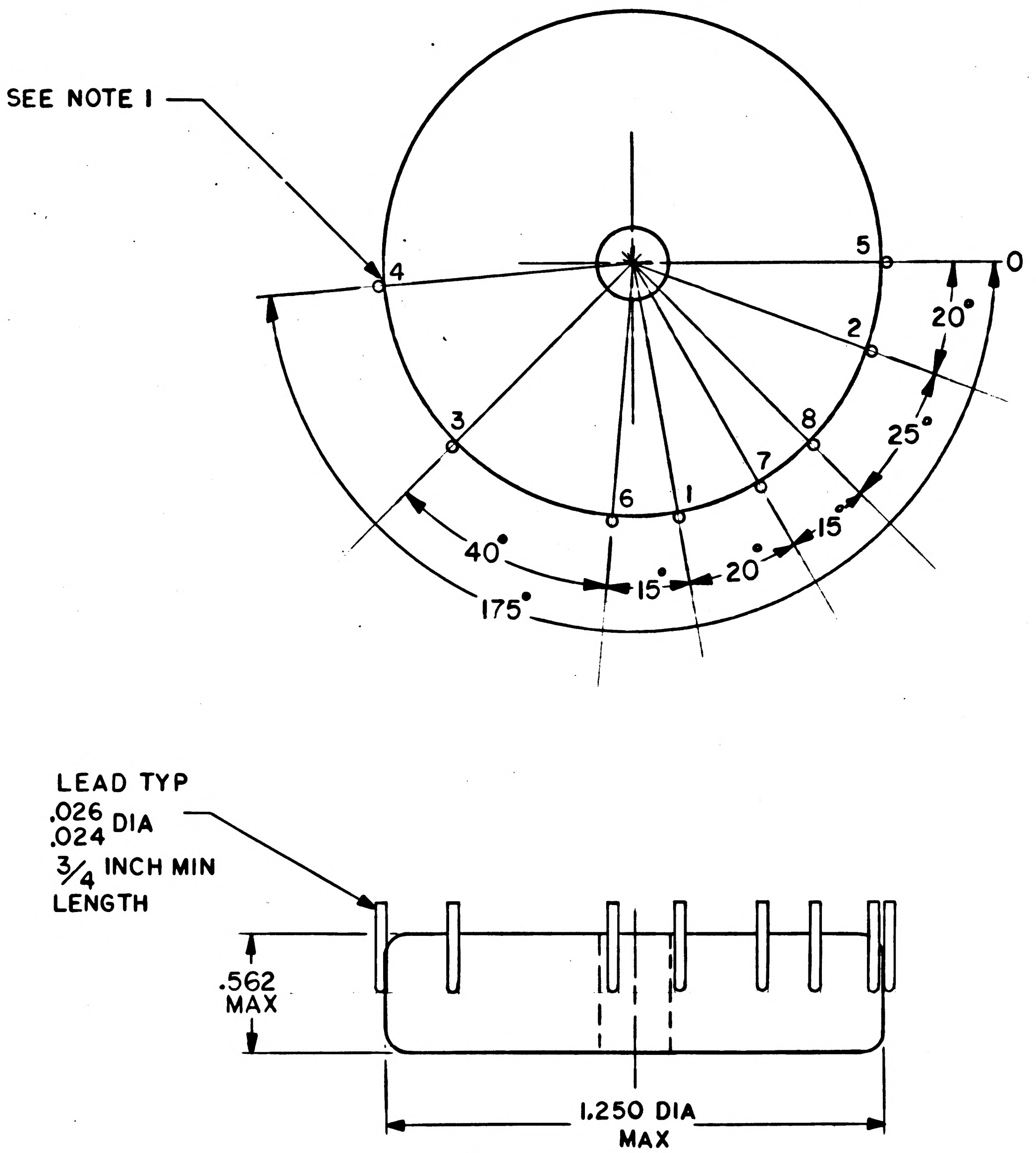


FIG. 1

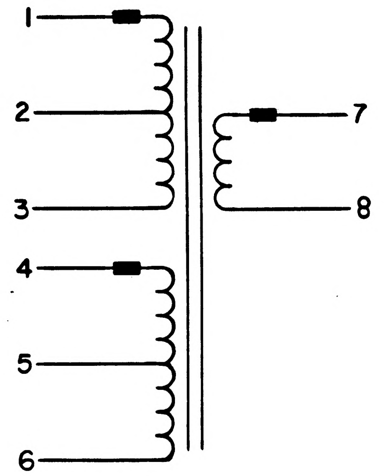


FIG. 2

NOTES:

1. COIL MAY PROTRUDE AS MUCH AS 1/32 OF AN INCH AT POINTS WITHIN ±10° OF EACH LEAD BREAKOUT

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± 2°
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN G Papia 29Dec64
CHECKED A. Minato 12-28-64
APPROVED M Gorsten
APPROVED D G Koso 12-28-64
APPROVED MIT W Kupfer 29Dec64
APPROVED MSC W J Rhine 12-29-64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSFORMER
POWER STEPUP
SPECIFICATION CONTROL DWG

CODE IDENT NO. ——
SIZE C
DRAWING NO. 1012148
SCALE NONE
SHEET 2 OF 3

MASTER

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
-		INITIAL RELEASE CLASS A PER TDRR 15187			12-29-64	WR
A		REVISED PER TDRR 16996				WR

TABLE 1

ELECTRICAL REQUIREMENTS

PARAMETER	CONDITIONS	SPECIFICATIONS LIMITS		
		MIN	MAX	UNITS
POLARITY	TERMINALS 1,4, & 7 SHALL HAVE SAME INSTANTANEOUS POLARITY			
INSULATION RESISTANCE	PER MIL-STD-202-METHOD 302 PER CONDITION B USE 100V ON 1-4; USE 500V ON 1-7 & 7-4	10K		MEGOHMS
DIELECTRIC STRENGTH	PER MIL-STD-202-METHOD 301 CHECK 1-4 @	100		VRMS
	CHECK 1-7 & 7-4 @	1400		
D.C. RESISTANCE	PER MIL-STD-202-METHOD 303 1-2=18.25 OHMS 1-3=36.50 OHMS 4-5= 4.30 OHMS 4-6= 8.60 OHMS 7-8=750.0 OHMS	-20	+20	%
NO LOAD VOLTAGE	APPLY 8 VOLTS RMS @ 1 K.C. BETWEEN TERM 1&3 READ AS FOLLOWS BETWEEN 1&2 = 4.0 VOLTS 4&5 = 0.85 VOLTS 4&6 = 1.7 VOLTS 7&8 =133.0 VOLTS	-5	+5	%
INDUCED VOLTAGE	PER MIL-T-27, APPLY 42 VOLTS RMS @4 K.C. TO TERMINALS 1&3. SECONDARIES OPEN.			
SELF OSCILLATING FREQUENCY	WHEN UNIT IS CONNECTED PER FIG. 3 THE FREQUENCY SHALL BE MEASURED.	1400	2200	CPS

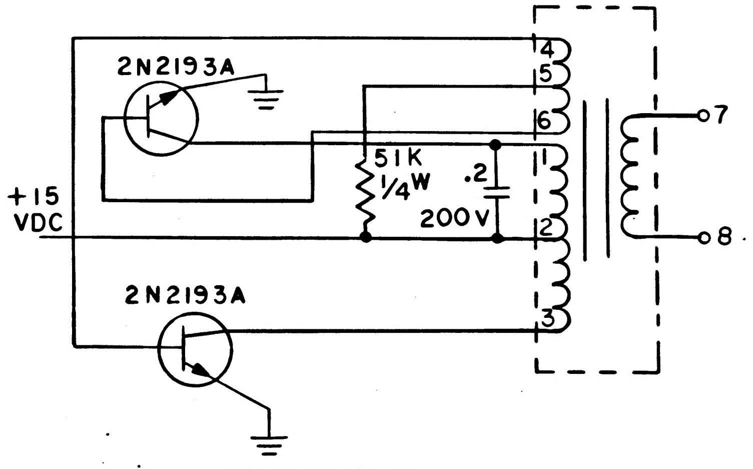


FIGURE 3

FREQUENCY TEST CIRCUIT

MASTER

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN	B Papia	28Dec64
CHECKED	A. Martz	12-28-64
APPROVED	M Gorstein	
APPROVED	DA Koso	12-28-64
APPROVED MIT	W Kupfer	29Dec64
APPROVED MSC	WJ Rhine	12-29-64
		DATE

TRANSFORMER, POWER, STEPUP
SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	DRAWING NO.
—	C	1012148
SCALE NONE		SHEET 3 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
-		INITIAL RELEASE CLASS A PER TDRR 15187			12-29-64	WK

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. UNITS SHALL BE CAPABLE OF MEETING THE REQUIREMENTS OF MIL-T-27 WITH ADDITIONS AND EXCEPTIONS SPECIFIED HEREIN.
   - C. SUPPLIERS SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND1015404, CLASS 2.
   - D. UNITS SHALL MEET THE QUALIFICATION REQUIREMENTS OF ND1002047.
   - E. UNITS SHALL BE PACKAGED IN SUCH A MANNER AS TO INSURE THE FOLLOWING,
     - (1) EACH INDIVIDUAL PART SHALL BE SEPARATED FROM ALL OTHERS AND PACKED SECURELY TO PREVENT CONTACT DURING TRANSIT.
     - (2) LEADS SHALL BE SECURED AGAINST WHIPPING OR VIBRATION DURING TRANSIT.

2. INSPECTION & ACCEPTANCE
   - A. MECHANICAL, REQUIREMENTS.
     - (1) LEAD MATERIAL SHALL BE PER ND 1015400. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
     - (2) MARKING, UNITS SHALL BE PERMANENTLY & LEGIBLY MARKED PER REQUIREMENTS OF MIL-T-27 AND ND1002019.
     - (3) DIMENSIONS AND LEAD CONFIGURATION PER FIG. 1.
   - B. ELECTRICAL REQUIREMENTS
     - (1) UNITS SHALL MEET ALL REQUIREMENTS OF TABLE 1.

3. DESIGN REQUIREMENTS
   - A. UNITS SHALL MEET ALL REQUIREMENTS OF MIL-T-27 WITH THE FOLLOWING CLARIFICATIONS,

     GRADE ------------ 3
     CLASS ------------ S
     LIFE EXPECTANCY ------ X, AT AN AMBIENT TEMPERATURE OF 71°C.
   - B. IMPREGNATION, UNITS SHALL BE VACUUM IMPREGNATED TO CONFORM TO GRADE 3 REQUIREMENTS OF MIL-T-27.

4. SPECIAL CONDITIONING

   TRANSFORMER SHALL BE TEMPERATURE CYCLED FOR 5 CYCLES PER MIL-STD-202, METHOD 102A EXCEPT THAT THE TEMPERATURES SHALL BE -55°C, +25°C AND 105°C AND EXPOSURE TIME SHALL BE 15 MINUTES AT EACH TEMPERATURE. DURING THE LAST CYCLE, THE UNIT SHALL BE TESTED FOR CONTINUITY AT EACH OF THE AMBIENT CONDITIONS. AFTER STABILIZATION AT ROOM TEMPERATURE, UNIT SHALL PASS NORMAL INSPECTION TESTS.

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL ————

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN	CJ Papia	28Dec64
CHECKED	A. Mark	12-28-64
APPROVED	M Gorstein	
APPROVED	DA Koso	12-28-64
APPROVED MIT	W Kupfer	28Dec64
APPROVED MSC	WJ Rhine	12-29-64
		DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSFORMER, POWER, STEPUP

SPECIFICATION CONTROL DWG

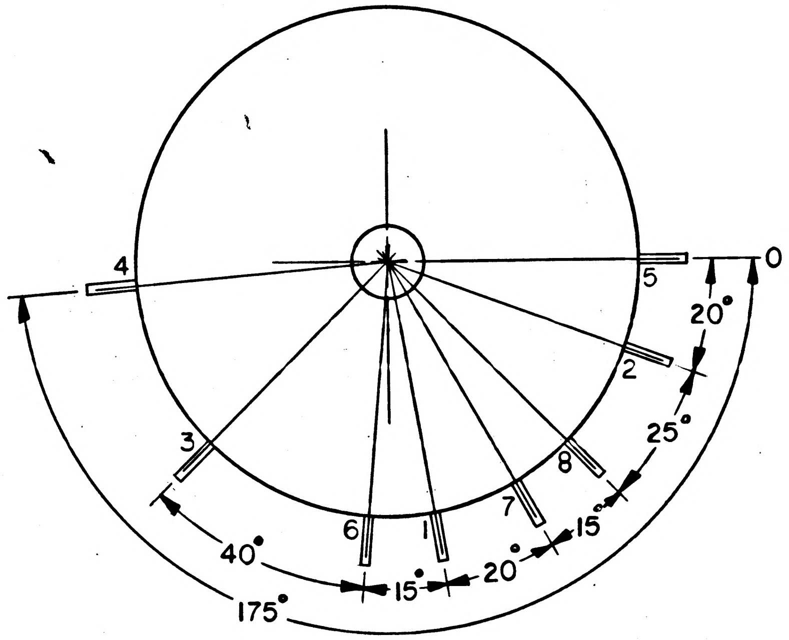
CODE IDENT NO.	SIZE	DRAWING NO.
————	C	1012148
SCALE NONE		SHEET 1 OF 3

MASTER

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 15187			12-29-6	WK



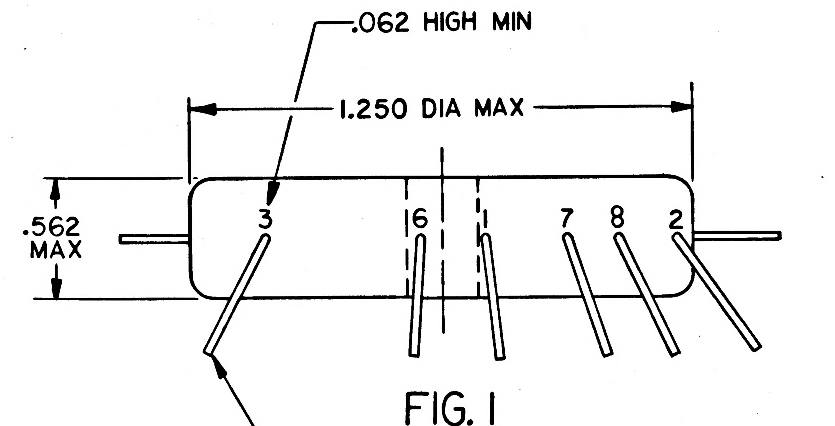


FIG. 1

LEADS TO BE BROUGHT OUT AT EDGE OF COIL. 4 INCHES MIN LENGTH

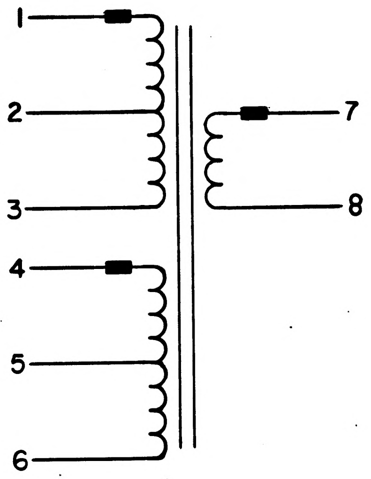


FIG. 2

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± —— DECIMALS ± —— ANGLES ± 2°
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN EJ Papia 23Dec64
CHECKED A. Amato 12-28-64
APPROVED M Gorton
APPROVED D G Koso 12-28-64
APPROVED MIT W Kupfer 29Dec64
APPROVED MSC W J Rhine 12-29-64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSFORMER
POWER STEPUP
SPECIFICATION CONTROL DWG

CODE IDENT NO. ——
SIZE C
DRAWING NO. 1012148
SCALE NONE
SHEET 2 OF 3

MASTER

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
-		INITIAL RELEASE CLASS A PER TDRR 15187			12-29-64	WK

TABLE 1

INSPECTION & ACCEPTANCE

PARAMETER	CONDITIONS	SPECIFICATIONS LIMITS		
		MIN	MAX	UNITS
POLARITY	TERMINALS 1,4, & 7 SHALL HAVE SAME INSTANTANEOUS POLARITY			
INSULATION RESISTANCE	PER MIL-STD-202-METHOD 302 PER CONDITION B	10K		MEGOHMS
DIELECTRIC STRENGTH	PER MIL-STD-202-METHOD 301 CHECK 1-4 @	100		VOLTS
	CHECK 1-7 & 7-4 @	500		
D.C. RESISTANCE	PER MIL-STD-202-METHOD 303 1-2=18.25 OHMS 1-3=36.50 OHMS 4-5= 4.30 OHMS 4-6= 8.60 OHMS 7-8=750.0 OHMS	-20	+20	%
NO LOAD VOLTAGE	APPLY 8 VOLTS RMS @ 1 K.C. BETWEEN TERM 1&3 READ AS FOLLOWS BETWEEN 1&2 = 4 VOLTS 4&5 = 0.8 VOLTS 4&6 = 1.6 VOLTS 7&8 = 135.0 VOLTS	-5	+5	%
INDUCED VOLTAGE	PER MIL-T-27, APPLY 16 VOLTS RMS @ 2 K.C. TO TERMINALS 1&3. SECONDARIES OPEN.			

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± —— ± —— ± ——
DO NOT SCALE THIS DRAWING

MATERIAL
——————

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN B J Papia 28Dec64
CHECKED A. Martz 12-28-64
APPROVED M. Gostan
APPROVED D A Koso 12-28-64
APPROVED MIT W Kupfer 29Dec64
APPROVED MSC W J Rhine 12-29-64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSFORMER, POWER, STEPUP

SPECIFICATION CONTROL DWG

CODE IDENT NO. ——
SIZE C
DRAWING NO. 1012148
SCALE NONE
SHEET 3 OF 3

MASTER

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 15187			12-29-64	WK
A		REVISED PER TDRR 16999			[illegible]	WK

REQUIREMENTS

1. GENERAL

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. UNITS SHALL BE CAPABLE OF MEETING THE REQUIREMENTS OF MIL-T-27 WITH THE ADDITIONS AND EXCEPTIONS SPECIFIED HEREIN.

C. SUPPLIES SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

D. UNITS SHALL MEET THE QUALIFICATION REQUIREMENTS OF ND 1002047.

E. UNITS SHALL BE PACKAGED IN SUCH A MANNER AS TO INSURE THE FOLLOWING,

(1). EACH INDIVIDUAL PART SHALL BE SEPARATED FROM ALL OTHERS AND PACKED SECURELY TO PREVENT CONTACT DURING TRANSIT.

(2). LEADS SHALL BE SECURED AGAINST WHIPPING OR VIBRATION DURING TRANSIT.

2. INSPECTION & ACCEPTANCE

A. MECHANICAL, REQUIREMENTS

(1) LEAD MATERIAL SHALL BE PER ND 1015400. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

(2) MARKING: UNITS SHALL BE PERMANENTLY AND LEGIBLY MARKED PER REQUIREMENTS OF ND1002019 WITH NASA DWG NUMBER AND REVISION LETTER, MANUFACTURER'S SERIAL AND/OR LOT CODE, AND LEAD IDENTIFICATION. MFGRS NAME AND/OR SYMBOL AND PART NUMBER MAY APPEAR ON PART AND PACKAGE. LETTER HEIGHT SHALL BE 1/16" MIN IF PART SIZE PROHIBITS LARGER.

(3) DIMENSIONS AND LEAD CONFIGURATION PER FIG. 1.

B. ELECTRICAL REQUIREMENTS

(1) UNITS SHALL MEET ALL REQUIREMENTS OF TABLE 1.

3. DESIGN REQUIREMENTS

A. UNITS SHALL MEET ALL REQUIREMENTS OF MIL-T-27 WITH THE FOLLOWING CLARIFICATIONS,

GRADE	3
CLASS	S
LIFE EXPECTANCY	X, AT AN AMBIENT TEMPERATURE OF 71°C.

B. IMPREGNATION, UNITS SHALL BE VACUUM IMPREGNATED TO CONFORM TO GRADE 3 REQUIREMENTS OF MIL-T-27.

C. RATED CONDITIONS: TERMINALS 1-2, 2-3, 15 VDC SWITCHED

D. RATED WORKING VOLTS: WINDING 1-3, 30 VOLTS PEAK. WINDING 4-6, 6.4 VOLTS PEAK. WINDING 7-8, 99 VOLTS PEAK. WINDING 9-10, 500 VOLTS PEAK.

4. SPECIAL CONDITIONING

TRANSFORMER SHALL BE TEMPERATURE CYCLED FOR 5 CYCLES PER MIL-STD-202, METHOD 102A EXCEPT THAT THE TEMPERATURES SHALL BE -55°C, +25°C AND 105°C AND EXPOSURE TIME SHALL BE 15 MINUTES AT EACH TEMPERATURE. DURING THE LAST CYCLE, THE UNIT SHALL BE TESTED FOR CONTINUITY AT EACH OF THE AMBIENT CONDITIONS. AFTER STABILIZATION AT ROOM TEMPERATURE, UNIT SHALL PASS NORMAL INSPECTION TESTS.

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± —— DECIMALS ± —— ANGLES ± ——
DO NOT SCALE THIS DRAWING

MATERIAL ——————

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

		DATE
DRAWN	BJ Papia	24 Dec 64
CHECKED	A. Martz	12-28-64
APPROVED	M Gorten	
APPROVED	DA Koso	12-28-64
APPROVED MIT	W Kupfer	29 Dec 64
APPROVED MSC	W J Rhine	12-29-64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSFORMER, POWER, STEPUP

SPECIFICATION CONTROL DWG

CODE IDENT NO. ——
SIZE C
DRAWING NO. 1012149
SCALE NONE
SHEET 1 OF 3

MASTER

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
–		INITIAL RELEASE CLASS A PER TDRR 15187			12-29-64	WK
A		REVISED PER TDRR 16999			[illegible]	WR

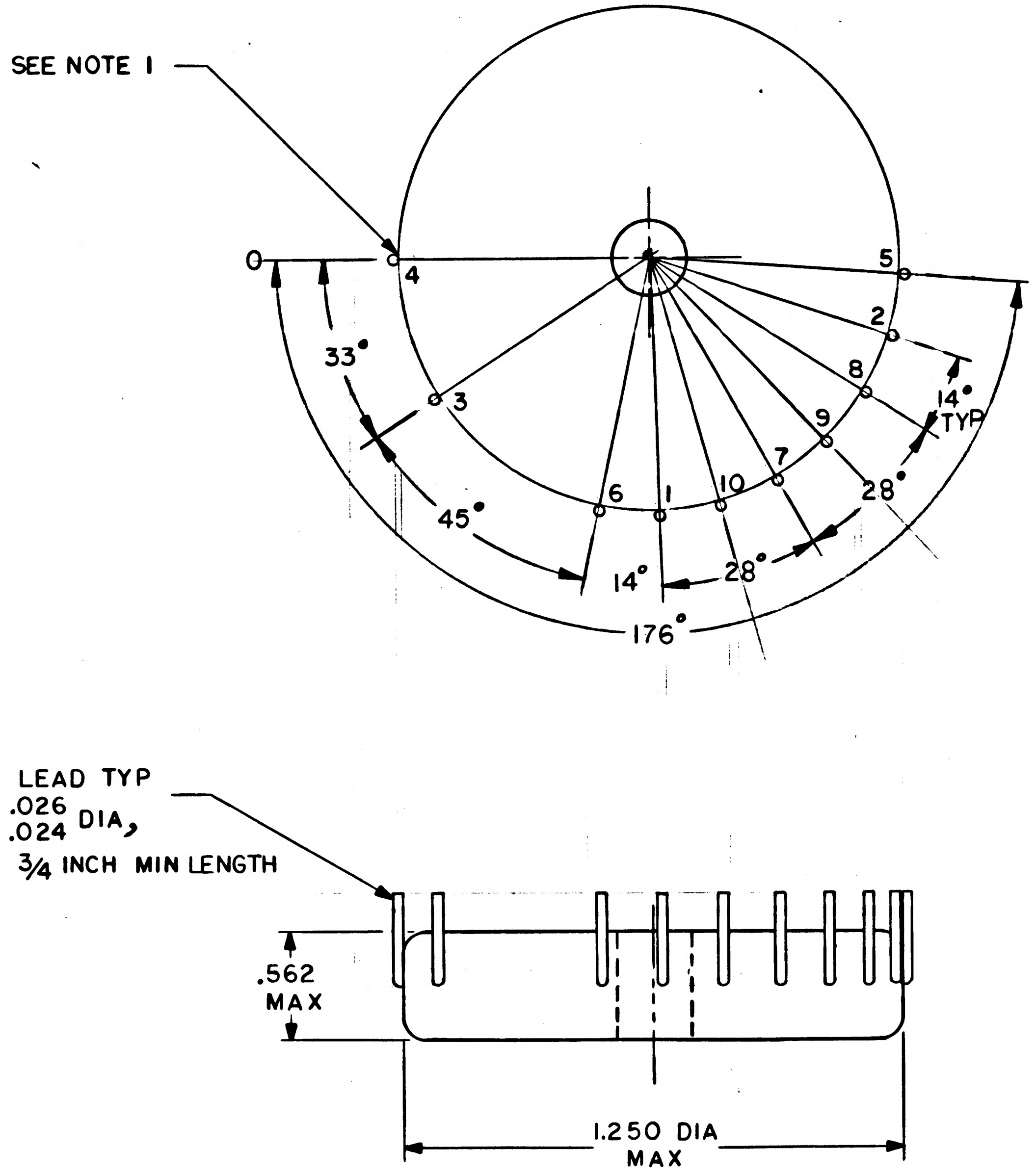


FIG. 1

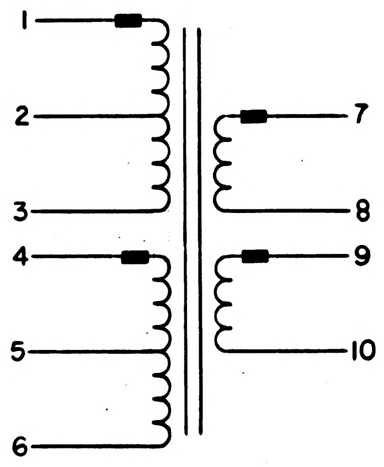


FIG. 2

NOTES:

1. COIL MAY PROTRUDE AS MUCH AS 1/32 OF AN INCH AT POINTS WITHIN ±10° OF EACH LEAD BREAKOUT

MASTER

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± 2°
DO NOT SCALE THIS DRAWING

MATERIAL

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN [illegible] 22Dec64
CHECKED A. Maxts 12-28-64
APPROVED M Gordon
APPROVED [illegible] 12-28-64
APPROVED MIT W Kupfer 29Dec64
APPROVED MSC W J Rhine 12-29-64
DATE

TRANSFORMER, POWER, STEPUP

SPECIFICATION CONTROL DWG

CODE IDENT NO. ——
SIZE C
DRAWING NO. 1012149
SCALE NONE
SHEET 2 OF 3

1012149 A

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 15187			12-29-64	WR
A		REVISED PER TDRR 16999			18 May 65	WR

TABLE 1

ELECTRICAL REQUIREMENTS

PARAMETER	CONDITIONS	SPECIFICATION UNITS MIN	MAX	UNITS
POLARITY	TERMINALS 1,4,7 AND 9 SHALL HAVE SAME INSTANTANEOUS POLARITY			
INSULATION RESISTANCE	PER MIL-STD-202-METHOD 302 PER CONDITION B USE 100 V ON 1-4,4-7 & 7-1; USE 500 V 1-9,4-9 & 7-9	10K		MEGOHMS
DIELECTRIC STRENGTH	PER MIL-STD-202-METHOD 301 CHECK 1-4,4-7 & 7-1 @	100		VRMS
	CHECK 1-9,4-9 & 7-9 @	1400		
D.C. RESISTANCE	PER MIL-STD-202, METHOD 303 1-2 = 18.25 OHMS 1-3 = 36.50 OHMS 4-5 = 4.30 OHMS 4-6 = 8.60 OHMS 7-8 = 150.0 OHMS 9-10= 750.0 OHMS	-20	+20	%
NO LOAD VOLTAGE	APPLY 8 VOLTS RMS @ 1 K.C. BETWEEN TERM 1&3. READ AS FOLLOWS BETWEEN 1&2 = 4.0 VOLTS 4&5 = 0.85 VOLTS 4&6 = 1.7 VOLTS 7&8 = 26.2 VOLTS 9&10 = 133.0 VOLTS	-5	+5	%
INDUCED VOLTAGE	PER MIL-T-27, APPLY 42 VOLTS RMS @ 4 K.C. TO TERMINALS 1&3. SECONDARIES OPEN.			
SELF OSCILLATION FREQUENCY	WHEN UNIT IS CONNECTED PER FIGURE 3, THE FREQUENCY SHALL BE MEASURED	1400	2200	CPS

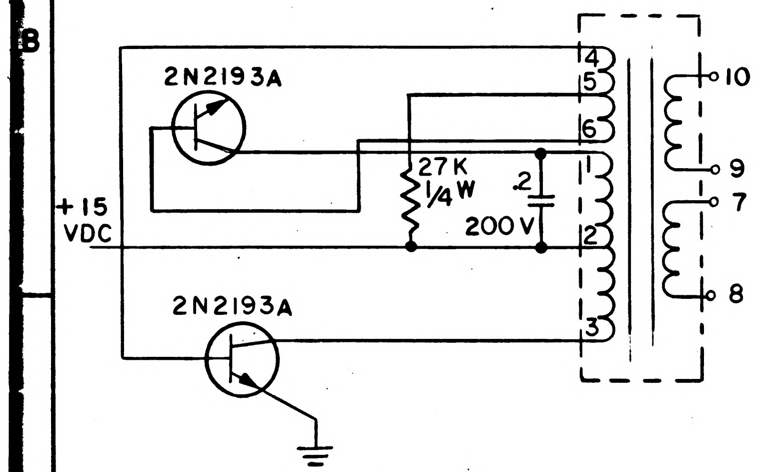


FIGURE 3

FREQUENCY TEST CIRCUIT

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± — ± — ± —
DO NOT SCALE THIS DRAWING
MATERIAL
—

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN	C. Papia	28 Dec 64
CHECKED	A. Marta	12-28-64
APPROVED	M. Gorton	
APPROVED	D. A. Koso	12-28-64
APPROVED MIT	W. Kupfer	29 Dec 64
APPROVED MSC	W. J. Rhine	12-29-64
		DATE

TRANSFORMER, POWER, STEPUP

SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	DRAWING NO.
—	C	1012149
SCALE NONE		SHEET 3 OF 3

MASTER

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 15187			12-29-64	WK
A		REVISED PER TDRR 16999			18May65	WK
B		REVISED PER TDRR 18763			5/11/65	WK

REQUIREMENTS

1. GENERAL

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. UNITS SHALL BE CAPABLE OF MEETING THE REQUIREMENTS OF MIL-T-27 WITH THE ADDITIONS AND EXCEPTIONS SPECIFIED HEREIN.

C. SUPPLIES SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

D. UNITS SHALL MEET THE QUALIFICATION REQUIREMENTS OF ND 1002047.

E. UNITS SHALL BE PACKAGED IN SUCH A MANNER AS TO INSURE THE FOLLOWING,

(1). EACH INDIVIDUAL PART SHALL BE SEPARATED FROM ALL OTHERS AND PACKED SECURELY TO PREVENT CONTACT DURING TRANSIT.

(2). LEADS SHALL BE SECURED AGAINST WHIPPING OR VIBRATION DURING TRANSIT.

2. INSPECTION & ACCEPTANCE

A. MECHANICAL, REQUIREMENTS

(1) LEAD MATERIAL SHALL BE PER ND 1015400. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

(2) MARKING: UNITS SHALL BE PERMANENTLY AND LEGIBLY MARKED PER REQUIREMENTS OF ND1002019 WITH NASA DWG NUMBER AND REVISION LETTER , MANUFACTURER'S SERIAL AND/OR LOT CODE, AND LEAD IDENTIFICATION. MFGRS NAME AND/OR SYMBOL AND PART NUMBER MAY APPEAR ON PART AND PACKAGE. LETTER HEIGHT SHALL BE 1/16" MIN IF PART SIZE PROHIBITS LARGER.

(3) DIMENSIONS AND LEAD CONFIGURATION PER FIG. 1.

B. ELECTRICAL REQUIREMENTS

(1) UNITS SHALL MEET ALL REQUIREMENTS OF TABLE 1.

3. DESIGN REQUIREMENTS

A. UNITS SHALL MEET ALL REQUIREMENTS OF MIL-T-27 WITH THE FOLLOWING CLARIFICATIONS,

GRADE	3
CLASS	S
LIFE EXPECTANCY	X, AT AN AMBIENT TEMPERATURE OF 71°C.

B. IMPREGNATION, UNITS SHALL BE VACUUM IMPREGNATED TO CONFORM TO GRADE 3 REQUIREMENTS OF MIL-T-27.

C. RATED CONDITIONS: TERMINALS 1-2, 2-3, 15 VDC SWITCHED

D. RATED WORKING VOLTS: WINDING 1-3, 30 VOLTS PEAK. WINDING 4-6, 6.4 VOLTS PEAK. WINDING 7-8, 99 VOLTS PEAK. WINDING 9-10, 500 VOLTS PEAK.

E. SOLDERING SHALL BE IN ACCORDANCE WITH ND 1002017.

4. SPECIAL CONDITIONING

TRANSFORMER SHALL BE TEMPERATURE CYCLED FOR 5 CYCLES PER MIL-STD-202, METHOD 102A EXCEPT THAT THE TEMPERATURES SHALL BE -55°C, +25°C AND 105°C AND EXPOSURE TIME SHALL BE 15 MINUTES AT EACH TEMPERATURE. DURING THE LAST CYCLE, THE UNIT SHALL BE TESTED FOR CONTINUITY AT EACH OF THE AMBIENT CONDITIONS. AFTER STABILIZATION AT ROOM TEMPERATURE, UNIT SHALL PASS NORMAL INSPECTION TESTS, INDICATED IN SECTION 2.

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN	BJ Papia	24Dec64
CHECKED	A. Mento	12-28-64
APPROVED	M Gorton	
APPROVED	DAKoso	12-28-64
APPROVED MIT	W Kupfer	29Dec64
APPROVED MSC	W J Rhine	12-29-64
		DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSFORMER, POWER, STEPUP

SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	DRAWING NO.
—	C	1012149
SCALE NONE		SHEET 1 OF 3

MASTER

1012149 B

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER: AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 15187			12-29-64	WK
A		REVISED PER TDRR 16999			18Mar65	WR
B		REVISED PER TDRR 18763			6/11/65	WK

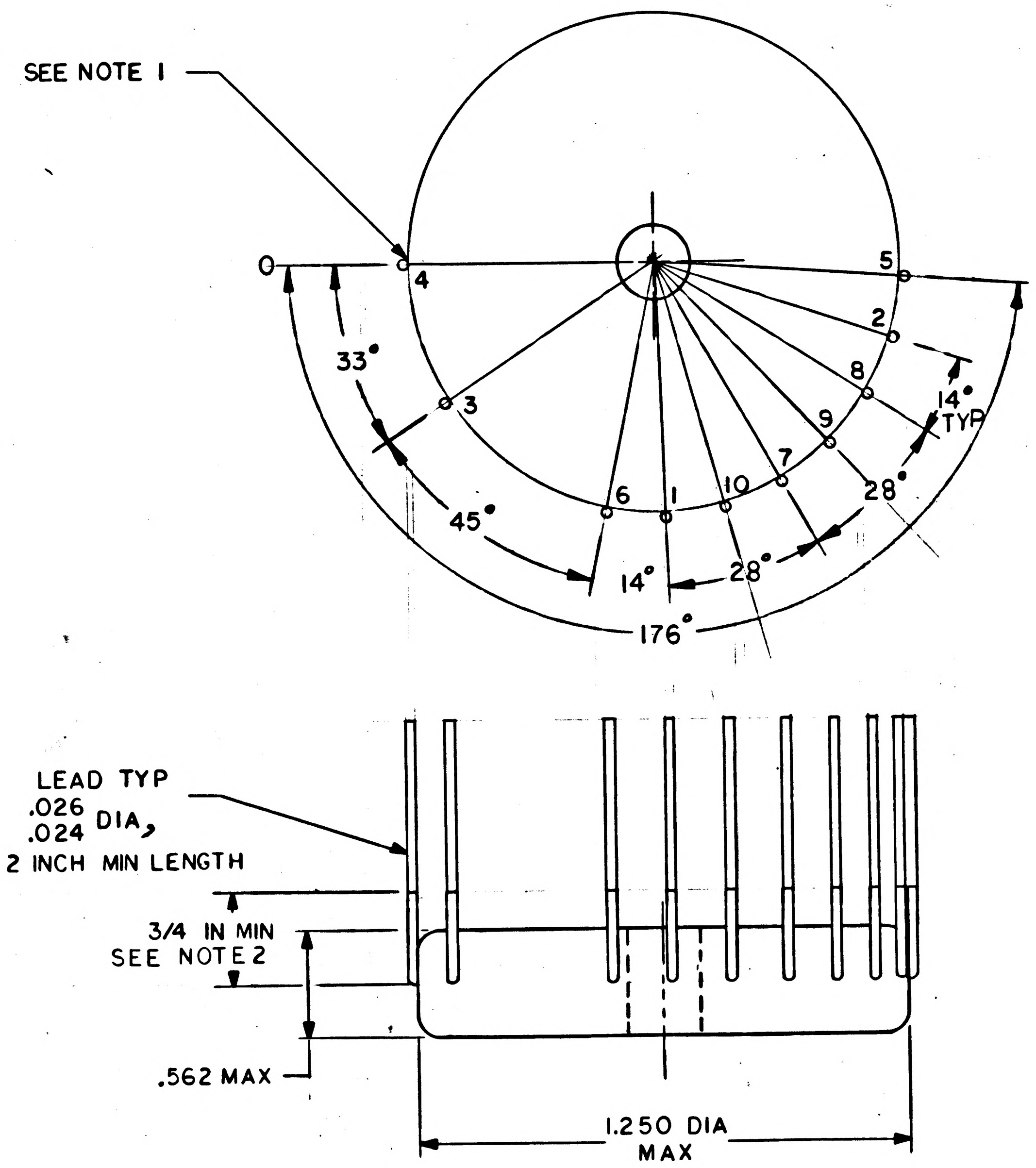


FIG. 1

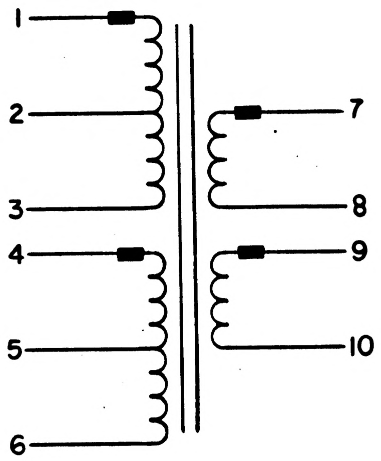


FIG. 2

NOTES:

1. COIL MAY PROTRUDE AS MUCH AS 1/32 OF AN INCH AT POINTS WITHIN ±10° OF EACH LEAD BREAKOUT
2. LEADS MUST BE FREE OF KINKS AND BENDS FOR 3/4 INCH MIN DIMENSION

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± 2°
DO NOT SCALE THIS DRAWING

MATERIAL
—

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

		DATE
DRAWN	O. Papia	22Dec64
CHECKED	A. Mautz	12-28-64
APPROVED	M. Gordon	
APPROVED	D. Koso	12-28-64
APPROVED MIT	W. Kupfer	29Dec64
APPROVED MSC	W. J. Rhine	12-29-64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSFORMER, POWER, STEPUP
SPECIFICATION CONTROL DWG

CODE IDENT NO. —
SIZE C
DRAWING NO. 1012149
SCALE NONE
SHEET 2 OF 3

MASTER

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 15187			12-29-64	WR
A		REVISED PER TDRR 16999			18 Mar 65	WR
B		REVISED PER TDRR 18763			6/11/65	WH

TABLE 1

ELECTRICAL REQUIREMENTS

PARAMETER	CONDITIONS	SPECIFICATION UNITS MIN	MAX	UNITS
POLARITY	TERMINALS 1,4,7 AND 9 SHALL HAVE SAME INSTANTANEOUS POLARITY			
INSULATION RESISTANCE	PER MIL-STD-202-METHOD 302 PER CONDITION B USE 100 V ON 1-4,4-7 & 7-1; USE 500 V 1-9,4-9 & 7-9	10K		MEGOHMS
DIELECTRIC STRENGTH	PER MIL-STD-202-METHOD 301 CHECK 1-4,4-7 & 7-1 @ CHECK 1-9,4-9 & 7-9 @	100 1400		VRMS
D.C. RESISTANCE	PER MIL-STD-202, METHOD 303 1-2 = 18.25 OHMS 1-3 = 36.50 OHMS 4-5 = 4.30 OHMS 4-6 = 8.60 OHMS 7-8 = 150.0 OHMS 9-10= 750.0 OHMS	-20	+20	%
NO LOAD VOLTAGE	APPLY 8 VOLTS RMS @ 1 K.C. BETWEEN TERM 1&3. READ AS FOLLOWS BETWEEN 1&2 = 4.0 VOLTS 4&5 = 0.85 VOLTS 4&6 = 1.7 VOLTS 7&8 = 26.2 VOLTS 9&10= 133.0 VOLTS	-5	+5	%
INDUCED VOLTAGE	PER MIL-T-27, APPLY 42 VOLTS RMS @ 4 K.C. TO TERMINALS 1&3. SECONDARIES OPEN.			
SELF OSCILLATION FREQUENCY	WHEN UNIT IS CONNECTED PER FIGURE 3, THE FREQUENCY SHALL BE MEASURED	1400	2200	CPS

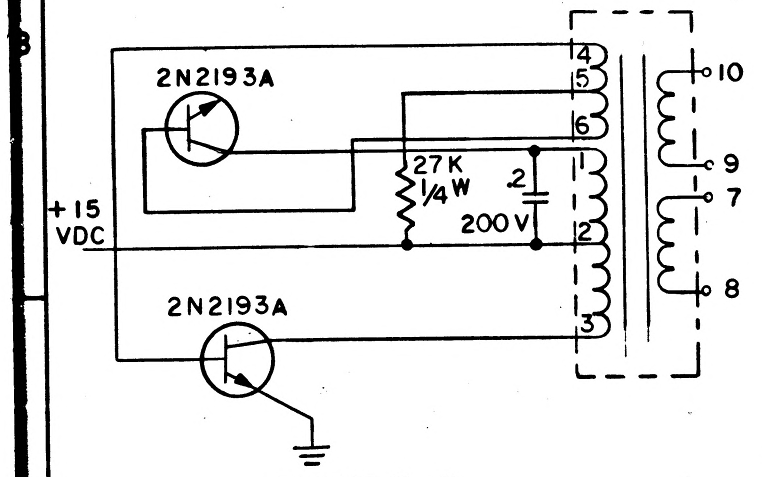


FIGURE 3

FREQUENCY TEST CIRCUIT

MASTER

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MIT
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CAMBRIDGE, MASS.

DRAWN CJ Papia 28 Dec 64
CHECKED A. Marts 12-28-64
APPROVED M. Gouston
APPROVED D.a Koso 12-28-64
APPROVED MIT W. Cupler 29 Dec 64
APPROVED MSC W J Rhine 12-29-64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSFORMER, POWER, STEPUP

SPECIFICATION CONTROL DWG

CODE IDENT NO. —
SIZE C
DRAWING NO. 1012149
SCALE NONE
SHEET 3 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 15187			12-29-64	WK

REQUIREMENTS

1. GENERAL

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. UNITS SHALL BE CAPABLE OF MEETING THE REQUIREMENTS OF MIL-T-27 WITH THE ADDITIONS AND EXCEPTIONS SPECIFIED HEREIN.

C. SUPPLIES SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

D. UNITS SHALL MEET THE QUALIFICATION REQUIREMENTS OF ND 1002047.

E. UNITS SHALL BE PACKAGED IN SUCH A MANNER AS TO INSURE THE FOLLOWING,

(1). EACH INDIVIDUAL PART SHALL BE SEPARATED FROM ALL OTHERS AND PACKED SECURELY TO PREVENT CONTACT DURING TRANSIT.

(2). LEADS SHALL BE SECURED AGAINST WHIPPING OR VIBRATION DURING TRANSIT.

2. INSPECTION & ACCEPTANCE

A. MECHANICAL, REQUIREMENTS

(1) LEAD MATERIAL SHALL BE PER ND 1015400. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

(2) MARKING: UNITS SHALL BE PERMANENTLY AND LEGIBLY MARKED PER REQUIREMENTS OF MIL-T-27 AND ND 1002019.

(3) DIMENSIONS AND LEAD CONFIGURATION PER FIG. 1.

B. ELECTRICAL REQUIREMENTS.

(1) UNITS SHALL MEET ALL REQUIREMENTS OF TABLE 1

3. DESIGN REQUIREMENTS

A. UNITS SHALL MEET ALL REQUIREMENTS OF MIL-T-27 WITH THE FOLLOWING CLARIFICATIONS,

GRADE——————3
CLASS——————S
LIFE EXPECTANCY——X,AT AN AMBIENT TEMPERATURE OF 71°C.

B. IMPREGNATION, UNITS SHALL BE VACUUM IMPREGNATED TO CONFORM TO GRADE 3 REQUIREMENTS OF MIL-T-27.

4. SPECIAL CONDITIONING

TRANSFORMER SHALL BE TEMPERATURE CYCLED FOR 5 CYCLES PER MIL-STD-202, METHOD 102A EXCEPT THAT THE TEMPERATURES SHALL BE -55°C, +25°C AND 105°C AND EXPOSURE TIME SHALL BE 15 MINUTES AT EACH TEMPERATURE. DURING THE LAST CYCLE, THE UNIT SHALL BE TESTED FOR CONTINUITY AT EACH OF THE AMBIENT CONDITIONS. AFTER STABILIZATION AT ROOM TEMPERATURE, UNIT SHALL PASS NORMAL INSPECTION TESTS.

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
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TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN	E Tapia	24 Dec 64
CHECKED	A. Marto	12-28-64
APPROVED	M Gortan	
APPROVED	DaKoso	12-28-64
APPROVED MIT	W Kupfer	29 Dec 64
APPROVED MSC	W J Rhine	12-28-64
		DATE

TRANSFORMER, POWER, STEPUP
SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	DRAWING NO.
—	C	1012149
SCALE NONE		SHEET 1 OF 3

MASTER

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
–		INITIAL RELEASE CLASS A PER TDRR 15187			12-29-64	WK

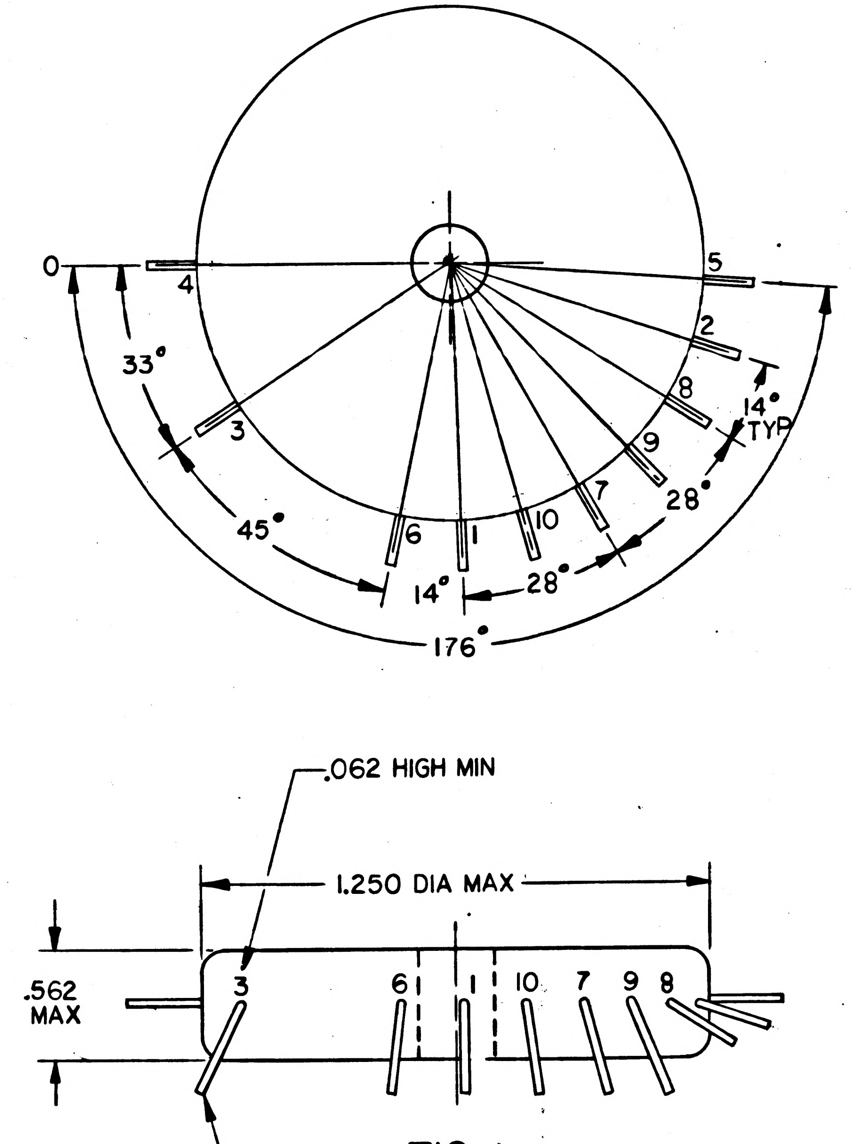


FIG. 1

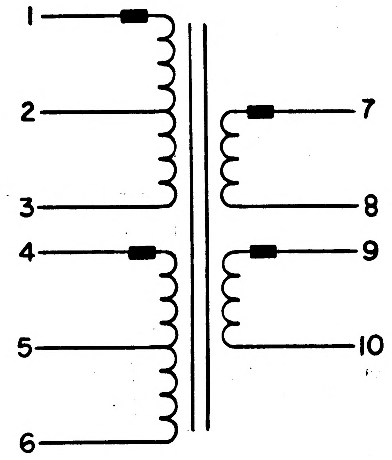


FIG. 2

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± 2°
DO NOT SCALE THIS DRAWING
MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN 22 Dec 64
CHECKED 12-28-64
APPROVED
APPROVED 12-28-64
APPROVED MIT 29 Dec 64
APPROVED MSC 12-29-64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSFORMER, POWER, STEPUP

SPECIFICATION CONTROL DWG

CODE IDENT NO. —
SIZE C
DRAWING NO. 1012149
SCALE NONE
SHEET 2 OF 3

MASTER

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 15187			12-29-64	WK

TABLE 1

INSPECTION & ACCEPTANCE

PARAMETER	CONDITIONS	SPECIFICATION UNITS MIN	MAX	UNITS
POLARITY	TERMINALS 1,4,7 AND 9 SHALL HAVE SAME INSTANTANEOUS POLARITY			
INSULATION RESISTANCE	PER MIL-STD-202-METHOD 302 PER CONDITION B	10K		MEGOHMS
DIELECTRIC STRENGTH	PER MIL-STD-202-METHOD 301 CHECK 1-4,4-7 & 7-1 @	100		VOLTS
	CHECK 1-9,4-9 & 7-9 @	500		
D.C. RESISTANCE	PER MIL-STD-202, METHOD 303 1-2 = 18.25 OHMS 1-3 = 36.50 OHMS 4-5 = 4.30 OHMS 4-6 = 8.60 OHMS 7-8 = 150.0 OHMS 9-10= 750.0 OHMS	-20	+20	%
NO LOAD VOLTAGE	APPLY 8 VOLTS RMS @ 1 K.C. BETWEEN TERM 1&3. READ AS FOLLOWS BETWEEN 1&2 = 4 VOLTS 4&5 = 0.8 VOLTS 4&6 = 1.6 VOLTS 7&8 = 27.0 VOLTS 9&10= 135.0 VOLTS	-5	+5	%
INDUCED VOLTAGE	PER MIL-T-27, APPLY 16 VOLTS RMS @ 2 K.C. TO TERMINALS 1&3. SECONDARIES OPEN.			

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

		DATE
DRAWN	CJ Papia	28Dec64
CHECKED	A. Marts	12-28-64
APPROVED	M. Gorton	
APPROVED	Da Koso	12-28-64
APPROVED MIT	W Kupfer	29Dec64
APPROVED MSC	WJ Rhine	12-29-64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSFORMER,
POWER, STEPUP
SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	DRAWING NO.
—	C	1012149

SCALE NONE
SHEET 3 OF 3

MASTER

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS					
SYM	DESCRIPTION	DR	CHK	DATE	APPROVED
—	INITIAL RELEASE CLASS A PER TDRR 10880			6 July 64	WK

REQUIREMENTS:

1. GENERAL

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED IN MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND1015404 CLASS 3.

C. EACH UNIT AND SHIPPING CONTAINER SHALL BE PERMANENTLY AND LEGIBLY MARKED PER ND1002019 WITH THE MANUFACTURER'S NAME AND SYMBOL, ITEM NAME NASA DRAWING NO., REVISION LETTER, NET CONTENTS AND DATE OF MFG.

2. ACCEPTANCE AND INSPECTION

A. CONDUCTOR: DUMET PER ND1015401, .025 ± .001 DIA

B. INSULATION: .020 WALL THICKNESS REF, OVERALL DIAMETER .068 MAX

C. DIELECTRIC STRENGTH: 12 KV MIN WHEN TESTED PER ASTM 149-59 (SHORT TIME TEST)

D. INSULATION RESISTANCE: 5 MEGOHMS PER FOOT MIN WHEN TESTED PER MIL-C-915 CONDITIONS D-4/25 ±5

3. DESIGN:

A. WORKING VOLTAGE RATING: 4KV RMS. AT SEA LEVEL

B. MAX OPERATING TEMP: 200°C

C. INSULATION: MODIFIED POLYTETRAFLOROETHYLENE (PTFE) WRAPPED, IRONED AND SINTERED TO PRODUCE A HOMOGENEOUS COVERING. COLOR WHITE

Colo

D. DIELECTRIC CONSTANT: 2.2 MAX, WHEN TESTED PER FED-STD-406 METHOD 4021 @60CPS AND 77°F

E. CONCENTRICITY: THE MINIMUM THICKNESS OF THE INSULATION SHALL BE NOT LESS THAN 41% OF THE DIFFERENCE BETWEEN THE MEASURED DIAMETER OVER THE INSULATION AND THE MEASURED DIAMETER OVER THE CONDUCTOR OR NOT LESS THAN 80% OF THE MAXIMUM THICKNESS AT THAT CROSS SECTION.

F. INSULATION PULL OFF FORCE: 8 OZ. MIN

(1) TEST METHOD: A SIX(6) INCH LENGTH OF WIRE SHALL BE STRIPPED 1-1/2 INCHES ON EACH END. ONE END OF THE WIRE SHALL BE PASSED THROUGH A .015 DIA HOLE IN A METAL PLATE. THE END OF THE WIRE WHICH PASSES THROUGH THE PLATE SHALL THEN BE PULLED IN SUCH A MANNER AS TO MEASURE THE FORCE REQUIRED TO PULL THE WIRE THROUGH THE INSULATION.

G. THE INSULATION SHALL NOT SUPPORT COMBUSTION.

H. INSULATION CUT THROUGH: SPECIMENS OF THE WIRE SHALL RESIST THE PENETRATION OF THE UNDERWRITERS LABORATORY STANDARD PENETRATION APPARATUS USING A METAL BLADE WITH A 90° AND .005 (±.0002) INCH RADIUS EDGE AT THE POINT OF CONTACT. THE BLADE SHALL BE LOADED WITH 400 GRAMS AND SHALL BE APPLIED TO THE INSULATED WIRE FOR A PERIOD OF 24 HOURS WHILE MAINTAINED AT A TEMPERATURE OF 50°C. DURING THIS PERIOD A POTENTIAL OF 500 VOLTS RMS SHALL BE APPLIED BETWEEN THE BLADE AND THE CONDUCTOR. NO CONTINUITY SHALL OCCUR.

J. STRAIGHTNESS: THE WIRE SHALL UNCOIL FREELY WITHOUT EXHIBITING A SET. A 30 INCH PIECE OF WIRE CUT FROM A SPOOL OR BARREL SHALL NOT RECOIL ITSELF INTO A 10 INCH CIRCLE.

K. WORKMANSHIP: THE INSULATORS SHALL BE UNIFORM THROUGHOUT AND FREE FROM ANY DEFECTS SUCH AS INCLUSIONS, RADIAL CRACKS, PINHOLES, DISCOLORATION OR DEFECTS WHICH MAY AFFECT ITS SERVICEABILITY OR REQUIRE SPECIAL HANDLING.

L. SPLICES: THE WIRE SHALL BE STRIPPED 2 INCHES AND TIED IN A KNOT ON EITHER SIDE OF ANY SPLICE. THE MINIMUM CONTINUOUS LENGTH WITHOUT A SPLICE SHALL BE 50 FEET.

PROCURE ONLY FROM APPROVED SOURCES LISTED IN [illegible] FOR THIS DRAWING.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN	E. Wapia	10 June 64
CHECKED	A. Marts	6-22-64
APPROVED	S.C. Smith	7-7-64
APPROVED		
APPROVED MIT	W Kupfer	8 July 64
APPROVED MSC		7/8/64
		DATE

WIRE, ELECTRICAL H.V.
(PTFE INSULATION, DUMET COND)
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
—	C	1012150

SCALE —— SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14037

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
④ -		INITIAL RELEASE CLASS A PER TDRR 14037			7/7/65	WK
A		REVISED PER TDRR 20463			7/7/65	WK

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKING AND SHIPPING IN ACCORDANCE WITH ND 1002215, CLASS I.
   - D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052.
   - E. UNITS SHALL BE CAPABLE OF MEETING APPLICABLE REQUIREMENTS OF MIL-C-26482.
2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS
     1. ITEMS SHALL BE MARKED WITH NASA DRAWING NUMBER, LATEST REVISION LETTER, DASH NUMBER DATE CODE OR DATE OF MANUFACTURE & MANUFACTURER'S IDENTIFICATION PER ND 1002019.
     2. MECHANICAL DIMENSIONS AS SHOWN.
     3. CONTACTS: SIZE 22 PINS, .0300 ± .0015
     4. ALL PIN LOCATIONS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.
     5. ENGAGEMENT: PUSH-PULL, QUICK DISCONNECT.
     6. THIS PART SHALL MATE WITH A MATING PART (REF) NASA DRAWING 1010771.
   - B. ELECTRICAL REQUIREMENTS
     1. INSULATION RESISTANCE: 5000 MEGOHMS PER MIL-C-26482
     2. DIELECTRIC WITHSTANDING VOLTAGE:
        SEA LEVEL: 1500 V RMS, 60 CPS, PER MIL-C-26482, WHEN MATED WITH MATING PARTS.
3. DESIGN REQUIREMENTS
   - A. MOUNTING: PANEL, SOLDER MOUNT (HERMETIC SEAL).
   - B. DIELECTRIC WITHSTANDING VOLTAGE:
     70,000 FEET: 375 V RMS, 60 CPS PER MIL-C-26482, WHEN MATED WITH MATING PARTS.
   - C. CONTACTS:
     1. CURRENT RATING: 3 AMP.
     2. MATERIAL: NICKEL IRON ALLOY (51% NICKEL, BALANCE IRON)
     3. FINISH: GOLD PLATE PER MIL-G-45204, TYPE II, .000100/.000200 THICK OVER COPPER PLATE PER MIL-C-14550, CLASS 3
     4. CONTACT RESISTANCE: 5 OHM MAX RESISTANCE AT 5 MICROAMPERES WHEN MATED WITH MATING PARTS. .5 OHM MAX RESISTANCE AT 3 AMPERES WHEN MATED WITH MATING PARTS.
   - D. SHELL:
     1. MATERIAL: MILD COLD ROLLED STEEL.
     2. FINISH: GOLD PLATE PER MIL-G-45204, TYPE II - .000100/.000200 OVER COPPER PLATE PER MIL-C-14550, CLASS 3.
   - E. INSULATION: VITREOUS MATERIAL SHALL BE FUSED TO PINS AND SHELL SO AS TO PREVENT A LEAK RATE IN EXCESS OF 0.1 MICRON CUBIC FOOT PER HOUR WHEN SUBJECTED TO A PRESSURE DIFFERENTIAL OF 1 ATMOSPHERE ACROSS THE CONNECTOR IN ACCORDANCE WITH MIL-C-26482.
   - F. MAX ENGAGEMENT FORCE (WITH CONTACTS) PER TABLE I.
   - G. MIN ENGAGEMENT FORCE (WITH CONTACTS) PER TABLE I.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

MASTER

NEXT ASSY	USED ON
APPLICATION	

KIC NO 68013094201 THRU 4204

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ±.016 ANGLES ± ~
DO NOT SCALE THIS DRAWING

MATERIAL SEE ABOVE

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN M MENZORIO 8/25/64
CHECKED J.E.Kelly 8-25-64
APPROVED
APPROVED E. Thomp 11/9/64
APPROVED MIT W Kupfer 4 Norris
APPROVED MSC W J Rhine 11-4-64 DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

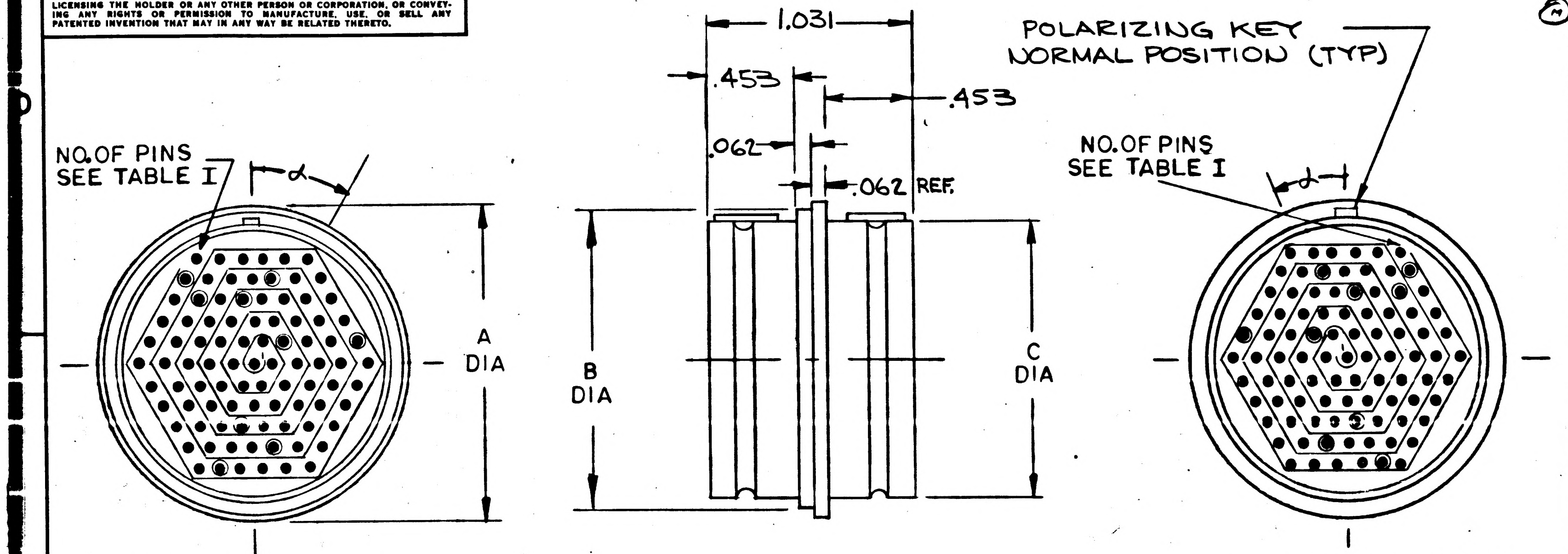
CONNECTOR, ELECTRICAL,
RECEPTACLE
H.S. THROUGH BULKHEAD)
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
DRAWING NO. 1012151
SCALE ~
SHEET 1 OF 2

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14037

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
-		INITIAL RELEASE CLASS A PER TDRR 14037			7/7/65	WR
A		REVISED PER TDRR 20463			7/7/65	WR



NORMAL PIN VIEW
(FOR REF ONLY)

REVERSE PIN VIEW
(FOR REF ONLY)

TABLE I

DASH NO.	NO. OF CONTACTS (PINS)	α DEGREES	DIMENSIONS A	DIMENSIONS B	DIMENSIONS C	MAX ENGAGEMENT LBS	MIN DIS-ENGAGEMENT LBS
001 002 003 004	91	0 225 150 75	1.250	1.125	1.000	40	3.75
005 006 007 008	61	0 225 150 75	1.062	.938	.844	35	3.75
009 010 011 012	37	0 225 150 75	.938	.813	.703	25	3.75
013 014 015 016	19	0 225 150 75	.797	.672	.578	20	3.75

KIC NO 68013094201 THRU 4204

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ±.016 ANGLES ± ~
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN H. Menzoeio 8/25/64
CHECKED J.E.Kelly 8-25-64
APPROVED
APPROVED E. Thomp 11/4/64
APPROVED MIT W Kupfer 4Nov64
APPROVED MSC W J Rhine 11-4-64 DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CONNECTOR, ELECTRICAL, RECEPTACLE
(H.S. THROUGH BULKHEAD)
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
DRAWING NO. 1012151
SCALE ~
SHEET 2 OF 2

MASTER

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14037

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
-		INITIAL RELEASE CLASS A PER TDRR 14037				

REQUIREMENTS

1. GENERAL
    - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
    - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
    - C. PACKING AND SHIPPING IN ACCORDANCE WITH ND 1002215, CLASS 1.
    - D. PARTS SHALL BE CAPABLE OF MEETING QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052.
    - E. UNITS SHALL BE CAPABLE OF MEETING APPLICABLE REQUIREMENTS OF MIL-C-26482.
2. INSPECTION AND ACCEPTANCE
    - A. MECHANICAL REQUIREMENTS
        1. ITEMS SHALL BE MARKED WITH NASA DRAWING NUMBER, LATEST REVISION LETTER, DASH NUMBER AND MANUFACTURER'S IDENTIFICATION PER ND 1002019.
        2. MECHANICAL DIMENSIONS AS SHOWN.
        3. CONTACTS: SIZE 22 PINS, .030 DIA (REF.)
        4. ALL PIN LOCATIONS SHALL BE IDENTIFIED ON BOTH SIDES OF BODY.
        5. ENGAGEMENT: PUSH-PULL, QUICK DISCONNECT.
        6. THIS PART SHALL MATE WITH A MATING PART (REF) NASA DRAWING 1010771.
    - B. ELECTRICAL REQUIREMENTS
        1. INSULATION RESISTANCE: 5000 MEGOHMS PER MIL-C-26482
        2. DIELECTRIC WITHSTANDING VOLTAGE:
           SEA LEVEL: 1500 V RMS, 60 CPS, PER MIL-C-26482, WHEN MATED WITH MATING PARTS.
3. DESIGN REQUIREMENTS
    - A. MOUNTING: PANEL, SOLDER MOUNT (HERMETIC SEAL).
    - B. DIELECTRIC WITHSTANDING VOLTAGE:
      70,000 FEET: 375 V RMS, 60 CPS
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        3. FINISH: GOLD PLATE PER MIL-G-45204, TYPE II, .000100/.000200 THICK OVER COPPER PLATE PER MIL-C-14550, CLASS 3
        4. CONTACT RESISTANCE: 5 OHM MAX RESISTANCE AT 5 MICROAMPERES WHEN MATED WITH MATING PARTS. .5 OHM MAX RESISTANCE AT 3 AMPERES WHEN MATED WITH MATING PARTS.
    - D. SHELL:
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    - F. MAX ENGAGEMENT FORCE (WITH CONTACTS) PER TABLE I.
    - G. MIN ENGAGEMENT FORCE (WITH CONTACTS) PER TABLE I.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

MASTER

NEXT ASSY	USED ON
APPLICATION	

KIC NO 68013094201 THRU 4204

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
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CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
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FRACTIONS ± ~ DECIMALS ±.016 ANGLES ± ~
DO NOT SCALE THIS DRAWING

MATERIAL
SEE ABOVE

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN M MENZORIO 8/25/64
CHECKED J.E.Kelly 8-25-64
APPROVED
APPROVED E. Thomp 11/4/64
APPROVED MIT W Gaffer 4 NorRA
APPROVED MSC W J Rhine 11-4-64 DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CONNECTOR, ELECTRICAL,
RECEPTACLE
H.S. THROUGH BULKHEAD)
SPECIFICATION CONTROL DWG

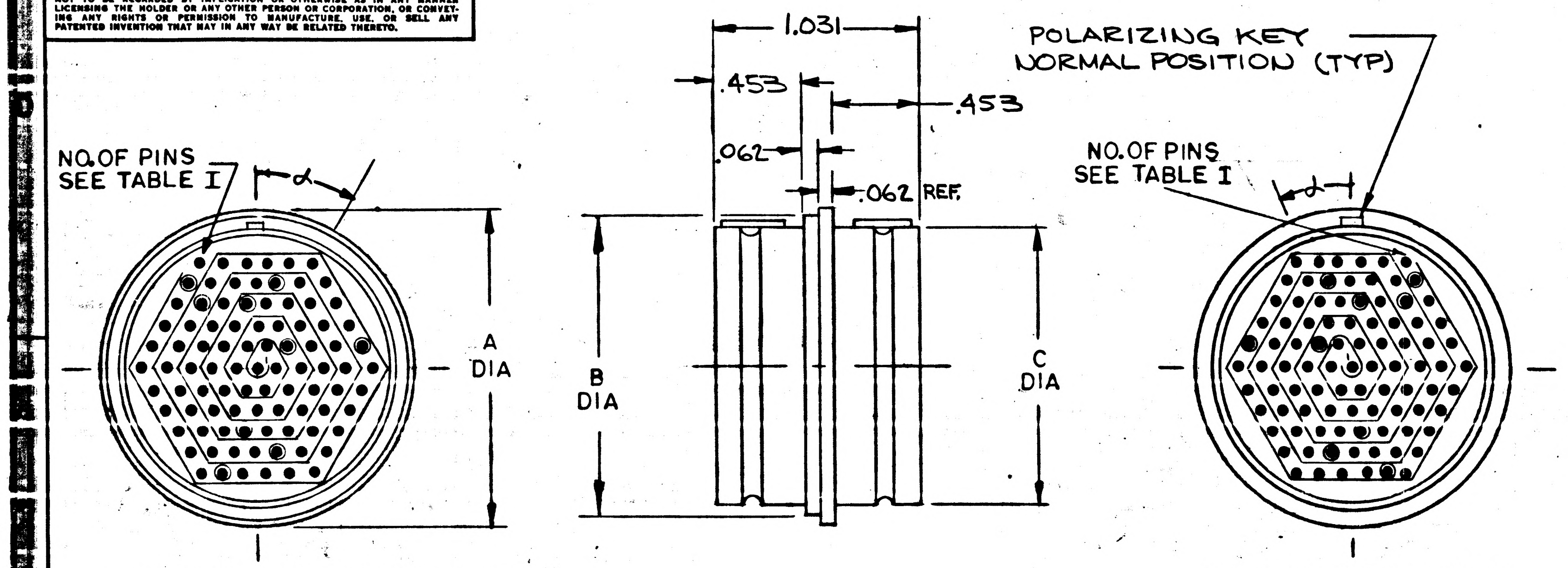
CODE IDENT NO.
SIZE C
DRAWING NO. 1012151
SCALE ~
SHEET 1 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14037

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
-		INITIAL RELEASE CLASS A PER TDRR 14037				



NORMAL PIN VIEW
(FOR REF ONLY)

REVERSE PIN VIEW
(FOR REF ONLY)

TABLE I

DASH NO.	NO. OF CONTACTS (PINS)	α DEGREES	DIMENSIONS A	DIMENSIONS B	DIMENSIONS C	MAX ENGAGEMENT LBS	MIN DIS-ENGAGEMENT LBS
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009 010 011 012	37	0 225 150 75	.938	.813	.703	25	3.75
013 014 015 016	19	0 225 150 75	.797	.672	.578	20	3.75

MASTER

KIC NO 68013094201 THRU 4204

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± ~ DECIMALS ±.016 ANGLES ± ~
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN H. Menzoeio 8/25/64
CHECKED J.E.Kelly 8-25-64
APPROVED
APPROVED E. Thomp 11/4/64
APPROVED MIT W Kupfer 4 Nov 64
APPROVED MSC W J Rhine 11-4-64 DATE

CONNECTOR, ELECTRICAL, RECEPTACLE
(H.S. THROUGH BULKHEAD)
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE C
DRAWING NO. 1012151
SCALE ~
SHEET 2 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE UNIT

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

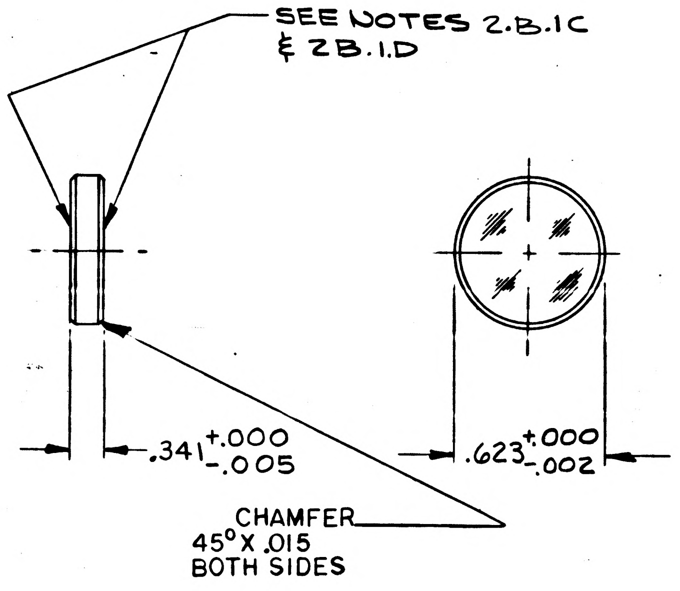
REVISIONS 15265						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
–		INITIAL RELEASE CLASS A PER TDRR 15265			1-5-65	WK

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-10327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PREPARATION FOR DELIVERY PER ND 1002215, CLASS I.

2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL
     1. DIMENSIONS AS SHOWN.
     2. EDGES FINE GROUND.
     3. IDENTIFY USING NASA DRAWING NUMBER, REVISION LETTER AND MANUFACTURER'S SYMBOL PER ND 1002019.
   - B. OPTICAL
     1. PART SHALL CONFORM TO REQUIREMENTS OF MIL-O-13830.
        - A. SURFACE QUALITY: 40-20
        - B. CLEAR APERTURE: ENTER -.566 EXIT -.566
        - C. BOTH SIDES POLISHED FLAT WITHIN 1/4 λ AT 5461Å
        - D. BOTH SIDES PARALLEL WITHIN 0°0'30".
        - E. CENTER FREQUENCY: 3500Å ± 25Å
        - F. EFFECTIVE BANDWIDTH: 200Å ± 5%
        - G. PEAK TRANSMISSION: GREATER THAN 40%
        - H. PASS BAND WALL SLOPE: $\frac{\text{10\% TRANS.PT.}}{\text{50\% TRANS.PT.}}$: .98 TO 1.02
        - I. TRANSMISSION AT ANY WAVELENGTH OUTSIDE PASS BAND (FROM 3000Å TO 10,000Å): LESS THAN .1%.

3. DESIGN REQUIREMENT
   - A. NO DIMMING OF MATERIALS SHALL BE EXPERIENCED AFTER EXPOSURE TO 100% RELATIVE HUMIDITY AT 20°C FOR 50 HOURS.
   - B. NO PHYSICAL OR OPTICAL DEGRADATION SHALL BE EXPERIENCED AFTER EXPOSURE TO A VACUUM OF 10^{-6} MM HG FOR 50 HOURS
   - C. NO DEGRADATION IN OPTICAL TRANSMISSION PROPERTIES SHALL BE EXPERIENCED AFTER EXPOSURE TO AN INTEGRATED DOSE OF 10^6 RADS IONIZING RADIATION.
   - D. NO DEGRADATION IN OPTICAL TRANSMISSION PROPERTIES SHALL BE EXPERIENCED AFTER EXPOSURE TO SOLAR RADIATION OF ONE (1) SUN FOR 30 HOURS.
   - E. OPERATING TEMPERATURE: 0°F TO 200°F



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

SUPPLIER: THIN FILM PRODUCTS, INC
169 BRIDGE ST
CAMBRIDGE, MASS.

PART NO. : UV-3500-200

MASTER

NEXT ASSY	USED ON
APPLICATION	

K.I.C. NO. 68420001001

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
± –	±.005	± 1°

DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN M MENZORIO 10-5-64
CHECKED 10-5-64
APPROVED 1-12-64 1/4/65 1-4-65
APPROVED 1-4-65

NASA APPROVAL 1-5-65
MIT APPROVAL 5 Jan 65
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FILTER, LIGHT
SOURCE CONTROL DWG

CODE IDENT NO.
SIZE C
DRAWING NO. 1012153
SCALE ~
SHEET 1 OF 1

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1012154 A

SYM	DESCRIPTION	DR	CHK	DATE	APPROVED
	INITIAL RELEASE CLASS A PER TDRR 15035			12-23-64	WR
A	REVISED PER TDRR 15771			2-2-65	WR.

REVISIONS 15035

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS I.
   - C. PRESERVATION, PACKAGING, PACKING AND SHIPPING SHALL BE IN ACCORDANCE WITH ND 1002215.
2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS
     1. ITEMS SHALL BE MARKED WITH NASA DRAWING NUMBER, LATEST REVISION LETTER AND MANUFACTURER'S IDENTIFICATION IN ACCORDANCE WITH:

        UNITS – PER ND 1002019

        PACKAGE AND SHIPPING CONTAINER – PER MIL-STD 129
     2. DIMENSIONS AS SHOWN
     3. RESONANT FREQUENCY:

        FORK "A" – 356 CPS ± 1 CPS
        FORK "B" – 455 CPS ± 1 CPS
     4. MECHANICAL SWING, AS MEASURED AT APERTURE: .034 INCH MIN DOUBLE AMPLITUDE AT RATED DRIVE VOLTAGE
     5. INTERSECTION OF APERTURE PLATE SLOTS SHALL BE LOCATED ON APERTURE HOLE CENTER WITHIN .010 DIA CIRCLE
     6. LEADS: E-32 PER MIL-W-16878
     7. SOLDERING SHALL BE IN ACCORDANCE WITH ND 1002071
   - B. ELECTRICAL REQUIREMENTS
     1. COIL RESISTANCE
        - A. DRIVE COILS: 2155 OHMS ± 42 OHMS
        - B. PICK-UP COILS: 965 OHMS ± 20 OHMS
     2. OUTPUT, PICK-UP COILS: 195 MV ± 25 MV RMS IN PHASE WITH DRIVING VOLTAGE AT .034 INCH DOUBLE AMPLITUDE AT RESONANT FREQUENCY
     3. DIELECTRIC WITHSTANDING VOLTAGE: 500 VOLTS RMS COIL TO COIL AND COIL TO FRAME PER MIL-STD-202, METHOD 301
     4. INSULATION RESISTANCE: 10 MEGOHMS MIN AT 100 VOLTS MIN COIL TO COIL AND COIL TO GROUND PER MIL-STD-202, METHOD 302
3. DESIGN REQUIREMENTS
   - A. INPUT VOLTAGE, DRIVE COIL: 3.2 ± .2 VOLTS RMS @ 356 CPS ±1 CPS DRIVE COIL "A", 3.2 ± .2V RMS @ 455 CPS ±1CPS DRIVE COIL "B"
   - B. BALANCE: THE FORKS SHALL BE BALANCED FOR A MINIMUM OF RESIDUAL MOMENTUM. THE MANUFACTURER SHALL PRESENT A PROCEDURE FOR BALANCING AND MEASURING THE RESIDUAL MOMENTUM OF THE FORKS TO THE CUSTOMER FOR APPROVAL PRIOR TO IMPLEMENTATION. BALANCE SHALL BE OBTAINED BY REMOVAL OF EXCESS MATERIAL. NO MATERIAL SHALL BE ADDED TO OBTAIN BALANCE WHICH WOULD PROTRUDE ABOVE SURFACE OF BALANCE WEIGHT.
   - C. APERTURE PLATES SHALL BE PERMANENTLY BONDED TO FORK TINE WEIGHT.
   - D. MATERIALS
     1. HOUSING – BERYLLIUM PER ND 1002125 – HEAT TREAT (STABILIZE & STRESS RELIEVE) PER ND1002114
     2. COIL CLAMPS – CRES IN ACCORDANCE WITH QQ-S-763, CLASS 416, COND.A.
     3. COIL CLAMP SCREWS – CRES, TO MEET THE REQUIREMENTS SPECIFIED IN NASA DRAWING 1011625.
     4. APERTURE PLATES – BERYLLIUM COPPER IN ACCORDANCE WITH QQ-C-533, HALF HARD
   - E. ENVIRONMENTAL REQUIREMENTS –

     THE UNIT SHALL BE CAPABLE OF MEETING ALL REQUIREMENTS BEFORE, DURING (EXCEPT NON-OPERATING), AND AFTER THE FOLLOWING EXPOSURES:

1. HIGH TEMPERATURE (OPERATING):	210°F ± 5°F
2. LOW TEMPERATURE (OPERATING):	0°F ± 5°F
3. VIBRATION, RANDOM (NON-OPERATING): (3 ORTHOGONAL MOUNT AXES)	10 TO 2000 CPS AT 0.1 g^2/CPS 15 MINUTES/AXIS
4. VIBRATION, SINUSOIDAL (OPERATING): (3 ORTHOGONAL MOUNT AXES)	10 TO 2000 CPS AT 1g 15 MINUTES/AXIS W/LOG SWEEP
5. SHOCK (NON-OPERATING):	30g PEAK 6 ± 1 MILLISECOND RISE TIME 1 ± 1 MILLISECOND DECAY TIME
6. HUMIDITY (NON-OPERATING):	MIL-STD 810, METHOD 507. EXCEPT UNIT WILL UNDERGO 5 CYCLES IN LIEU OF 10 CYCLES SPECIFIED THEREIN.

4. SPECIAL CONDITIONING (100% BY MANUFACTURER) – UNIT SHALL BE OPERATED DURING TEMPERATURE CYCLING FOR 5 CONSECUTIVE CYCLES. EACH CYCLE IS AS FOLLOWS:

   2-1/2 HOURS AT 210°F ± 5°F

   2-1/2 HOURS AT ROOM TEMPERATURE (77°F REF.)

   2-1/2 HOURS AT 0°F ± 5°F

   2-1/2 HOURS AT ROOM TEMPERATURE (77°F REF.)

THE MANUFACTURER SHALL SUPPLY TO CUSTOMER INSPECTION AND ACCEPTANCE REQUIREMENT DATA BEFORE AND AFTER SPECIAL CONDITIONING. UNITS SHALL MEET STATED REQUIREMENTS BEFORE AND AFTER SPECIAL CONDITIONING

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING.

MASTER

KIC NO 68258000901

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ±.005 ANGLES ± 1°
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN	M Nenzobio	9/16/64
CHECKED		9-16-64
APPROVED		12-16-64
APPROVED		
APPROVED MIT	W. Cuyler	22 Dec 64
APPROVED MSC	W J Rhine	12-22-64
		DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESONATOR, TUNING FORKS
ASSY OF (TRACKER)
SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	DRAWING NO.
	D	1012154
SCALE		SHEET 1 OF 2

1012154 A

8 7 6 5 4 3 2 1

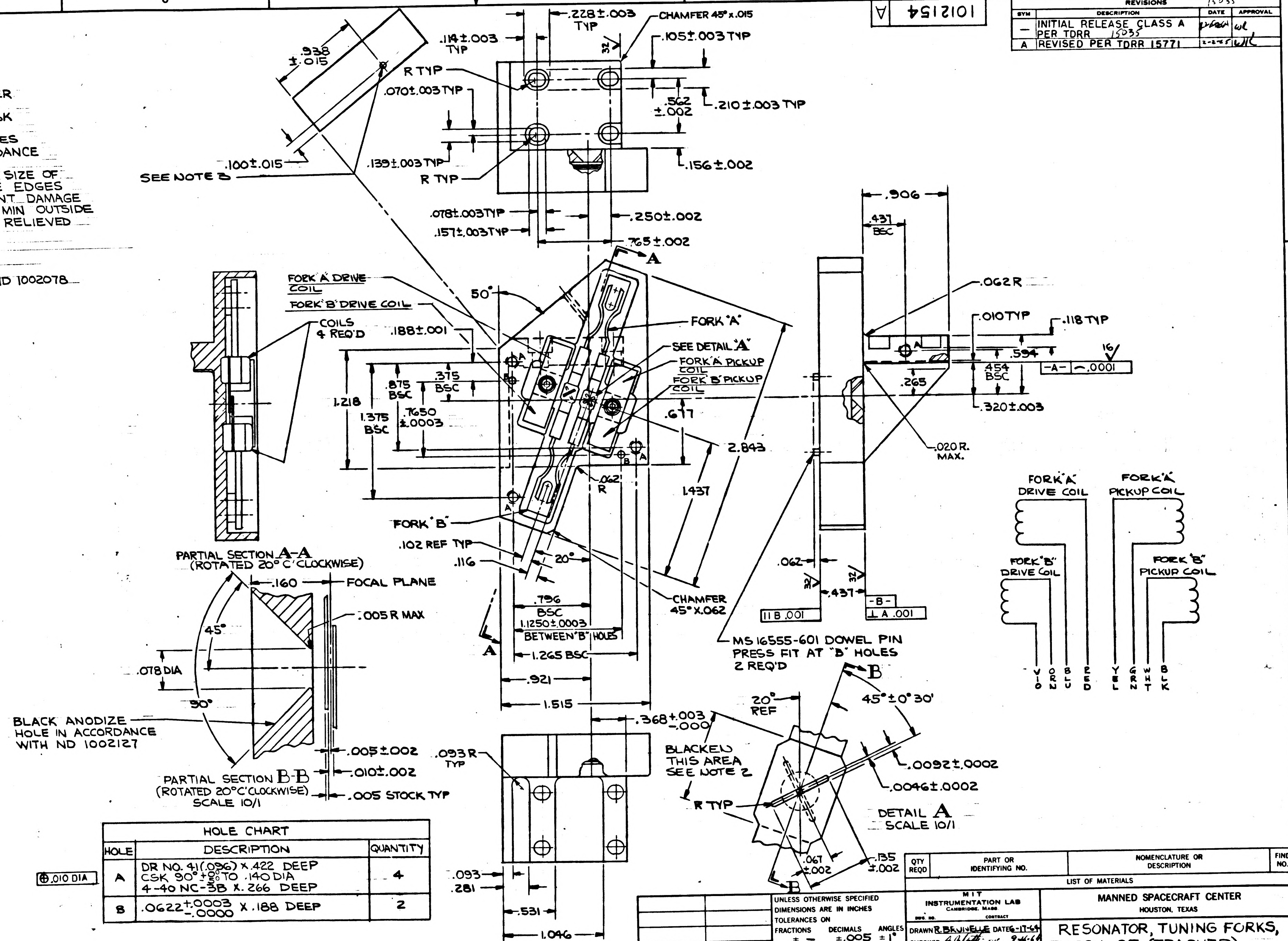
A	1012154

REVISIONS 15035			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 15035	12-6-64	wl
A	REVISED PER TDRR 15771	2-2-65	WK

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

NOTES:

1. HOUSING TO BE VAPOR BLASTED ALL OVER THEN BLACK ANODIZED IN ACCORDANCE WITH ND 1002127 (PERMISSIBLE TO MASK "B" HOLES IF NECESSARY)
2. BLACKEN AREA INDICATED ON BOTH SIDES OF FOUR APERTURE PLATES IN ACCORDANCE WITH MIL-F-495
3. DRILL HOLE THRU AT LOCATION SHOWN, SIZE OF HOLE TO ACCOMODATE COIL LEADS. HOLE EDGES TO HAVE SUFFICIENT RADIUS TO PREVENT DAMAGE TO LEADS. LEADS TO EXTEND 8 INCHES MIN OUTSIDE OF HOUSING AND ARE TO BE STRAINED RELIEVED AT EXIT HOLE.
4. UNLESS OTHERWISE SPECIFIED
   a) $\sqrt{}^{63}$ FINISH ALL OVER
   b) BREAK CORNERS IN ACCORDANCE WITH ND 1002078


.938 ±.015
.100±.015
SEE NOTE 3
.114±.003 TYP
.228±.003 TYP
CHAMFER 45° x .015
.105±.003 TYP
R TYP
.070±.003 TYP
.562 ±.002
.210±.003 TYP
.139±.003 TYP
R TYP
.156±.002
.078±.003 TYP
.157±.003 TYP
.250±.002
.765±.002
A
FORK A DRIVE COIL
FORK B DRIVE COIL
COILS 4 REQ'D
50°
.188±.001
FORK "A"
SEE DETAIL "A"
FORK A PICKUP COIL
FORK B PICKUP COIL
.875 BSC
.375 BSC
1.218
1.375 BSC
.7650 ±.0003
.677
2.843
1.437
.062 R
FORK "B"
.102 REF TYP
.116
20°
.796 BSC
1.1250±.0003 BETWEEN "B" HOLES
1.265 BSC
.921
1.515
CHAMFER 45° X .062
A
PARTIAL SECTION A-A (ROTATED 20° C' CLOCKWISE)
.160
FOCAL PLANE
.005 R MAX
45°
.078 DIA
30°
BLACK ANODIZE HOLE IN ACCORDANCE WITH ND 1002127
.005±.002
.010±.002
.005 STOCK TYP
PARTIAL SECTION B-B (ROTATED 20° C' CLOCKWISE) SCALE 10/1
.906
.437 BSC
.062 R
.010 TYP
.118 TYP
.594
.454 BSC
-A- ⏥ .0001
16
.265
.320±.003
.020 R. MAX.
.062
32
.437
-B-
⟂ A .001
// B .001
MS 16555-601 DOWEL PIN PRESS FIT AT "B" HOLES 2 REQ'D
.368 +.003 -.000
.093 R TYP
.093
.281
.531
1.046
20° REF
B
45°±0°30'
BLACKEN THIS AREA SEE NOTE 2
.0092±.0002
.0046±.0002
R TYP
DETAIL A SCALE 10/1
.067 ±.002
.135 ±.002
B
FORK "A" DRIVE COIL
FORK "A" PICKUP COIL
FORK "B" DRIVE COIL
FORK "B" PICKUP COIL
VIO
ORN
BLU
RED
YEL
GRN
WHT
BLK

HOLE CHART		
HOLE	DESCRIPTION	QUANTITY
A	DR NO. 41(.096) X .422 DEEP CSK 90° $^{+0°}_{-5°}$ TO .140 DIA 4-40 NC-3B X .266 DEEP	4
B	.0622 $^{+.0003}_{-.0000}$ X .188 DEEP	2

⊕ .010 DIA

MASTER

KIC 68258000901 NO

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

2011701	2011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ±1°
DO NOT SCALE THIS DRAWING
MATERIAL SEE REQUIREMENTS SHEET 2 OF 2
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN R. BRUNELLE DATE 6-17-64
CHECKED 9-16-64
APPROVAL 12-16-64
APPROVAL E. Phareys 12-21-64
NASA APPROVAL W. J. Rhine 12-22-64
MIT APPROVAL 12-22-64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESONATOR, TUNING FORKS, ASSY OF (TRACKER)
SPECIFICATION CONTROL DWG

CODE IDENT NO. SIZE D NASA DRAWING NO. 1012154
SCALE 2/1 WT SHEET 2 OF 2

8 7 6 5 4 3 2 1

1012154 A

SYM	DESCRIPTION	DR	CHK	DATE	APPROVED
	INITIAL RELEASE CLASS A PER TDRR 15035				WR
A	REVISED PER TDRR 15771			2-2-65	WR
B	REVISED PER TDRR 17496				WR

NOTICE WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS I.
   - C. PRESERVATION, PACKAGING, PACKING AND SHIPPING SHALL BE IN ACCORDANCE WITH ND 1002215.

2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS
     1. ITEMS SHALL BE MARKED WITH NASA DRAWING NUMBER, LATEST REVISION LETTER AND MANUFACTURER'S IDENTIFICATION IN ACCORDANCE WITH:

        UNITS - PER ND 1002019

        PACKAGE AND SHIPPING CONTAINER - PER MIL-STD 129
     2. DIMENSIONS AS SHOWN
     3. RESONANT FREQUENCY:

        FORK "A" - 356 CPS ± 1 CPS

        FORK "B" - 455 CPS ± 1 CPS
     4. MECHANICAL SWING, AS MEASURED AT APERTURE: .034 INCH MIN DOUBLE AMPLITUDE AT RATED DRIVE VOLTAGE
     5. INTERSECTION OF APERTURE PLATE SLOTS SHALL BE LOCATED ON APERTURE HOLE CENTER WITHIN .010 DIA CIRCLE
     6. LEADS: E-32 PER MIL-W-16878
     7. SOLDERING SHALL BE IN ACCORDANCE WITH ND 1002071
   - B. ELECTRICAL REQUIREMENTS
     1. COIL RESISTANCE
        - A. DRIVE COILS: 2155 OHMS ± 42 OHMS
        - B. PICK-UP COILS: 965 OHMS ± 20 OHMS
     2. OUTPUT, PICK-UP COILS: 195 MV ± 25 MV RMS IN PHASE WITH DRIVING VOLTAGE AT .034 INCH DOUBLE AMPLITUDE AT RESONANT FREQUENCY
     3. DIELECTRIC WITHSTANDING VOLTAGE: 500 VOLTS RMS COIL TO COIL AND COIL TO FRAME PER MIL-STD-202, METHOD 301
     4. INSULATION RESISTANCE: 10 MEGOHMS MIN AT 100 VOLTS MIN COIL TO COIL AND COIL TO GROUND PER MIL-STD-202, METHOD 302

3. DESIGN REQUIREMENTS
   - A. INPUT VOLTAGE, DRIVE COIL: 3.2 ± .2 VOLTS RMS @ 356 CPS ± 1 CPS DRIVE COIL "A", 3.2 ± .2 V RMS @ 455 CPS ± 1 CPS DRIVE COIL "B"
   - B. BALANCE: THE FORKS SHALL BE BALANCED FOR A MINIMUM OF RESIDUAL MOMENTUM. THE MANUFACTURER SHALL PRESENT A PROCEDURE FOR BALANCING AND MEASURING THE RESIDUAL MOMENTUM OF THE FORKS TO THE CUSTOMER FOR APPROVAL PRIOR TO IMPLEMENTATION. BALANCE SHALL BE OBTAINED BY REMOVAL OF EXCESS MATERIAL. NO MATERIAL SHALL BE ADDED TO OBTAIN BALANCE WHICH WOULD PROTRUDE ABOVE SURFACE OF BALANCE WEIGHT.
   - C. APERTURE PLATES SHALL BE PERMANENTLY BONDED TO FORK TINE WEIGHT.
   - D. MATERIALS
     1. HOUSING - BERYLLIUM PER ND 1002125 - HEAT TREAT (STABILIZE & STRESS RELIEVE) PER ND1002114
     2. COIL CLAMPS - ALUMINUM ALLOY IN ACCORDANCE WITH QQ-A-225/6 TEMPER T4. BLACK ANODIZE PER MIL-A-8625 TYPE II.
     3. COIL CLAMP SCREWS - CRES, TO MEET THE REQUIREMENTS SPECIFIED IN NASA DRAWING 1011625.
     4. APERTURE PLATES - BERYLLIUM COPPER IN ACCORDANCE WITH QQ-C-533, HALF HARD
   - E. ENVIRONMENTAL REQUIREMENTS -

     THE UNIT SHALL BE CAPABLE OF MEETING ALL REQUIREMENTS BEFORE, DURING (EXCEPT NON-OPERATING), AND AFTER THE FOLLOWING EXPOSURES:

1.	HIGH TEMPERATURE (OPERATING):	210°F ± 5°F
2.	LOW TEMPERATURE (OPERATING):	0°F ± 5°F
3.	VIBRATION, RANDOM (NON-OPERATING): (3 ORTHOGONAL MOUNT AXES)	10 TO 2000 CPS AT 0.1 g^2/CPS 15 MINUTES/AXIS
4.	VIBRATION, SINUSOIDAL (OPERATING): (3 ORTHOGONAL MOUNT AXES)	10 TO 2000 CPS AT 1g 15 MINUTES/AXIS W/LOG SWEEP
5.	SHOCK (NON-OPERATING):	30g PEAK 6 ± 1 MILLISECOND RISE TIME 1 ± 1 MILLISECOND DECAY TIME
6.	HUMIDITY (NON-OPERATING):	MIL-STD 810, METHOD 507. EXCEPT UNIT WILL UNDERGO 5 CYCLES IN LIEU OF 10 CYCLES SPECIFIED THEREIN.

4. SPECIAL CONDITIONING (100% BY MANUFACTURER) - UNIT SHALL BE OPERATED DURING TEMPERATURE CYCLING FOR 5 CONSECUTIVE CYCLES. EACH CYCLE IS AS FOLLOWS:

   2-1/2 HOURS AT 210°F ± 5°F

   2-1/2 HOURS AT ROOM TEMPERATURE (77°F REF.)

   2-1/2 HOURS AT 0°F ± 5°F

   2-1/2 HOURS AT ROOM TEMPERATURE (77°F REF.)

THE MANUFACTURER SHALL SUPPLY TO CUSTOMER INSPECTION AND ACCEPTANCE REQUIREMENT DATA BEFORE AND AFTER SPECIAL CONDITIONING. UNITS SHALL MEET STATED REQUIREMENTS BEFORE AND AFTER SPECIAL CONDITIONING

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

KIC NO 68258000901

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ±.005 ANGLES ± 1°
DO NOT SCALE THIS DRAWING

MATERIAL

NEXT ASSY	USED ON
APPLICATION	

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN H Nenzorio 9-1-64
CHECKED 9-16-64
APPROVED 12-16-64
APPROVED
APPROVED MIT 22 Dec 64
APPROVED MSC 12-22-64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESONATOR, TUNING FORKS
ASSY OF (TRACKER)
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE D
DRAWING NO. 1012154
SCALE
SHEET 1 OF 2

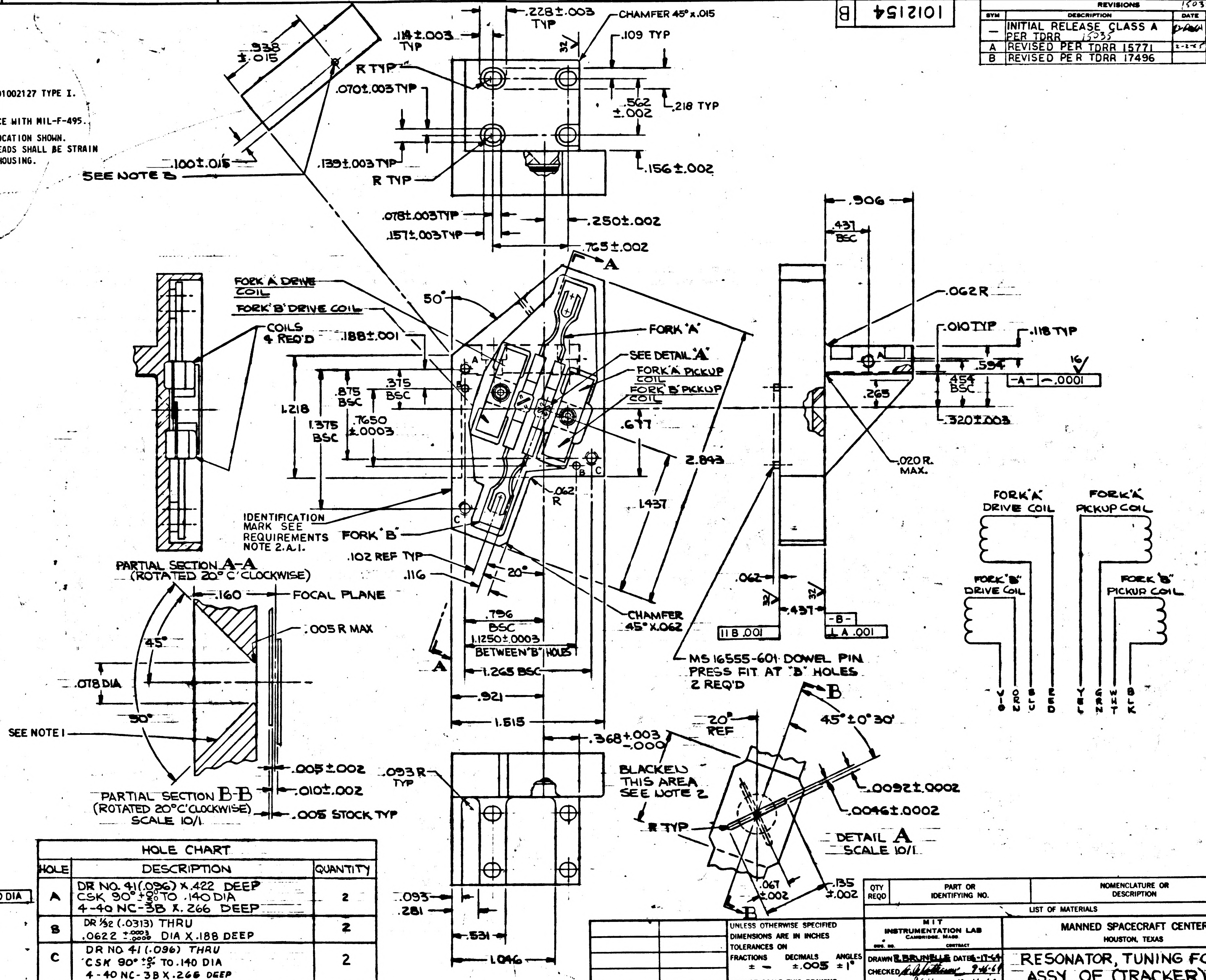
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1012154 B

SYM	DESCRIPTION	DATE	APPROVAL
REVISIONS 15035			
—	INITIAL RELEASE CLASS A PER TDRR 15035		wl
A	REVISED PER TDRR 15771	2-2-65	wl
B	REVISED PER TDRR 17496		wR

NOTES:

1. HOUSING AND HOLE INJECTION B-B TO BE BLACK ANODIZED IN ACCORDANCE WITH ND1002127 TYPE I. "A", "B" AND "C" HOLES SHALL NOT BE ANODIZED.
2. BLACKEN AREA INDICATED ON BOTH SIDES OF FOUR APERTURE PLATES IN ACCORDANCE WITH MIL-F-495.
3. HOLE WITH POLYTETRAFLOUROETHYLENE BUSHING TO ACCOMMODATE COIL LEADS AT LOCATION SHOWN. INSIDE EDGES OF BUSHING SHALL BE ROUNDED TO PREVENT CHAFING OF LEADS. LEADS SHALL BE STRAIN RELIEVED AT EXIT HOLE AND SHALL EXTEND A MINIMUM OF 8 INCHES OUTSIDE OF HOUSING.
4. UNLESS OTHERWISE SPECIFIED
   a. 63 FINISH ALL OVER
   b. BREAK CORNERS IN ACCORDANCE WITH ND1002078.


.938 ±.015
.100±.015
SEE NOTE 3
.114±.003 TYP
R TYP
.070±.003 TYP
.139±.003 TYP
R TYP
.228±.003 TYP
CHAMFER 45° x .015
.109 TYP
.562 ±.002
.218 TYP
.156±.002
.078±.003 TYP
.157±.003 TYP
.250±.002
.765±.002
A
.906
.437 BSC
.062 R
.010 TYP
.118 TYP
.594
.452 BSC
-A- ⌒ .0001
.265
.320±.003
.020 R. MAX.
FORK A DRIVE COIL
FORK B DRIVE COIL
COILS 4 REQ'D
.188±.001
50°
FORK 'A'
SEE DETAIL 'A'
FORK A PICKUP COIL
FORK B PICKUP COIL
.375 BSC
.875 BSC
1.218
1.375 BSC
.7650 ±.0003
.677
2.843
1.437
.062 R
IDENTIFICATION MARK SEE REQUIREMENTS NOTE 2.A.1.
FORK 'B'
.102 REF TYP
.116
20°
CHAMFER 45° X .062
.796 BSC
1.1250±.0003 BETWEEN "B" HOLES
1.265 BSC
.921
1.515
MS 16555-601 DOWEL PIN PRESS FIT AT "B" HOLES 2 REQ'D
.062
.437
-B-
⊥ A .001
// B .001
PARTIAL SECTION A-A (ROTATED 20° C'CLOCKWISE)
.160
FOCAL PLANE
45°
.005 R MAX
.078 DIA
90°
SEE NOTE 1
.005±.002
.010±.002
.005 STOCK TYP
PARTIAL SECTION B-B (ROTATED 20°C'CLOCKWISE) SCALE 10/1
.093 R TYP
.368+.003 -.000
.093
.281
.531
1.046
20° REF
45°±0°30'
BLACKEN THIS AREA SEE NOTE 2
R TYP
.0092±.0002
.0046±.0002
DETAIL A SCALE 10/1
.067 ±.002
.135 ±.002
B
FORK 'A' DRIVE COIL
FORK 'A' PICKUP COIL
FORK 'B' DRIVE COIL
FORK 'B' PICKUP COIL
VIO
ORN
BLU
RED
GRY
GRN
WHT
BLK
⊕ .010 DIA

HOLE CHART		
HOLE	DESCRIPTION	QUANTITY
A	DR NO. 41(.096) X .422 DEEP CSK 90° +0° -5° TO .140 DIA 4-40 NC-3B X .266 DEEP	2
B	DR 1/32 (.0313) THRU .0622 +.0003 -.0000 DIA X .188 DEEP	2
C	DR NO 41 (.096) THRU CSK 90° +0° -5° TO .140 DIA 4-40 NC-3B X .266 DEEP	2

MASTER

KIC 68258000901
NO

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
2011701	2011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ±1°
DO NOT SCALE THIS DRAWING
MATERIAL SEE REQUIREMENTS SHEET 1 OF 2
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN E. BRUNELLE DATE 6-17-64
CHECKED 9-16-64
APPROVAL 12-16-64
APPROVAL 12-21-64
NASA APPROVAL W. J. 12-22-64
MIT APPROVAL 12-22-64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESONATOR, TUNING FORKS,
ASSY OF (TRACKER)
SPECIFICATION CONTROL DWG

CODE IDENT NO. | SIZE D | NASA DRAWING NO. 1012154
SCALE 2/1 | WT | SHEET 2 OF 2

C 1012154

SYM	DESCRIPTION	DR	CHK	DATE	APPROVED
	INITIAL RELEASE CLASS A PER TDRR 15035			22 Dec 64	WR
A	REVISED PER TDRR 15771			2-2-65	WR
B	REVISED PER TDRR 17496				WR
C	REVISED PER TDRR 19617			6/15/65	WR.

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REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS I.
   - C. PRESERVATION, PACKAGING, PACKING AND SHIPPING SHALL BE IN ACCORDANCE WITH ND 1002215.

2. INSPECTION AND ACCEPTANCE AT ROOM TEMPERATURE, 70°F ± 5°F
   - A. MECHANICAL REQUIREMENTS
     1. ITEMS SHALL BE MARKED WITH NASA DRAWING NUMBER, LATEST REVISION LETTER AND MANUFACTURER'S IDENTIFICATION IN ACCORDANCE WITH:

        UNITS – PER ND 1002019
        PACKAGE AND SHIPPING CONTAINER – PER MIL-STD 129
     2. DIMENSIONS AS SHOWN
     3. RESONANT FREQUENCY:

        FORK "A" – 356 CPS ± 1 CPS
        FORK "B" – 455 CPS ± 1 CPS
     4. MECHANICAL SWING, AS MEASURED AT APERTURE: .034 INCH DOUBLE AMPLITUDE AT A DRIVE VOL. OF 6.5 VRMS MAX. WITHOUT MECHANICAL INTERFERENCE AT RESONANT FREQ. PER PARA 2.A.3 & A MIN. OF RESIDUAL MOMENTUM PER PARA 3.B.
     5. INTERSECTION OF APERTURE PLATE SLOTS SHALL BE LOCATED ON APERTURE HOLE CENTER WITHIN .010 DIA CIRCLE
     6. LEADS: E-32 PER MIL-W-16878
     7. SOLDERING SHALL BE IN ACCORDANCE WITH ND 1002071
   - B. ELECTRICAL REQUIREMENTS
     1. COIL RESISTANCE
        - A. DRIVE COILS: 2155 OHMS ± 42 OHMS
        - B. PICK-UP COILS: 965 OHMS ± 20 OHMS

        AT 70°F. A TEMPERATURE COEFFICENT FACTOR OF +.22 PERCENT PER DEGREE IS APPLICABLE
     2. OUTPUT, PICK-UP COILS: WITH AN INPUT OF 3.2±.2 VOLTS RMS TO DRIVE COIL THE DOUBLE AMPL. SHALL BE .021±.001 INCH AT RESONANT FREQ. PER PARA 2.A.3. WITH THIS INPUT VOL. & AMP. THE PICKUP COIL OUTPUT SHALL BE 100 MV±15 MV RMS.
     3. DIELECTRIC WITHSTANDING VOLTAGE: 500 VOLTS RMS COIL TO COIL & COIL TO FRAME PER MIL-STD-202, METHOD 301.
     4. INSULATION RESISTANCE: 10 MEGOHMS MIN AT 100 VOLTS MIN COIL TO COIL AND COIL TO GROUND PER MIL-STD-202, METHOD 302

3. DESIGN REQUIREMENTS
   - A. INPUT VOLTAGE, DRIVE COIL: 3.2 ± .2 VOLTS RMS @ 356 CPS ± 1 CPS DRIVE COIL "A", 3.2 ± .2 V RMS @ 455 CPS ± 1 CPS DRIVE COIL "B"
   - B. BALANCE: THE FORKS SHALL BE BALANCED FOR A MINIMUM OF RESIDUAL MOMENTUM. THE MANUFACTURER SHALL PRESENT A PROCEDURE FOR BALANCING AND MEASURING THE RESIDUAL MOMENTUM OF THE FORKS TO THE CUSTOMER FOR APPROVAL PRIOR TO IMPLEMENTATION. BALANCE SHALL BE OBTAINED BY REMOVAL OF EXCESS MATERIAL. NO MATERIAL SHALL BE ADDED TO OBTAIN BALANCE WHICH WOULD PROTRUDE ABOVE SURFACE OF BALANCE WEIGHT.
   - C. APERTURE PLATES SHALL BE PERMANENTLY BONDED TO FORK TINE WEIGHT.
   - D. MATERIALS
     1. HOUSING – BERYLLIUM PER ND 1002125 – HEAT TREAT (STABILIZE & STRESS RELIEVE) PER ND1002114
     2. COIL CLAMPS – ALUMINUM ALLOY IN ACCORDANCE WITH QQ-A-225/6 TEMPER T4. BLACK ANODIZE PER MIL-A-8625 TYPE II.
     3. COIL CLAMP SCREWS – CRES, TO MEET THE REQUIREMENTS SPECIFIED IN NASA DRAWING 1011625.
     4. APERTURE PLATES – BERYLLIUM COPPER IN ACCORDANCE WITH QQ-C-533, HALF HARD
   - E. ENVIRONMENTAL REQUIREMENTS –

     THE UNIT SHALL BE CAPABLE OF MEETING ALL REQUIREMENTS BEFORE, DURING (EXCEPT NON-OPERATING), AND AFTER THE FOLLOWING EXPOSURES:

1. HIGH TEMPERATURE (OPERATING):	210°F ± 5°F
2. LOW TEMPERATURE (OPERATING):	0°F ± 5°F
3. VIBRATION, RANDOM (NON-OPERATING): (3 ORTHOGONAL MOUNT AXES)	10 TO 2000 CPS AT 0.1 g^2/CPS 15 MINUTES/AXIS
4. VIBRATION, SINUSOIDAL (OPERATING): (3 ORTHOGONAL MOUNT AXES)	10 TO 2000 CPS AT 1g 15 MINUTES/AXIS W/LOG SWEEP
5. SHOCK (NON-OPERATING):	30g PEAK 6 ± 1 MILLISECOND RISE TIME 1 ± 1 MILLISECOND DECAY TIME
6. HUMIDITY (NON-OPERATING):	MIL-STD 810, METHOD 507. EXCEPT UNIT WILL UNDERGO 5 CYCLES IN LIEU OF 10 CYCLES SPECIFIED THEREIN.

4. SPECIAL CONDITIONING (100% BY MANUFACTURER) – UNIT SHALL BE OPERATED DURING TEMPERATURE CYCLING FOR 5 CONSECUTIVE CYCLES. EACH CYCLE IS AS FOLLOWS:

   2-1/2 HOURS AT 210°F ± 5°F
   2-1/2 HOURS AT ROOM TEMPERATURE (77°F REF.)
   2-1/2 HOURS AT 0°F ± 5°F
   2-1/2 HOURS AT ROOM TEMPERATURE (77°F REF.)

   THE MANUFACTURER SHALL SUPPLY TO CUSTOMER INSPECTION AND ACCEPTANCE REQUIREMENT DATA BEFORE AND AFTER SPECIAL CONDITIONING. UNITS SHALL MEET STATED REQUIREMENTS BEFORE AND AFTER SPECIAL CONDITIONING

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING.

MASTER

KIC NO 68258000901

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ±.005 ANGLES ± 1°
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

		DATE
DRAWN	M Neuzbio	9-1-64
CHECKED		9-16-64
APPROVED	W.K. Ross	12-16-64
APPROVED		
APPROVED MIT	W Cooper	22 Dec 64
APPROVED MSC		12-22-64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESONATOR, TUNING FORKS
ASSY OF (TRACKER)
SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	DRAWING NO.
	D	1012154

SCALE
SHEET 1 OF 2

1012154 C

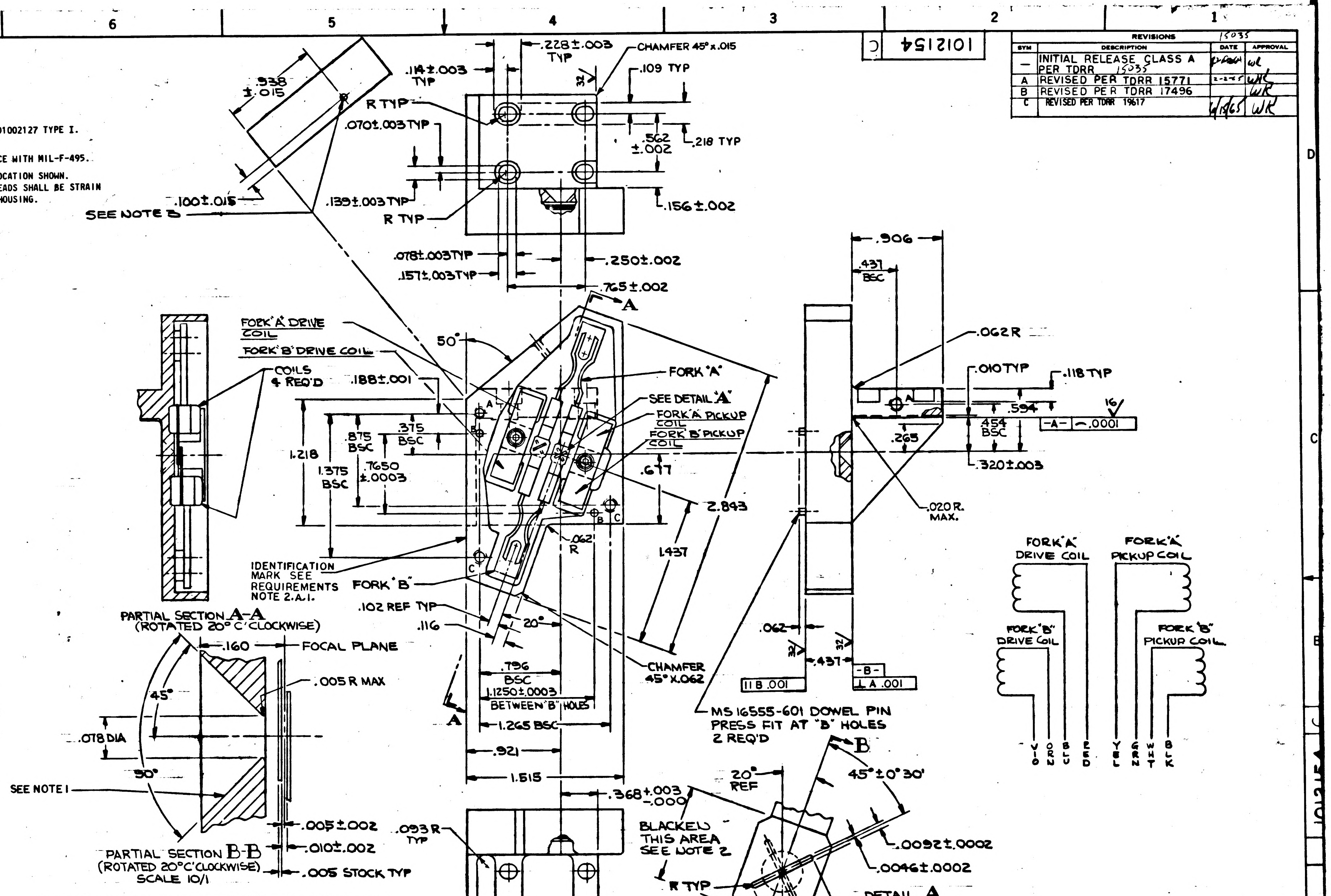
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

NOTES:

1. HOUSING AND HOLE INJECTION B-B TO BE BLACK ANODIZED IN ACCORDANCE WITH ND1002127 TYPE I. "A", "B" AND "C" HOLES SHALL NOT BE ANODIZED.
2. BLACKEN AREA INDICATED ON BOTH SIDES OF FOUR APERTURE PLATES IN ACCORDANCE WITH MIL-F-495.
3. HOLE WITH POLYTETRAFLOUROETHYLENE BUSHING TO ACCOMMODATE COIL LEADS AT LOCATION SHOWN. INSIDE EDGES OF BUSHING SHALL BE ROUNDED TO PREVENT CHAFING OF LEADS. LEADS SHALL BE STRAIN RELIEVED AT EXIT HOLE AND SHALL EXTEND A MINIMUM OF 8 INCHES OUTSIDE OF HOUSING.
4. UNLESS OTHERWISE SPECIFIED
   - a. 63 FINISH ALL OVER
   - b. BREAK CORNERS IN ACCORDANCE WITH ND1002078.

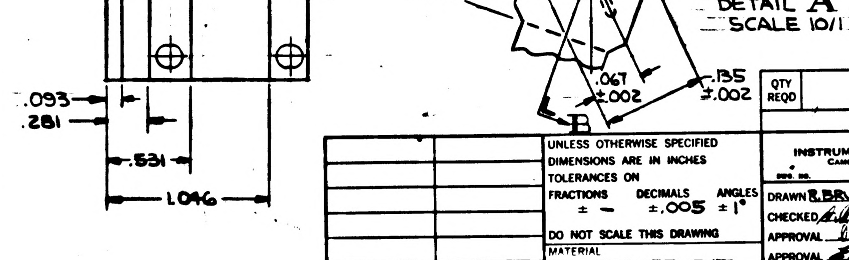
1012154 C

REVISIONS 15035			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 15035	12-20-64	WR
A	REVISED PER TDRR 15771	2-2-65	WR
B	REVISED PER TDRR 17496		WR
C	REVISED PER TDRR 19617	4/15/65	WR


.938 ±.015
.100±.015
SEE NOTE B
.114±.003 TYP
.228±.003 TYP
CHAMFER 45° x.015
.109 TYP
R TYP
.070±.003 TYP
.562 ±.002
.218 TYP
.139±.003 TYP
R TYP
.156±.002
.078±.003 TYP
.157±.003 TYP
.250±.002
.765±.002
A
.906
.437 BSC
.062R
.010 TYP
.118 TYP
.594
.454 BSC
-A- ⌒ .0001
.265
.320±.003
.020R. MAX.
FORK 'A' DRIVE COIL
FORK 'B' DRIVE COIL
COILS 4 REQ'D
50°
.188±.001
FORK 'A'
SEE DETAIL 'A'
FORK 'A' PICKUP COIL
FORK 'B' PICKUP COIL
1.218
.875 BSC
.375 BSC
1.375 BSC
.7650 ±.0003
.677
2.843
1.437
.062 R
IDENTIFICATION MARK SEE REQUIREMENTS NOTE 2.A.I.
FORK 'B'
.102 REF TYP
.116
20°
CHAMFER 45° X.062
.796 BSC
1.1250±.0003 BETWEEN 'B' HOLES
1.265 BSC
.921
1.515
MS 16555-601 DOWEL PIN PRESS FIT AT "B" HOLES 2 REQ'D
.062
.437
-B-
⊥ A .001
∥ B .001
PARTIAL SECTION A-A (ROTATED 20° C'CLOCKWISE)
.160
FOCAL PLANE
.005 R MAX
45°
.078 DIA
30°
SEE NOTE 1
.005±.002
.010±.002
.005 STOCK TYP
PARTIAL SECTION B-B (ROTATED 20°C'CLOCKWISE) SCALE 10/1
.093 R TYP
.368 +.003 -.000
20° REF
BLACKEN THIS AREA SEE NOTE 2
B
45°±0°30'
.0092±.0002
.0046±.0002
R TYP
DETAIL A SCALE 10/1
FORK 'A' DRIVE COIL
FORK 'A' PICKUP COIL
FORK 'B' DRIVE COIL
FORK 'B' PICKUP COIL
VIO
ORN
BLU
RED
YEL
GRN
WHT
BLK

⊕ .010 DIA

HOLE CHART		
HOLE	DESCRIPTION	QUANTITY
A	DR NO. 41(.096) X.422 DEEP CSK 90° +0° -5° TO .140 DIA 4-40 NC-3B X.266 DEEP	2
B	DR 1/32 (.0313) THRU .0622 +.0003 -.0000 DIA X.188 DEEP	2
C	DR NO 41 (.096) THRU CSK 90° +0° -5° TO .140 DIA 4-40 NC-3B X.266 DEEP	2


.067 ±.002
.135 ±.002
B
.093
.281
.531
1.046

MASTER

KIC 68258000901 NO

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

2011701	2011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ±1°
DO NOT SCALE THIS DRAWING
MATERIAL SEE REQUIREMENTS SHEET 1 OF 2
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN R.BRUNELLE DATE 6-17-64
CHECKED 9-16-64
APPROVAL 12-16-64
APPROVAL E. Phang 12-21-64
NASA APPROVAL 12-22-64
MIT APPROVAL 12-22-64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESONATOR, TUNING FORKS,
ASSY OF (TRACKER)
SPECIFICATION CONTROL DWG

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1012154
SCALE 2/1
WT
SHEET 2 OF 2

D 1012154

SYM	DESCRIPTION	DR	CHK	DATE	APPROVED
	REVISIONS 15035				
	INITIAL RELEASE CLASS A PER TDRR 15035			22 Dec 64	WR
A	REVISED PER TDRR 15771			2-2-65	WR
B	REVISED PER TDRR 17496				WR
C	REVISED PER TDRR 19617			6/15/65	WK.
D	REVISED PER TDRR 20874			7/27/65	WK

NOTICE. WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS I.
   - C. PRESERVATION, PACKAGING, PACKING AND SHIPPING SHALL BE IN ACCORDANCE WITH ND 1002215.

2. INSPECTION AND ACCEPTANCE AT ROOM TEMPERATURE, 70°F ± 5°F
   - A. MECHANICAL REQUIREMENTS
     - 1. ITEMS SHALL BE MARKED WITH NASA DRAWING NUMBER, LATEST REVISION LETTER AND MANUFACTURER'S IDENTIFICATION IN ACCORDANCE WITH:

       UNITS - PER ND 1002019

       PACKAGE AND SHIPPING CONTAINER - PER MIL-STD 129
     - 2. DIMENSIONS AS SHOWN
     - 3. RESONANT FREQUENCY:

       FORK "A" - 356 CPS ± 1 CPS

       FORK "B" - 455 CPS ± 1 CPS
     - 4. MECHANICAL SWING, AS MEASURED AT APERTURE: .034 INCH DOUBLE AMPLITUDE AT A DRIVE VOL. OF 6.5 VRMS MAX. WITHOUT MECHANICAL INTERFERENCE AT RESONANT FREQ. PER PARA 2.A.3 & A MIN. OF RESIDUAL MOMENTUM PER PARA 3.B.
     - 5. INTERSECTION OF APERTURE PLATE SLOTS SHALL BE LOCATED ON APERTURE HOLE CENTER WITHIN .010 DIA CIRCLE
     - 6. LEADS: E-32 PER MIL-W-16878
     - 7. SOLDERING SHALL BE IN ACCORDANCE WITH ND 1002071
   - B. ELECTRICAL REQUIREMENTS
     - 1. COIL RESISTANCE
       - A. DRIVE COILS: 2155 OHMS ± 42 OHMS
       - B. PICK-UP COILS: 965 OHMS ± 20 OHMS

       AT 70°F. A TEMPERATURE COEFFICENT FACTOR OF +.22 PERCENT PER DEGREE IS APPLICABLE
     - 2. OUTPUT, PICK-UP COILS: WITH AN INPUT OF 3.2±.2 VOLTS RMS TO DRIVE COIL THE DOUBLE AMPL. SHALL BE .021±.001 INCH AT RESONANT FREQ. PER PARA 2.A.3. WITH THIS INPUT VOL. & AMP THE PICKUP COIL OUTPUT SHALL BE 100 MV±15 MV RMS.
     - 3. DIELECTRIC WITHSTANDING VOLTAGE: 500 VOLTS RMS COIL TO COIL & COIL TO FRAME PER MIL-STD-202, METHOD 301.
     - 4. INSULATION RESISTANCE: 10 MEGOHMS MIN AT 100 VOLTS MIN COIL TO COIL AND COIL TO GROUND PER MIL-STD-202, METHOD 302

3. DESIGN REQUIREMENTS
   - A. INPUT VOLTAGE, DRIVE COIL: 3.2 ± .2 VOLTS RMS @ 356 CPS ±1 CPS DRIVE COIL "A", 3.2±.2V RMS @ 455 CPS ±1CPS DRIVE COIL "B"
   - B. BALANCE: THE FORKS SHALL BE BALANCED FOR A MINIMUM OF RESIDUAL MOMENTUM. THE MANUFACTURER SHALL PRESENT A PROCEDURE FOR BALANCING AND MEASURING THE RESIDUAL MOMENTUM OF THE FORKS TO THE CUSTOMER FOR APPROVAL PRIOR TO IMPLEMENTATION. BALANCE SHALL BE OBTAINED BY REMOVAL OF EXCESS MATERIAL. NO MATERIAL SHALL BE ADDED TO OBTAIN BALANCE WHICH WOULD PROTRUDE ABOVE SURFACE OF BALANCE WEIGHT.
   - C. APERTURE PLATES SHALL BE PERMANENTLY BONDED TO FORK TINE WEIGHT.
   - D. MATERIALS
     - 1. HOUSING - BERYLLIUM PER ND 1002125 - HEAT TREAT (STABILIZE & STRESS RELIEVE) PER ND1002114
     - 2. COIL CLAMPS - ALUMINUM ALLOY IN ACCORDANCE WITH QQ-A-225/6 TEMPER T4. BLACK ANODIZE PER MIL-A-8625 TYPE II.
     - 3. COIL CLAMP SCREWS - CRES, TO MEET THE REQUIREMENTS SPECIFIED IN NASA DRAWING 1011625.
     - 4. APERTURE PLATES - BERYLLIUM COPPER IN ACCORDANCE WITH QQ-C-533, HALF HARD
   - E. ENVIRONMENTAL REQUIREMENTS

     THE UNIT SHALL BE CAPABLE OF MEETING ALL REQUIREMENTS BEFORE, DURING (EXCEPT NON-OPERATING), AND AFTER THE FOLLOWING EXPOSURES, EXCEPT THAT DURING OPERATING EXPOSURES THE DRIVE COIL INPUT VOLTAGES CAN BE ± 15% OF THE ROOM TEMPERATURE VOLTAGES (REFERENCE) DETERMINED IN PARAGRAPH 2.B.2 WHILE MAINTAINING THE DOUBLE AMPLITUDE REQUIREMENTS OF PARAGRAPH 2.B.2.

1. HIGH TEMPERATURE (OPERATING):	167°F ± 5°F
2. LOW TEMPERATURE (OPERATING):	0°F ± 5°F
3. VIBRATION, RANDOM (NON-OPERATING): (3 ORTHOGONAL MOUNT AXES)	10 TO 2000 CPS AT 0.1 g^2/CPS 15 MINUTES/AXIS
4. VIBRATION, SINUSOIDAL (NON-OPERATING): (3 ORTHOGONAL MOUNT AXES)	10 TO 2000 CPS AT 1g 15 MINUTES/AXIS W/LOG SWEEP
5. SHOCK (NON-OPERATING):	30g PEAK 6 ± 1 MILLISECOND RISE TIME 1 ± 1 MILLISECOND DECAY TIME
6. HUMIDITY (NON-OPERATING):	MIL-STD 810, METHOD 507. EXCEPT UNIT WILL UNDERGO 5 CYCLES IN LIEU OF 10 CYCLES SPECIFIED THEREIN.

4. SPECIAL CONDITIONING (100% BY MANUFACTURER) - UNIT SHALL BE OPERATED DURING TEMPERATURE CYCLING FOR 5 CONSECUTIVE CYCLES. EACH CYCLE IS AS FOLLOWS:

   2-1/2 HOURS AT 210°F ± 5°F

   2-1/2 HOURS AT ROOM TEMPERATURE (77°F REF.)

   2-1/2 HOURS AT 0°F ± 5°F

   2-1/2 HOURS AT ROOM TEMPERATURE (77°F REF.)

THE MANUFACTURER SHALL SUPPLY TO CUSTOMER INSPECTION AND ACCEPTANCE REQUIREMENT DATA BEFORE AND AFTER SPECIAL CONDITIONING. UNITS SHALL MEET STATED REQUIREMENTS BEFORE AND AFTER SPECIAL CONDITIONING

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

KIC NO 68258000901

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ±.005 ANGLES ± 1°
DO NOT SCALE THIS DRAWING

MATERIAL

NEXT ASSY	USED ON
APPLICATION	

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN	U Neuzorio	9/1/64
CHECKED		9-16-64
APPROVED		12-16-64
APPROVED		
APPROVED MIT	W Crafton	22 Dec 64
APPROVED MSC		12-22-64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESONATOR, TUNING FORKS
ASSY OF (TRACKER)
SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	DRAWING NO.
80230	D	1012154

SCALE

SHEET 1 OF 2

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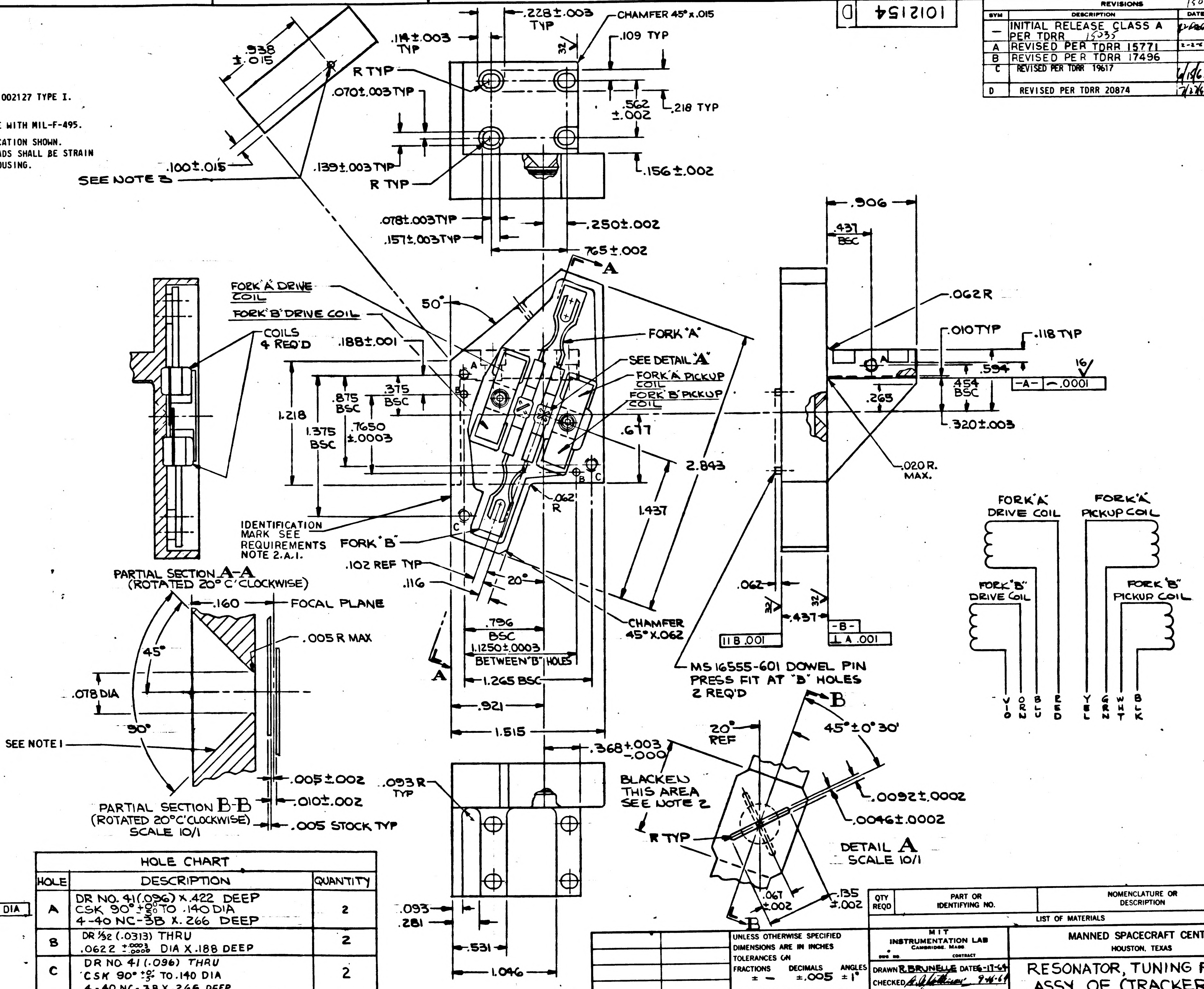
D 1012154

SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 15035	12-22-64	wk
A	REVISED PER TDRR 15771	2-2-65	WK
B	REVISED PER TDRR 17496		WK
C	REVISED PER TDRR 19617	6/15/65	WK
D	REVISED PER TDRR 20874	7/27/65	WK

REVISIONS 15035

NOTES:

1. HOUSING AND HOLE INJECTION B-B TO BE BLACK ANODIZED IN ACCORDANCE WITH ND1002127 TYPE I. "A", "B" AND "C" HOLES SHALL NOT BE ANODIZED.
2. BLACKEN AREA INDICATED ON BOTH SIDES OF FOUR APERTURE PLATES IN ACCORDANCE WITH MIL-F-495.
3. HOLE WITH POLYTETRAFLOUROETHYLENE BUSHING TO ACCOMMODATE COIL LEADS AT LOCATION SHOWN. INSIDE EDGES OF BUSHING SHALL BE ROUNDED TO PREVENT CHAFING OF LEADS. LEADS SHALL BE STRAIN RELIEVED AT EXIT HOLE AND SHALL EXTEND A MINIMUM OF 8 INCHES OUTSIDE OF HOUSING.
4. UNLESS OTHERWISE SPECIFIED
   - a. 63 FINISH ALL OVER
   - b. BREAK CORNERS IN ACCORDANCE WITH ND1002078.


.938 ±.015
.100±.015
SEE NOTE 3
.114±.003 TYP
.228±.003 TYP
CHAMFER 45°x.015
.109 TYP
R TYP
.070±.003 TYP
.562 ±.002
.218 TYP
.139±.003 TYP
R TYP
.156±.002
.078±.003 TYP
.157±.003 TYP
.250±.002
.765±.002
A
FORK 'A' DRIVE COIL
FORK 'B' DRIVE COIL
COILS 4 REQ'D
50°
.188±.001
FORK 'A'
SEE DETAIL 'A'
FORK 'A' PICKUP COIL
FORK 'B' PICKUP COIL
1.218
.875 BSC
.375 BSC
1.375 BSC
.7650 ±.0003
.677
2.843
.062 R
1.437
IDENTIFICATION MARK SEE REQUIREMENTS NOTE 2.A.1.
FORK 'B'
.102 REF TYP
.116
20°
CHAMFER 45°X.062
.796 BSC
1.1250±.0003 BETWEEN 'B' HOLES
1.265 BSC
.921
1.515
.906
.437 BSC
.062R
.010 TYP
.118 TYP
.594
.454 BSC
-A- ⏤ .0001
.265
.320±.003
.020 R. MAX.
.062
.437
-B-
11 B .001
⊥ A .001
MS 16555-601 DOWEL PIN PRESS FIT AT 'B' HOLES 2 REQ'D
PARTIAL SECTION A-A (ROTATED 20° C'CLOCKWISE)
.160
FOCAL PLANE
.005 R MAX
45°
.078 DIA
90°
SEE NOTE 1
.005±.002
.010±.002
.005 STOCK TYP
PARTIAL SECTION B-B (ROTATED 20°C'CLOCKWISE) SCALE 10/1
.368 +.003 -.000
.093R TYP
.093
.281
.531
1.046
B
20° REF
45°±0°30'
BLACKEN THIS AREA SEE NOTE 2
.0092±.0002
.0046±.0002
R TYP
DETAIL A SCALE 10/1
.067 ±.002
.135 ±.002
FORK 'A' DRIVE COIL
FORK 'A' PICKUP COIL
FORK 'B' DRIVE COIL
FORK 'B' PICKUP COIL
VIO
ORN
BLU
RED
YEL
GRN
WHT
BLK
⊕ .010 DIA

HOLE CHART		
HOLE	DESCRIPTION	QUANTITY
A	DR NO. 41(.096) X.422 DEEP CSK 90° +0° -5° TO .140 DIA 4-40 NC-3B X.266 DEEP	2
B	DR 1/32 (.0313) THRU .0622 +.0003 -.0000 DIA X .188 DEEP	2
C	DR NO. 41 (.096) THRU CSK 90° +0° -5° TO .140 DIA 4-40 NC-3B X.266 DEEP	2

KIC 68258000901
NO

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

2011701	2011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ±1°
DO NOT SCALE THIS DRAWING
MATERIAL SEE REQUIREMENTS SHEET 1 OF 2
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG NO. CONTRACT
DRAWN R. BRUNELLE DATE 6-17-64
CHECKED 9-16-64
APPROVAL 12-16-64
APPROVAL 12-21-64
NASA APPROVAL W. J. 12-22-64
MIT APPROVAL 22 Dec 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESONATOR, TUNING FORKS, ASSY OF (TRACKER)
SPECIFICATION CONTROL DWG

CODE IDENT NO. 80230
SIZE D
NASA DRAWING NO. 1012154
SCALE 2/1
WT
SHEET 2 OF 2

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1012154

REVISIONS 15035						
SYM		DESCRIPTION	DR	CHK	DATE	APPROVED
		INITIAL RELEASE CLASS A PER TDRR 15035			22 Dec 64	

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS I.
   - C. PRESERVATION, PACKAGING, PACKING AND SHIPPING SHALL BE IN ACCORDANCE WITH ND 1002215.
2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS
     1. ITEMS SHALL BE MARKED WITH NASA DRAWING NUMBER, LATEST REVISION LETTER AND MANUFACTURER'S IDENTIFICATION IN ACCORDANCE WITH:

        UNITS – PER ND 1002019

        PACKAGE AND SHIPPING CONTAINER – PER MIL-STD 129
     2. DIMENSIONS AS SHOWN
     3. RESONANT FREQUENCY:

        FORK "A" – 356 CPS ± 1 CPS
        FORK "B" – 455 CPS ± 1 CPS
     4. MECHANICAL SWING, AS MEASURED AT APERTURE: .034 INCH MIN DOUBLE AMPLITUDE AT RATED DRIVE VOLTAGE
     5. INTERSECTION OF APERTURE PLATE SLOTS SHALL BE LOCATED ON APERTURE HOLE CENTER WITHIN .010 DIA CIRCLE
     6. LEADS: E-32 PER MIL-W-16878
     7. SOLDERING SHALL BE IN ACCORDANCE WITH ND 1002071
   - B. ELECTRICAL REQUIREMENTS
     1. COIL RESISTANCE
        - A. DRIVE COILS: 2155 OHMS ± 42 OHMS
        - B. PICK-UP COILS: 965 OHMS ± 20 OHMS
     2. OUTPUT, PICK-UP COILS: 195 MV ± 25 MV RMS IN PHASE WITH DRIVING VOLTAGE AT .034 INCH DOUBLE AMPLITUDE AT RESONANT FREQUENCY
     3. DIELECTRIC WITHSTANDING VOLTAGE: 500 VOLTS RMS COIL TO COIL AND COIL TO FRAME PER MIL-STD-202, METHOD 301
     4. INSULATION RESISTANCE: 10 MEGOHMS MIN AT 100 VOLTS MIN COIL TO COIL AND COIL TO GROUND PER MIL-STD-202, METHOD 302
3. DESIGN REQUIREMENTS
   - A. INPUT VOLTAGE, DRIVE COIL: 3.2 ± .2 VOLTS RMS @ 356 CPS ± 1 CPS DRIVE COIL "A", 3.2 ± .2 V RMS @ 455 CPS ± 1 CPS DRIVE COIL "B"
   - B. BALANCE: THE FORKS SHALL BE BALANCED FOR A MINIMUM OF RESIDUAL MOMENTUM. THE MANUFACTURER SHALL PRESENT A PROCEDURE FOR BALANCING AND MEASURING THE RESIDUAL MOMENTUM OF THE FORKS TO THE CUSTOMER FOR APPROVAL PRIOR TO IMPLEMENTATION. BALANCE SHALL BE OBTAINED BY REMOVAL OF EXCESS MATERIAL. NO MATERIAL SHALL BE ADDED TO OBTAIN BALANCE WHICH WOULD PROTRUDE ABOVE SURFACE OF BALANCE WEIGHT.
   - C. APERTURE PLATES SHALL BE PERMANENTLY BONDED TO FORK TINE WEIGHT.
   - D. MATERIALS
     1. HOUSING – BERYLLIUM PER ND 1002125 – HEAT TREAT (STABILIZE & STRESS RELIEVE) PER ND1002114
     2. COIL CLAMPS – CRES IN ACCORDANCE WITH QQ-S-763, CLASS 416, COND.A.
     3. COIL CLAMP SCREWS – CRES, TO MEET THE REQUIREMENTS SPECIFIED IN NASA DRAWING 1011625.
     4. APERTURE PLATES – BERYLLIUM COPPER IN ACCORDANCE WITH QQ-C-533, HALF HARD
   - E. ENVIRONMENTAL REQUIREMENTS –

     THE UNIT SHALL BE CAPABLE OF MEETING ALL REQUIREMENTS BEFORE, DURING (EXCEPT NON-OPERATING), AND AFTER THE FOLLOWING EXPOSURES:

1. HIGH TEMPERATURE (OPERATING):	210°F ± 5°F
2. LOW TEMPERATURE (OPERATING):	0°F ± 5°F
3. VIBRATION, RANDOM (NON-OPERATING): (3 ORTHOGONAL MOUNT AXES)	10 TO 2000 CPS AT 0.1 g^2/CPS 15 MINUTES/AXIS
4. VIBRATION, SINUSOIDAL (OPERATING): (3 ORTHOGONAL MOUNT AXES)	10 TO 2000 CPS AT 1g 15 MINUTES/AXIS W/LOG SWEEP
5. SHOCK (NON-OPERATING):	30g PEAK 6 ± 1 MILLISECOND RISE TIME 1 ± 1 MILLISECOND DECAY TIME
6. HUMIDITY (NON-OPERATING):	MIL-STD 810, METHOD 507. EXCEPT UNIT WILL UNDERGO 5 CYCLES IN LIEU OF 10 CYCLES SPECIFIED THEREIN.

4. SPECIAL CONDITIONING (100% BY MANUFACTURER) – UNIT SHALL BE OPERATED DURING TEMPERATURE CYCLING FOR 5 CONSECUTIVE CYCLES. EACH CYCLE IS AS FOLLOWS:

   2-1/2 HOURS AT 210°F ± 5°F

   2-1/2 HOURS AT ROOM TEMPERATURE (77°F REF.)

   2-1/2 HOURS AT 0°F ± 5°F

   2-1/2 HOURS AT ROOM TEMPERATURE (77°F REF.)

   THE MANUFACTURER SHALL SUPPLY TO CUSTOMER INSPECTION AND ACCEPTANCE REQUIREMENT DATA BEFORE AND AFTER SPECIAL CONDITIONING. UNITS SHALL MEET STATED REQUIREMENTS BEFORE AND AFTER SPECIAL CONDITIONING

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING.

MASTER

KIC NO 68258000901

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS				

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ±.005 ANGLES ± 1°
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

		DATE
DRAWN	H. Manzo	9/1/64
CHECKED		9-16-64
APPROVED		12-16-64
APPROVED		
APPROVED MIT	W. Cuyler	22 Dec 64
APPROVED MSC		12-22-64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESONATOR, TUNING FORKS
ASSY OF (TRACKER)
SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	DRAWING NO.
	D	1012154
SCALE		SHEET 1 OF 2

8 7 6 5 4 3 2 1

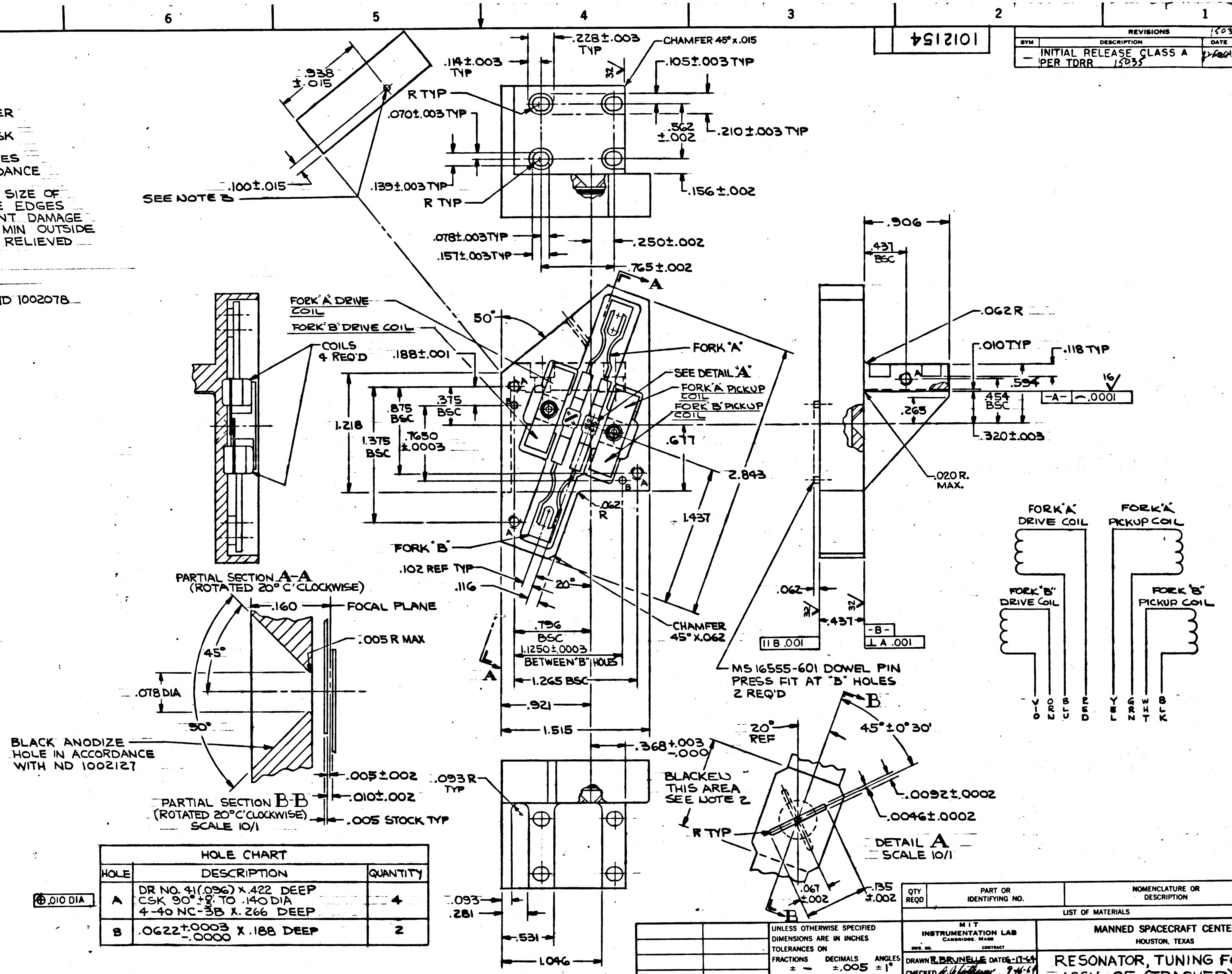
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1012154

REVISIONS	15035		
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 15035	12-22-64	wl

NOTES:

1. HOUSING TO BE VAPOR BLASTED ALL OVER THEN BLACK ANODIZED IN ACCORDANCE WITH ND 1002127 (PERMISSIBLE TO MASK "B" HOLES IF NECESSARY)
2. BLACKEN AREA INDICATED ON BOTH SIDES OF FOUR APERTURE PLATES IN ACCORDANCE WITH MIL-F-495
3. DRILL HOLE THRU AT LOCATION SHOWN, SIZE OF HOLE TO ACCOMODATE COIL LEADS. HOLE EDGES TO HAVE SUFFICIENT RADIUS TO PREVENT DAMAGE TO LEADS. LEADS TO EXTEND 8 INCHES MIN OUTSIDE OF HOUSING AND ARE TO BE STRAINED RELIEVED AT EXIT HOLE.
4. UNLESS OTHERWISE SPECIFIED
   - a) $\overset{63}{\surd}$ FINISH ALL OVER
   - b) BREAK CORNERS IN ACCORDANCE WITH ND 1002078


.228±.003 TYP
CHAMFER 45° x .015
.114±.003 TYP
32
.105±.003 TYP
.938 ±.015
R TYP
.070±.003 TYP
.562 ±.002
.210±.003 TYP
.100±.015
SEE NOTE 3
.139±.003 TYP
R TYP
.156±.002
.078±.003 TYP
.157±.003 TYP
.250±.002
.765±.002
A
.906
.437 BSC
FORK 'A' DRIVE COIL
FORK 'B' DRIVE COIL
50°
COILS 4 REQ'D
.188±.001
FORK 'A'
SEE DETAIL 'A'
FORK 'A' PICKUP COIL
FORK 'B' PICKUP COIL
.875 BSC
.375 BSC
1.218
1.375 BSC
.7650 ±.0003
.677
2.843
.062 R
1.437
.062 R
.010 TYP
.118 TYP
.594
16
-A- ⌒ .0001
.454 BSC
.265
.320±.003
.020 R. MAX.
FORK 'B'
.102 REF TYP
.116
20°
CHAMFER 45° X .062
.062
32
.437
-B-
⊥ A .001
// B .001
.796 BSC
.1250±.0003 BETWEEN "B" HOLES
1.265 BSC
.921
1.515
MS 16555-601 DOWEL PIN PRESS FIT AT "B" HOLES 2 REQ'D
PARTIAL SECTION A-A (ROTATED 20° C'CLOCKWISE)
.160
FOCAL PLANE
.005 R MAX
45°
.078 DIA
30°
BLACK ANODIZE HOLE IN ACCORDANCE WITH ND 1002127
.005±.002
.010±.002
.005 STOCK TYP
PARTIAL SECTION B-B (ROTATED 20° C'CLOCKWISE) SCALE 10/1
.368 +.003 -.000
.093 R TYP
.093
.281
.531
1.046
FORK 'A' DRIVE COIL
FORK 'A' PICKUP COIL
FORK 'B' DRIVE COIL
FORK 'B' PICKUP COIL
VIO
ORN
BLU
RED
YEL
GRN
WHT
BLK
B
20° REF
45°±0°30'
BLACKEN THIS AREA SEE NOTE 2
.0092±.0002
.0046±.0002
R TYP
DETAIL A SCALE 10/1
.067 ±.002
.135 ±.002

HOLE CHART		
HOLE	DESCRIPTION	QUANTITY
A	DR NO. 41(.096) X .422 DEEP CSK 90° +0° -5° TO .140 DIA 4-40 NC-3B X .266 DEEP	4
B	.0622 +.0003 -.0000 X .188 DEEP	2

⊕ .010 DIA

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

2011701	2011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
± —	±.005	±1°

DO NOT SCALE THIS DRAWING

MATERIAL SEE REQUIREMENTS SHEET 2 OF 2

HEAT TREATMENT

FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN R. BRUNELLE DATE 6-17-64
CHECKED 9-16-64
APPROVAL 12-16-64
APPROVAL 12-21-64
NASA APPROVAL W. J. 12-22-64
MIT APPROVAL 22 Dec 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESONATOR, TUNING FORKS, ASSY OF (TRACKER)
SPECIFICATION CONTROL DWG

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	D	1012154
SCALE 2/1	WT	SHEET 2 OF 2

A

KIC 68258000901
NO

MASTER

8 7 6 5 4 3 2 1

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
REVISIONS						
—		INITIAL RELEASE CLASS A PER TDRR 1463			12-1-64	
A		REVISED PER TDRR 17495				

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REQUIREMENTS

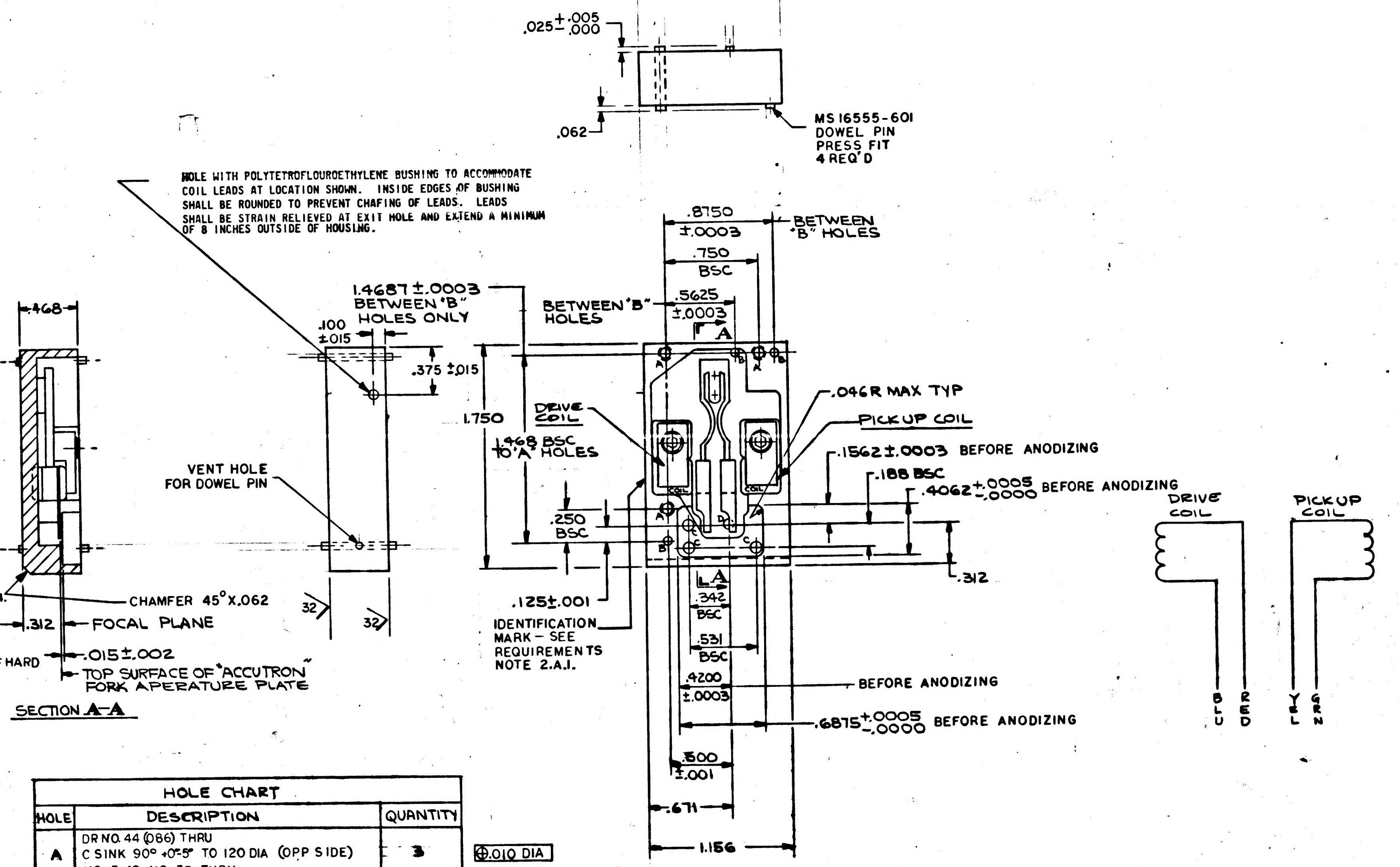
1. GENERAL
   - A. INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS I.
   - C. PRESERVATION, PACKAGING, PACKING AND SHIPPING SHALL BE IN ACCORDANCE WITH ND 1002215.

2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS
     - 1. ITEMS SHALL BE MARKED WITH NASA DRAWING NUMBER, LATEST REVISION LETTER AND MANUFACTURER'S IDENTIFICATION IN ACCORDANCE WITH:
       UNITS – PER ND 1002019
       PACKAGE AND SHIPPING CONTAINER – PER MIL-STD-129
     - 2. DIMENSIONS AS SHOWN
     - 3. RESONANT FREQUENCY: 550 CPS ± 1 CPS
     - 4. MECHANICAL SWING, AS MEASURED AT APERTURE – .020 INCH MIN DOUBLE AMPLITUDE AT RATED DRIVE VOLTAGE + FREQUENCY
     - 5. MODULATING EDGE OF APERTURE PLATE SHALL BE LOCATED WITHIN .0005 FROM CENTER OF HOLE "D".
     - 6. LEADS: TE-32 PER MIL-W-16878
   - B. ELECTRICAL REQUIREMENTS
     - 1. COIL RESISTANCE
       - A. DRIVE COIL: 2155 OHMS ± 42 OHMS
       - B. PICK-UP COIL: 985 OHMS ± 20 OHMS
     - 2. OUTPUT, PICK-UP COIL: 195 MV ± 25 MV RMS IN PHASE WITH DRIVING VOLTAGE AT .010 INCH DOUBLE AMPLITUDE AT RESONANT FREQUENCY
     - 3. DIELECTRIC WITHSTANDING VOLTAGE: 500 VOLTS RMS, COIL TO COIL AND COIL TO FRAME PER MIL-STD-202, METHOD 301
     - 4. INSULATION RESISTANCE: 10 MEGOHMS MIN AT 100 VOLTS MIN, COIL TO COIL AND COIL TO GROUND PER MIL-STD 202, METHOD 302

3. DESIGN REQUIREMENT.
   - A. INPUT VOLTAGE, DRIVE COIL: 3.2 ± .2 VOLTS RMS + FREQUENCY
   - B. BALANCE: THE FORKS SHALL BE BALANCED FOR A MINIMUM OF RESIDUAL MOMENTUM. THE MANUFACTURER SHALL PRESENT A PROCEDURE FOR BALANCING AND MEASURING THE RESIDUAL MOMENTUM OF THE FORKS TO THE CUSTOMER FOR APPROVAL PRIOR TO IMPLEMENTATION. BALANCE SHALL BE OBTAINED BY REMOVAL OF EXCESS MATERIAL. NO MATERIAL SHALL BE ADDED TO OBTAIN BALANCE WHICH WOULD PROTRUDE ABOVE SURFACE OF BALANCE WEIGHT.
   - C. APERTURE PLATES SHALL BE PERMANENTLY BONDED TO FORK TINE WEIGHT.
   - D. MATERIALS + PROCESS
     - 1. HOUSING – BERYLLIUM PER ND1002125–HEAT TREAT (STABILIZE & PRESS RELIEVE) PER ND1002114.
     - 2. COIL CLAMPS – ALUMINUM ALLOY IN ACCORDANCE WITH QQ-A-225/6–TEMPER T4 BLACK ANODIZE IN ACCORDANCE WITH MIL-A-8625 TYPE II.
     - 3. COIL CLAMP SCREWS – CRES, TO MEET THE REQUIREMENTS SPECIFIED IN NASA DRAWING 1011625.
     - 4. APERTURE PLATES – BERYLLIUM COPPER IN ACCORDANCE WITH QQ-C-533 HALF HARD
     - 5. SOLDERING SHALL BE IN ACCORDANCE WITH ND 1002071.
   - E. ENVIRONMENTAL REQUIREMENTS– THE UNIT SHALL BE CAPABLE OF MEETING ALL REQUIREMENTS BEFORE, DURING (EXCEPT NON-OPERATING), AND AFTER THE FOLLOWING EXPOSURES:
     - 1. HIGH TEMPERATURE (OPERATING): 210°F ± 5°F
     - 2. LOW TEMPERATURE (OPERATING): 0°F ± 5°F
     - 3. VIBRATION, RANDOM (NON-OPERATING): 10 TO 2000 CPS AT 0.1 g^2/CPS (3 ORTHOGONAL MOUNT AXES) 15 MINUTES/AXIS
     - 4. VIBRATION, SINUSOIDAL (OPERATING): 10 TO 2000 CPS AT 1g (3 ORTHOGONAL MOUNT AXES) 15 MINUTES/AXIS W/LOG SWEEP
     - 5. SHOCK (NON-OPERATING): 30g PEAK 6 ± 1 MILLISECOND RISE TIME 1 ± 1 MILLISECOND DECAY TIME
     - 6. HUMIDITY (NON-OPERATING): MIL-STD-810 METHOD 507 EXCEPT UNIT WILL UNDERGO 5 CYCLES IN LIEU OF 10 CYCLES SPECIFIED THEREIN.

4. SPECIAL CONDITIONING (100% BY MANUFACTURER) – UNIT SHALL BE OPERATED DURING TEMPERATURE CYCLING FOR 5 CONSECUTIVE CYCLES. EACH CYCLE IS AS FOLLOWS:
   2 1/2 HOURS AT 210°F ± 5°F
   2 1/2 HOURS AT ROOM TEMPERATURE (77°F REF)
   2 1/2 HOURS AT 0°F ± 5°F
   2 1/2 HOURS AT ROOM TEMPERATURE (77°F REF)
   THE MANUFACTURER SHALL SUPPLY TO CUSTOMER INSPECTION AND ACCEPTANCE REQUIREMENT DATA BEFORE AND AFTER SPECIAL CONDITIONING.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING



HOLE WITH POLYTETRAFLOUROETHYLENE BUSHING TO ACCOMMODATE COIL LEADS AT LOCATION SHOWN. INSIDE EDGES OF BUSHING SHALL BE ROUNDED TO PREVENT CHAFING OF LEADS. LEADS SHALL BE STRAIN RELIEVED AT EXIT HOLE AND EXTEND A MINIMUM OF 8 INCHES OUTSIDE OF HOUSING.

SECTION A-A

HOLE CHART

HOLE	DESCRIPTION	QUANTITY	
A	DR NO. 44 (.086) THRU C SINK 90° +0° −5° TO .120 DIA (OPP SIDE) NO. 3-48 NC-3B THRU	3	⊕.010 DIA
B	.0622 +.0003 −.0000 DIA THRU	3	
C	DR NO 43 (.089) THRU C'BORE .190 DIA (OPP SIDE) X .094 DEEP	3	⊕.004 DIA
D	.078 DIA THRU (SEE NOTE 1)	1	

NOTES:
1. HOUSING AND "D" HOLE TO BE BLACK ANODIZED ALL OVER IN ACCORDANCE WITH ND1002127 TYPE I. "A" & "B" HOLES SHALL NOT BE ANODIZED. ANODIZING "C" HOLES OPTIONAL.
2. BLACKEN BOTH SURFACES OF THE TWO APERTURE PLATES IN ACCORDANCE WITH MIL-F-495.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63 FINISH ALL OVER
   b. BREAK CORNERS IN ACCORDANCE WITH ND1002078.

MASTER

KIC NO	68258001001		
QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
2011701	2011000
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± – DECIMALS ±.005 ANGLES ± –
DO NOT SCALE THIS DRAWING

MATERIAL
SEE REQUIREMENTS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN	R. BRUNELLE	6-15-64
CHECKED		9-16-64
APPROVED	D.A. Koso	11-1-64
APPROVED		
APPROVED MIT	W. Cuffee	
APPROVED MSC		12-1-64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESONATOR, TUNING FORK
ASSY OF (PHOTOMETER)

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
	D	1012155

SCALE 2/1
SHEET 1 OF 1

1012155 B

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
REVISIONS						
—		INITIAL RELEASE CLASS A PER TDRR 14631			12-1-64	WK
A		REVISED PER TDRR 17495				WK
B		REVISED PER TDRR 18784			5/18/65	WK

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REQUIREMENTS

1. **GENERAL**
   - A. INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS I.
   - C. PRESERVATION, PACKAGING, PACKING AND SHIPPING SHALL BE IN ACCORDANCE WITH ND 1002215.

2. INSPECTION AND ACCEPTANCE AT 70°F ± 5°F-
   - A. MECHANICAL REQUIREMENTS
     1. ITEMS SHALL BE MARKED WITH NASA DRAWING NUMBER, LATEST REVISION LETTER AND MANUFACTURER'S IDENTIFICATION IN ACCORDANCE WITH:
        UNITS - PER ND 1002019
        PACKAGE AND SHIPPING CONTAINER - PER MIL-STD-129
     2. DIMENSIONS AS SHOWN
     3. RESONANT FREQUENCY: 550 CPS ± 1 CPS
     4. MECHANICAL SWING, AS MEASURED AT APERTURE - .034 INCH DOUBLE AMPLITUDE AT A DRIVE VOLTAGE OF 6.5 V RMS MAX. WITHOUT MECHANICAL INTERFERENCE AT RESONANT FREQ. PER PARA. 2.A.3 AND A MIN. OF RESIDUAL MOMENTUM PER PARA. 3.B.
     5. MODULATING EDGE OF APERTURE PLATE SHALL BE LOCATED WITHIN .0005 FROM CENTER OF HOLE "D".
     6. LEADS: TE-32 PER MIL-W-16878
   - B. ELECTRICAL REQUIREMENTS
     1. COIL RESISTANCE
        - A. DRIVE COIL: 2155 OHMS ± 42 OHMS
        - B. PICK-UP COIL: 965 OHMS ± 20 OHMS

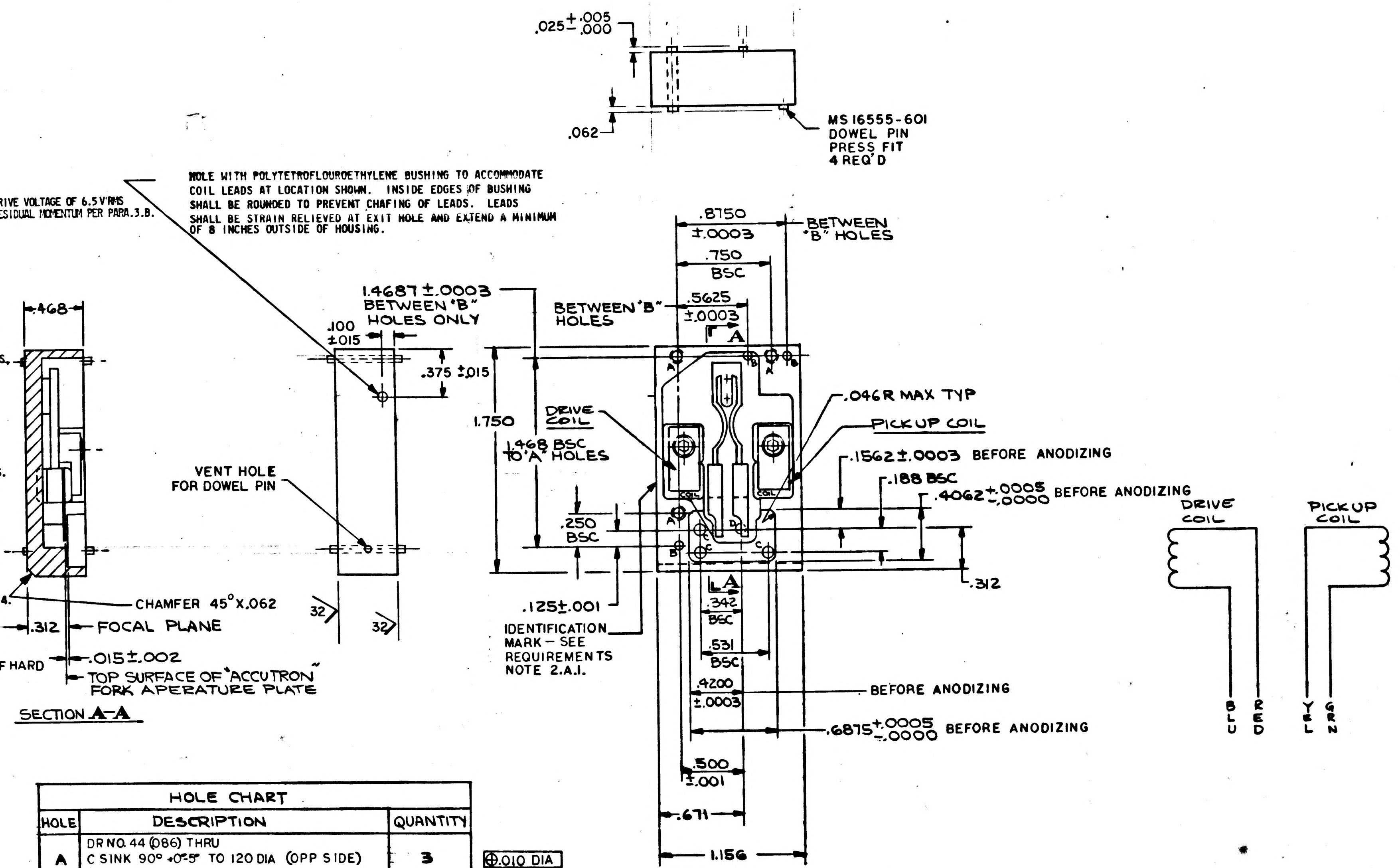
        } AT 70°F, A TEMPERATURE COEFF. OF +22 PERCENT PER DEGREE F SHALL APPLY
     2. OUTPUT, PICK-UP COIL: 70 MV ± 10 MV RMS WITH INPUT VOLTAGE DRIVE COIL 2.0 ± .2 V RMS, AT .015 ± .001 INCH DOUBLE AMPLITUDE AT RESONANT FREQUENCY PER PARA. 2.A.3.
     3. DIELECTRIC WITHSTANDING VOLTAGE: 500 VOLTS RMS, COIL TO COIL AND COIL TO FRAME PER MIL-STD-202, METHOD 301
     4. INSULATION RESISTANCE: 10 MEGOHMS MIN AT 100 VOLTS MIN, COIL TO COIL AND COIL TO GROUND PER MIL-STD 202, METHOD 302

3. DESIGN REQUIREMENTS
   - A. INPUT VOLTAGE, DRIVE COIL: 2.0 ± .2 VOLTS RMS, AT A RESONANT FREQUENCY, 550 CPS ±1 CPS.
   - B. BALANCE: THE FORKS SHALL BE BALANCED FOR A MINIMUM OF RESIDUAL MOMENTUM. THE MANUFACTURER SHALL PRESENT A PROCEDURE FOR BALANCING AND MEASURING THE RESIDUAL MOMENTUM OF THE FORKS TO THE CUSTOMER FOR APPROVAL PRIOR TO IMPLEMENTATION. BALANCE SHALL BE OBTAINED BY REMOVAL OF EXCESS MATERIAL. NO MATERIAL SHALL BE ADDED TO OBTAIN BALANCE WHICH WOULD PROTRUDE ABOVE SURFACE OF BALANCE WEIGHT.
   - C. APERTURE PLATES SHALL BE PERMANENTLY BONDED TO FORK TINE WEIGHT.
   - D. MATERIALS + PROCESS
     1. HOUSING - BERYLLIUM PER ND1002125-HEAT TREAT (STABILIZE & PRESS RELIEVE) PER ND1002114.
     2. COIL CLAMPS - ALUMINUM ALLOY IN ACCORDANCE WITH QQ-A-225/6-TEMPER T4 BLACK ANODIZE IN ACCORDANCE WITH MIL-A-8625 TYPE II.
     3. COIL CLAMP SCREWS - CRES, TO MEET THE REQUIREMENTS SPECIFIED IN NASA DRAWING 1011625.
     4. APERTURE PLATES - BERYLLIUM COPPER IN ACCORDANCE WITH QQ-C-533 HALF HARD
     5. SOLDERING SHALL BE IN ACCORDANCE WITH ND 1002071.
   - E. ENVIRONMENTAL REQUIREMENTS- THE UNIT SHALL BE CAPABLE OF MEETING ALL REQUIREMENTS BEFORE, DURING (EXCEPT NON-OPERATING), AND AFTER THE FOLLOWING EXPOSURES:
     1. HIGH TEMPERATURE (OPERATING): 167°F ± 5°F
     2. LOW TEMPERATURE (OPERATING): 0°F ± 5°F
     3. VIBRATION, RANDOM (NON-OPERATING): 10 TO 2000 CPS AT 0.1 g^2/CPS (3 ORTHOGONAL MOUNT AXES) 15 MINUTES/AXIS
     4. VIBRATION, SINUSOIDAL (NON OPERATING): 10 TO 2000 CPS AT 1g (3 ORTHOGONAL MOUNT AXES) 15 MINUTES/AXIS W/LOG SWEEP
     5. SHOCK (NON-OPERATING): 30g PEAK 6 ± 1 MILLISECOND RISE TIME
        1 ± 1 MILLISECOND DECAY TIME
     6. HUMIDITY (NON-OPERATING): MIL-STD-810 METHOD 507 EXCEPT UNIT WILL UNDERGO 5 CYCLES IN LIEU OF 10 CYCLES SPECIFIED THEREIN.
     7. EXCEPT THAT DURING OPERATING EXPOSURES THE PERCENT CHANGE FROM INITIAL VOLTAGES SHALL NOT EXCEED ±15% WHILE MAINTAING THE DOUBLE AMPLITUDE REQUIREMETN OF PARA. 2.B.2.

4. SPECIAL CONDITIONING (100% BY MANUFACTURER) - UNIT SHALL BE OPERATED DURING TEMPERATURE CYCLING FOR 5 CONSECUTIVE CYCLES. EACH CYCLE IS AS FOLLOWS:
   2 1/2 HOURS AT 210°F ± 5°F
   2 1/2 HOURS AT ROOM TEMPERATURE (77°F REF)
   2 1/2 HOURS AT 0°F ± 5°F
   2 1/2 HOURS AT ROOM TEMPERATURE (77°F REF)

THE MANUFACTURER SHALL SUPPLY TO CUSTOMER INSPECTION AND ACCEPTANCE REQUIREMENT DATA BEFORE AND AFTER SPECIAL CONDITIONING.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING



HOLE WITH POLYTETROFLOUROETHYLENE BUSHING TO ACCOMMODATE COIL LEADS AT LOCATION SHOWN. INSIDE EDGES OF BUSHING SHALL BE ROUNDED TO PREVENT CHAFING OF LEADS. LEADS SHALL BE STRAIN RELIEVED AT EXIT HOLE AND EXTEND A MINIMUM OF 8 INCHES OUTSIDE OF HOUSING.

SECTION A-A

HOLE CHART			
HOLE	DESCRIPTION	QUANTITY	
A	DR NO. 44 (.086) THRU C SINK 90° +0° -5° TO 120 DIA (OPP SIDE) NO. 3-48 NC-3B THRU	3	⊕ .010 DIA
B	.0622 +.0003 -.0000 DIA THRU	3	
C	DR NO 43 (.089) THRU C'BORE .190 DIA (OPP SIDE) X .094 DEEP	3	⊕ .004 DIA
D	.078 DIA THRU (SEE NOTE 1)	1	

NOTES:
1. HOUSING AND "D" HOLE TO BE BLACK ANODIZED ALL OVER IN ACCORDANCE WITH ND1002127 TYPE I. "A" & "B" HOLES SHALL NOT BE ANODIZED. ANODIZING "C" HOLES OPTIONAL.
2. BLACKEN BOTH SURFACES OF THE TWO APERTURE PLATES IN ACCORDANCE WITH MIL-F-495.
3. UNLESS OTHERWISE SPECIFIED:
   - a. 63√ FINISH ALL OVER
   - b. BREAK CORNERS IN ACCORDANCE WITH ND1002078.

MASTER

KIC NO 68258001001

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS				

NEXT ASSY	USED ON
2011701	2011000
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± – DECIMALS ±.005 ANGLES ± –
DO NOT SCALE THIS DRAWING

MATERIAL
SEE REQUIREMENTS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN R. BRUNELLE 6-15-64
CHECKED [illegible] 9-16-64
APPROVED [illegible] 11-1-64
APPROVED
APPROVED MIT W. Cuffer 1 Dec 64
APPROVED MSC [illegible] 12-1-64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESONATOR, TUNING FORK
ASSY OF (PHOTOMETER)

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE D
DRAWING NO. 1012155
SCALE 2/1
SHEET 1 OF 1

1012155 C

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 14631			12-1-64	
A		REVISED PER TDRR 17495				
B		REVISED PER TDRR 18784			5/18/65	
C		REVISED PER TDRR 21258			8/17/65	

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS I.
   - C. PRESERVATION, PACKAGING, PACKING AND SHIPPING SHALL BE IN ACCORDANCE WITH ND 1002215.

2. INSPECTION AND ACCEPTANCE AT 70°F ± 5°F-
   - A. MECHANICAL REQUIREMENTS
     - 1. ITEMS SHALL BE MARKED WITH NASA DRAWING NUMBER, LATEST REVISION LETTER AND MANUFACTURER'S IDENTIFICATION IN ACCORDANCE WITH:
       - UNITS - PER ND 1002019
       - PACKAGE AND SHIPPING CONTAINER - PER MIL-STD-129
     - 2. DIMENSIONS AS SHOWN
     - 3. RESONANT FREQUENCY: 550 CPS ± 1 CPS
     - 4. MECHANICAL SWING, AS MEASURED AT APERTURE - .034 INCH DOUBLE AMPLITUDE AT A DRIVE VOLTAGE OF 6.5 V RMS MAX. WITHOUT MECHANICAL INTERFERENCE AT RESONANT FREQ. PER PARA. 2.A.3 AND A MIN. OF RESIDUAL MOMENTUM PER PARA.3.B.
     - 5. MODULATING EDGE OF APERTURE PLATE SHALL BE LOCATED WITHIN .0005 FROM CENTER OF HOLE "D".
     - 6. LEADS: TE-32 PER MIL-W-16878
   - B. ELECTRICAL REQUIREMENTS
     - 1. COIL RESISTANCE
       - A. DRIVE COIL: 2155 OHMS ± 42 OHMS
       - B. PICK-UP COIL: 985 OHMS ± 20 OHMS
       - } AT 70°F, A TEMPERATURE COEFF. OF +22 PERCENT PER DEGREE F SHALL APPLY
     - 2. OUTPUT, PICK-UP COIL: 70 MV ± 10 MV RMS WITH INPUT VOLTAGE DRIVE COIL 2.0 ± .2 V RMS, AT .015 ± .001 INCH DOUBLE AMPLITUDE AT RESONANT FREQUENCY PER PARA. 2.A.3.
     - 3. DIELECTRIC WITHSTANDING VOLTAGE: 500 VOLTS RMS, COIL TO COIL AND COIL TO FRAME PER MIL-STD-202, METHOD 301
     - 4. INSULATION RESISTANCE: 10 MEGOHMS MIN AT 100 VOLTS MIN, COIL TO COIL AND COIL TO GROUND PER MIL-STD 202, METHOD 302

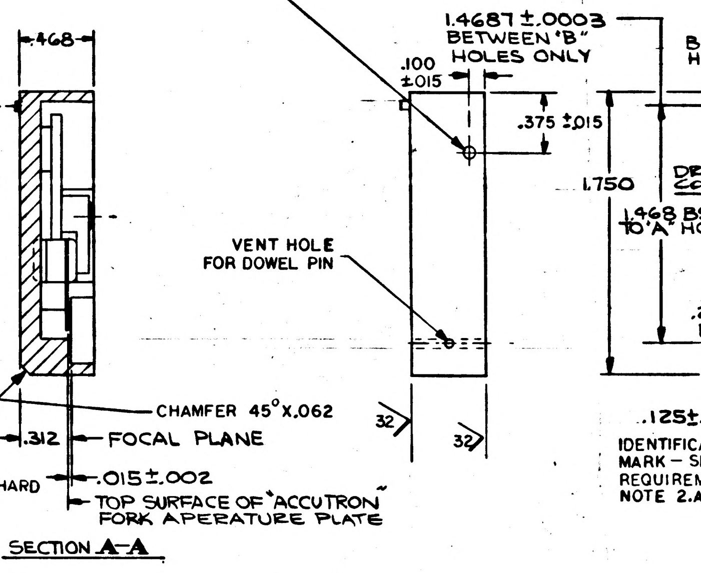
3. DESIGN REQUIREMENTS
   - A. INPUT VOLTAGE, DRIVE COIL: 2.0 ± .2 VOLTS RMS, AT A RESONANT FREQUENCY, 550 CPS ±1 CPS.
   - B. BALANCE: THE FORKS SHALL BE BALANCED FOR A MINIMUM OF RESIDUAL MOMENTUM. THE MANUFACTURER SHALL PRESENT A PROCEDURE FOR BALANCING AND MEASURING THE RESIDUAL MOMENTUM OF THE FORKS TO THE CUSTOMER FOR APPROVAL PRIOR TO IMPLEMENTATION. BALANCE SHALL BE OBTAINED BY REMOVAL OF EXCESS MATERIAL. NO MATERIAL SHALL BE ADDED TO OBTAIN BALANCE WHICH WOULD PROTRUDE ABOVE SURFACE OF BALANCE WEIGHT.
   - C. APERTURE PLATES SHALL BE PERMANENTLY BONDED TO FORK TINE WEIGHT.
   - D. MATERIALS + PROCESS
     - 1. HOUSING - BERYLLIUM PER ND1002125-HEAT TREAT(STABILIZE & PRESS RELIEVE) PER ND1002114.
     - 2. COIL CLAMPS - ALUMINUM ALLOY IN ACCORDANCE WITH QQ-A-225/6-TEMPER T4 BLACK ANODIZE IN ACCORDANCE WITH MIL-A-8625 TYPE II.
     - 3. COIL CLAMP SCREWS - CRES, TO MEET THE REQUIREMENTS SPECIFIED IN NASA DRAWING 1011625.
     - 4. APERTURE PLATES - BERYLLIUM COPPER IN ACCORDANCE WITH QQ-C-533 HALF HARD
     - 5. SOLDERING SHALL BE IN ACCORDANCE WITH ND 1002071.
   - E. ENVIRONMENTAL REQUIREMENTS- THE UNIT SHALL BE CAPABLE OF MEETING ALL REQUIREMENTS BEFORE, DURING (EXCEPT NON-OPERATING), AND AFTER THE FOLLOWING EXPOSURES:
     - 1. HIGH TEMPERATURE (OPERATING): 167°F ± 5°F
     - 2. LOW TEMPERATURE (OPERATING): 0°F ± 5°F
     - 3. VIBRATION, RANDOM (NON-OPERATING): 10 TO 2000 CPS AT 0.1 g^2/CPS
       (3 ORTHOGONAL MOUNT AXES) 15 MINUTES/AXIS
     - 4. VIBRATION, SINUSOIDAL (NON OPERATING): 10 TO 2000 CPS AT 1g
       (3 ORTHOGONAL MOUNT AXES) 15 MINUTES/AXIS W/LOG SWEEP
     - 5. SHOCK (NON-OPERATING): 30g PEAK 6 ± 1 MILLISECOND RISE TIME
       1 ± 1 MILLISECOND DECAY TIME
     - 6. HUMIDITY (NON-OPERATING): MIL-STD-810 METHOD 507 EXCEPT UNIT WILL UNDERGO 5 CYCLES IN LIEU OF 10 CYCLES SPECIFIED THEREIN.
     - 7. EXCEPT THAT DURING OPERATING EXPOSURES THE PERCENT CHANGE FROM INITIAL VOLTAGES SHALL NOT EXCEED ±15% WHILE MAINTAING THE DOUBLE AMPLITUDE REQUIREMETN OF PARA. 2.B.2.

4. SPECIAL CONDITIONING (100% BY MANUFACTURER) - UNIT SHALL BE OPERATED DURING TEMPERATURE CYCLING FOR 5 CONSECUTIVE CYCLES. EACH CYCLE IS AS FOLLOWS:
   - 2 1/2 HOURS AT 210°F ± 5°F
   - 2 1/2 HOURS AT ROOM TEMPERATURE (77°F REF)
   - 2 1/2 HOURS AT 0°F ± 5°F
   - 2 1/2 HOURS AT ROOM TEMPERATURE (77°F REF)

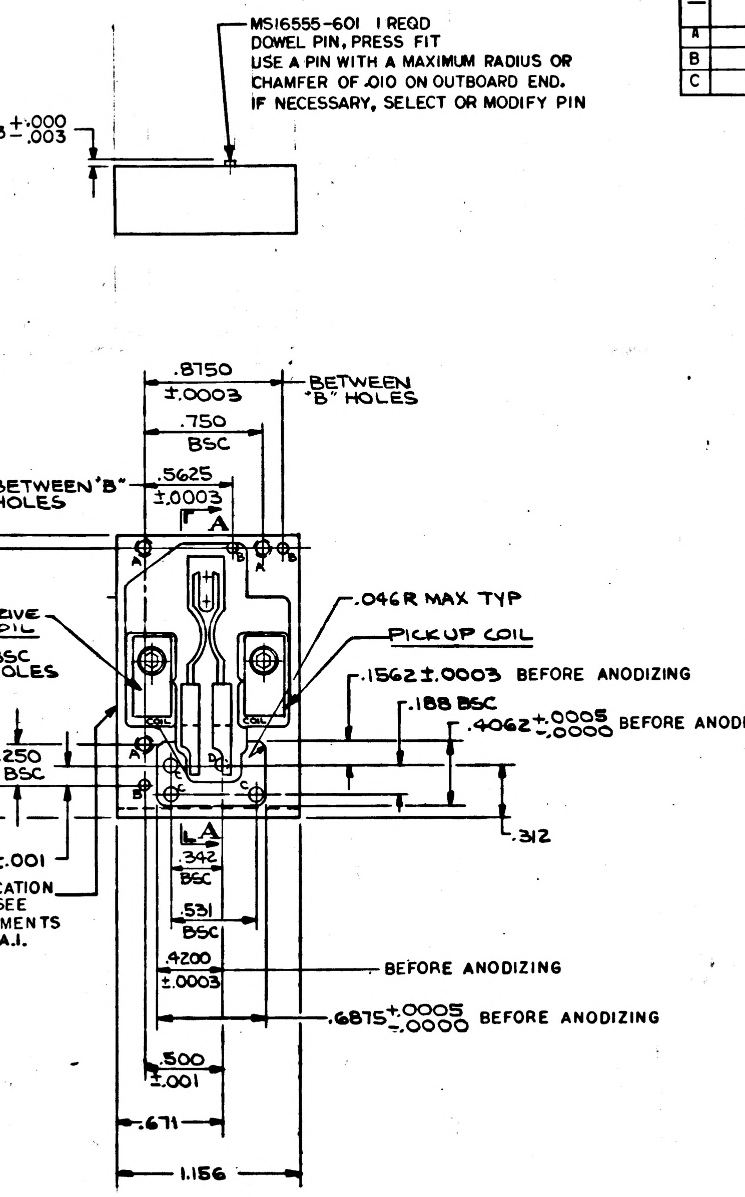
   THE MANUFACTURER SHALL SUPPLY TO CUSTOMER INSPECTION AND ACCEPTANCE REQUIREMENT DATA BEFORE AND AFTER SPECIAL CONDITIONING.

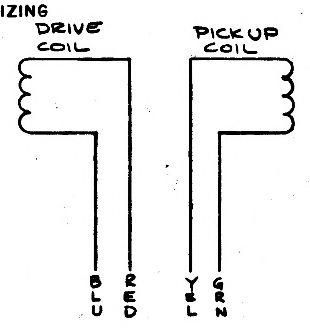
PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

HOLE WITH POLYTETROFLOUROETHYLENE BUSHING TO ACCOMMODATE COIL LEADS AT LOCATION SHOWN. INSIDE EDGES OF BUSHING SHALL BE ROUNDED TO PREVENT CHAFING OF LEADS. LEADS SHALL BE STRAIN RELIEVED AT EXIT HOLE AND EXTEND A MINIMUM OF 8 INCHES OUTSIDE OF HOUSING.


.468
VENT HOLE FOR DOWEL PIN
1.4687 ±.0003 BETWEEN "B" HOLES ONLY
.100 ±.015
.375 ±.015
CHAMFER 45° X .062
.312
FOCAL PLANE
.015 ±.002
TOP SURFACE OF "ACCUTRON" FORK APERATURE PLATE
32

SECTION A-A


MS16555-601 1 REQD DOWEL PIN, PRESS FIT USE A PIN WITH A MAXIMUM RADIUS OR CHAMFER OF .010 ON OUTBOARD END. IF NECESSARY, SELECT OR MODIFY PIN
.033 +.000 −.003
.8750 ±.0003 BETWEEN "B" HOLES
.750 BSC
BETWEEN "B" HOLES
.5625 ±.0003
A
1.750
DRIVE COIL
1.468 BSC TO "A" HOLES
.046R MAX TYP
PICKUP COIL
.1562 ±.0003 BEFORE ANODIZING
.188 BSC
.4062 +.0005 −.0000 BEFORE ANODIZING
.250 BSC
.312
.125 ±.001
IDENTIFICATION MARK – SEE REQUIREMENTS NOTE 2.A.I.
.342 BSC
.531 BSC
.4200 ±.0003 BEFORE ANODIZING
.6875 +.0005 −.0000 BEFORE ANODIZING
.500 ±.001
.671
1.156
A
B
C
D
COIL


DRIVE COIL
PICKUP COIL
BLU
RED
YEL
GRN

HOLE CHART

HOLE	DESCRIPTION	QUANTITY	
A	DR NO. 44 (.086) THRU C SINK 90° +0°-5° TO .120 DIA (OPP SIDE) NO. 3-48 NC-3B THRU	3	⊕ .010 DIA
B	.0622 +.0003 −.0000 DIA THRU	3	
C	DR NO 43 (.089) THRU C'BORE .190 DIA (OPP SIDE) X .094 DEEP	3	⊕ .004 DIA
D	.078 DIA THRU (SEE NOTE 1)	1	

NOTES:
1. HOUSING AND "D" HOLE TO BE BLACK ANODIZED ALL OVER IN ACCORDANCE WITH ND1002127 TYPE I. "A" & "B" HOLES SHALL NOT BE ANODIZED. ANODIZING "C" HOLES OPTIONAL.
2. BLACKEN BOTH SURFACES OF THE TWO APERTURE PLATES IN ACCORDANCE WITH MIL-F-495.
3. UNLESS OTHERWISE SPECIFIED:
   - a. 63✓ FINISH ALL OVER
   - b. BREAK CORNERS IN ACCORDANCE WITH ND1002078.

MASTER

KIC NO 68258001001

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
2011701	2011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE REQUIREMENTS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN R. BRUNELLE 6-15-64
CHECKED 9-16-64
APPROVED 11-1-64
APPROVED
APPROVED MIT 1 Dec 64
APPROVED MSC 12-1-64 DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESONATOR, TUNING FORK ASSY OF (PHOTOMETER)

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE D
DRAWING NO. 1012155
SCALE 2/1
SHEET 1 OF 1

1012155 D

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 14631			12-1-64	
A		REVISED PER TDRR 17495				
B		REVISED PER TDRR 18784			5/18/65	WR
C		REVISED PER TDRR 21258			8/17/65	WR
D		REVISED PER TDRR 23567	KCH		8/23/65	

REQUIREMENTS

1. GENERAL
   - A. INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS I.
   - C. PRESERVATION, PACKAGING, PACKING AND SHIPPING SHALL BE IN ACCORDANCE WITH ND 1002215.

2. INSPECTION AND ACCEPTANCE AT 70°F ± 5°F-
   - A. MECHANICAL REQUIREMENTS
     1. ITEMS SHALL BE MARKED WITH NASA DRAWING NUMBER, LATEST REVISION LETTER AND MANUFACTURER'S IDENTIFICATION IN ACCORDANCE WITH:
        UNITS - PER ND 1002019
        PACKAGE AND SHIPPING CONTAINER - PER MIL-STD-129
     2. DIMENSIONS AS SHOWN
     3. RESONANT FREQUENCY: 550 CPS ± 1 CPS
     4. MECHANICAL SWING, AS MEASURED AT APERTURE - .054 INCH DOUBLE AMPLITUDE AT A DRIVE VOLTAGE OF 6.5 V RMS MAX. WITHOUT MECHANICAL INTERFERENCE AT RESONANT FREQ. PER PARA. 2.A.3 AND A MIN. OF RESIDUAL MOMENTUM PER PARA. 3.B.
     5. MODULATING EDGE OF APERTURE PLATE SHALL BE LOCATED WITHIN .0005 FROM CENTER OF HOLE "D".
     6. LEADS: TE-32 PER MIL-W-16878
   - B. ELECTRICAL REQUIREMENTS
     1. COIL RESISTANCE
        - A. DRIVE COIL: 2155 OHMS ± 42 OHMS
        - B. PICK-UP COIL: 985 OHMS ± 20 OHMS

        AT 70°F, A TEMPERATURE COEFF. OF +22 PERCENT PER DEGREE F SHALL APPLY
     2. OUTPUT, PICK-UP COIL: 70MV ± 10 MV RMS WITH INPUT VOLTAGE DRIVE COIL 2.0 ± .2 V RMS, AT .015 ± .001 INCH DOUBLE AMPLITUDE AT RESONANT FREQUENCY PER PARA. 2.A.3.
     3. DIELECTRIC WITHSTANDING VOLTAGE: 500 VOLTS RMS, COIL TO COIL AND COIL TO FRAME PER MIL-STD-202, METHOD 301
     4. INSULATION RESISTANCE: 10 MEGOHMS MIN AT 100 VOLTS MIN, COIL TO COIL AND COIL TO GROUND PER MIL-STD 202, METHOD 302

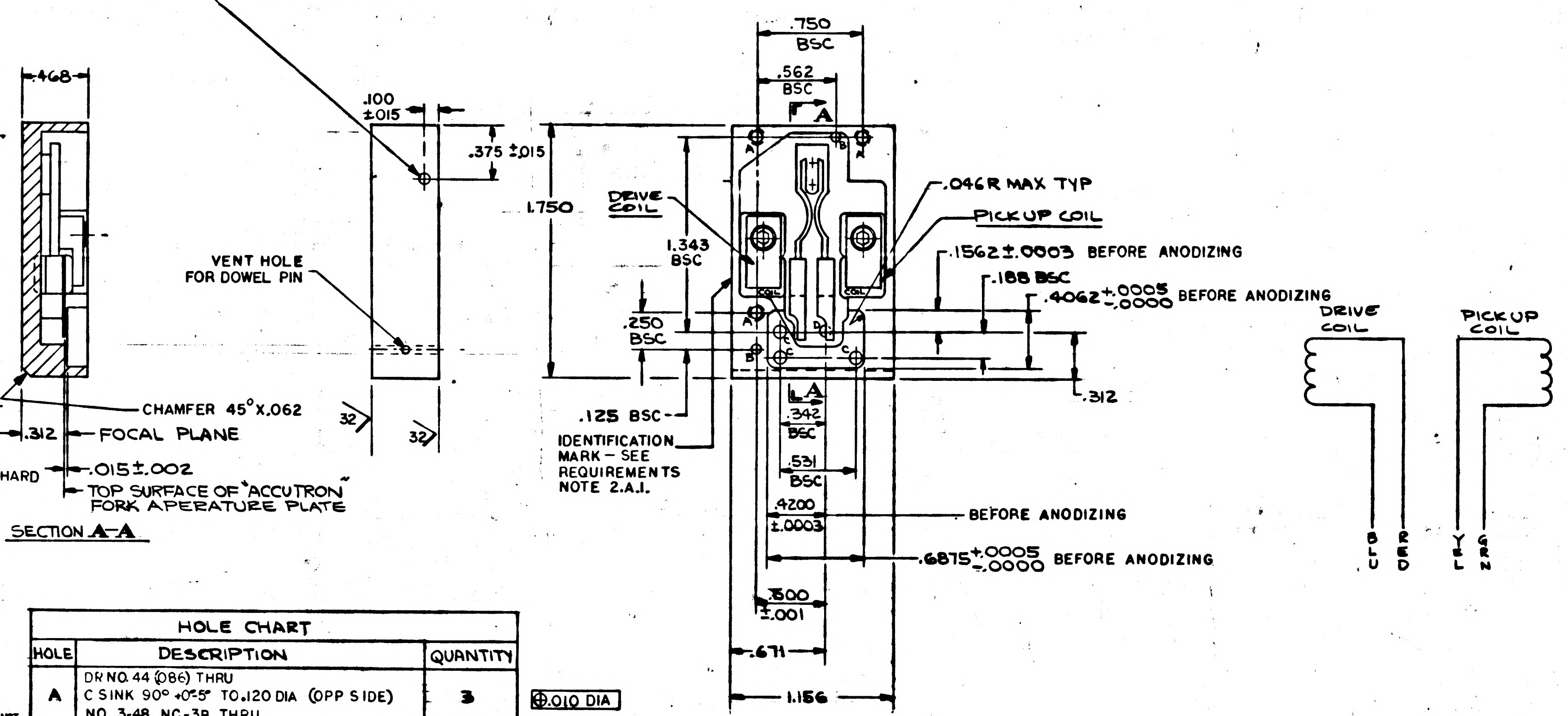
3. DESIGN REQUIREMENTS
   - A. INPUT VOLTAGE, DRIVE COIL: 2.0 ± .2 VOLTS RMS, AT A RESONANT FREQUENCY, 550 CPS ± 1 CPS.
   - B. BALANCE: THE FORKS SHALL BE BALANCED FOR A MINIMUM OF RESIDUAL MOMENTUM. THE MANUFACTURER SHALL PRESENT A PROCEDURE FOR BALANCING AND MEASURING THE RESIDUAL MOMENTUM OF THE FORKS TO THE CUSTOMER FOR APPROVAL PRIOR TO IMPLEMENTATION. BALANCE SHALL BE OBTAINED BY REMOVAL OF EXCESS MATERIAL. NO MATERIAL SHALL BE ADDED TO OBTAIN BALANCE WHICH WOULD PROTRUDE ABOVE SURFACE OF BALANCE WEIGHT.
   - C. APERTURE PLATES SHALL BE PERMANENTLY BONDED TO FORK TINE WEIGHT.
   - D. MATERIALS + PROCESS
     1. HOUSING - BERYLLIUM PER ND1002125-HEAT TREAT (STABILIZE & PRESS RELIEVE) PER ND1002114.
     2. COIL CLAMPS - ALUMINUM ALLOY IN ACCORDANCE WITH QQ-A-225/6-TEMPER T4 BLACK ANODIZE IN ACCORDANCE WITH MIL-A-8625 TYPE II.
     3. COIL CLAMP SCREWS - CRES, TO MEET THE REQUIREMENTS SPECIFIED IN NASA DRAWING 1011625.
     4. APERTURE PLATES - BERYLLIUM COPPER IN ACCORDANCE WITH QQ-C-533 HALF HARD
     5. SOLDERING SHALL BE IN ACCORDANCE WITH ND 1002071.
   - E. ENVIRONMENTAL REQUIREMENTS- THE UNIT SHALL BE CAPABLE OF MEETING ALL REQUIREMENTS BEFORE, DURING (EXCEPT NON-OPERATING), AND AFTER THE FOLLOWING EXPOSURES:
     1. HIGH TEMPERATURE (OPERATING): 167°F ± 5°F
     2. LOW TEMPERATURE (OPERATING): 0°F ± 5°F
     3. VIBRATION, RANDOM (NON-OPERATING): 10 TO 2000 CPS AT 0.1 g^2/CPS
        (3 ORTHOGONAL MOUNT AXES) 15 MINUTES/AXIS
     4. VIBRATION, SINUSOIDAL (NON OPERATING): 10 TO 2000 CPS AT 1g
        (3 ORTHOGONAL MOUNT AXES) 15 MINUTES/AXIS W/LOG SWEEP
     5. SHOCK (NON-OPERATING): 30g PEAK 6 ± 1 MILLISECOND RISE TIME
        1 ± 1 MILLISECOND DECAY TIME
     6. HUMIDITY (NON-OPERATING): MIL-STD-810 METHOD 507 EXCEPT UNIT WILL UNDERGO 5 CYCLES IN LIEU OF 10 CYCLES SPECIFIED THEREIN.
     7. EXCEPT THAT DURING OPERATING EXPOSURES THE PERCENT CHANGE FROM INITIAL VOLTAGES SHALL, NOT EXCEED ±15% WHILE MAINTAING THE DOUBLE AMPLITUDE REQUIREMETN OF PARA. 2.B.2.

4. SPECIAL CONDITIONING (100% BY MANUFACTURER) - UNIT SHALL BE OPERATED DURING TEMPERATURE CYCLING FOR 5 CONSECUTIVE CYCLES. EACH CYCLE IS AS FOLLOWS:
   2 1/2 HOURS AT 210°F ± 5°F
   2 1/2 HOURS AT ROOM TEMPERATURE (77°F REF)
   2 1/2 HOURS AT 0°F ± 5°F
   2 1/2 HOURS AT ROOM TEMPERATURE (77°F REF)

THE MANUFACTURER SHALL SUPPLY TO CUSTOMER INSPECTION AND ACCEPTANCE REQUIREMENT DATA BEFORE AND AFTER SPECIAL CONDITIONING.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

HOLE WITH POLYTETROFLOUROETHYLENE BUSHING TO ACCOMMODATE COIL LEADS AT LOCATION SHOWN. INSIDE EDGES OF BUSHING SHALL BE ROUNDED TO PREVENT CHAFING OF LEADS. LEADS SHALL BE STRAIN RELIEVED AT EXIT HOLE AND EXTEND A MINIMUM OF 8 INCHES OUTSIDE OF HOUSING.



SECTION A-A

HOLE CHART			
HOLE	DESCRIPTION	QUANTITY	
A	DR NO. 44 (.086) THRU C SINK 90° +0° -5° TO .120 DIA (OPP SIDE) NO. 3-48 NC-3B THRU	3	⊕ .010 DIA
B	1/16 DR THRU	2	⊕ .004 DIA
C	DR NO 43 (.089) THRU C'BORE .190 DIA (OPP SIDE) X .094 DEEP	3	⊕ .004 DIA
D	.078 DIA THRU (SEE NOTE 1)	1	

NOTES:
1. HOUSING AND "D" HOLE TO BE BLACK ANODIZED ALL OVER IN ACCORDANCE WITH ND1002127 TYPE I. "A" & "B" HOLES SHALL NOT BE ANODIZED. ANODIZING "C" HOLES OPTIONAL.
2. BLACKEN BOTH SURFACES OF THE TWO APERTURE PLATES IN ACCORDANCE WITH MIL-F-495.
3. UNLESS OTHERWISE SPECIFIED:
   - a. 63√ FINISH ALL OVER
   - b. BREAK CORNERS IN ACCORDANCE WITH ND1002078.

MASTER

KIC NO 68258001001

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

2011701	2011000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± - DECIMALS ±.005 ANGLES ± -
DO NOT SCALE THIS DRAWING

MATERIAL
SEE REQUIREMENTS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN R. BRUNELLE 6-15-64
CHECKED 9-16-64
APPROVED 11-1-64
APPROVED
APPROVED MIT
APPROVED MSC 12-1-64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESONATOR, TUNING FORK ASSY OF (PHOTOMETER)

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE D
DRAWING NO. 1012155
SCALE 2/1
SHEET 1 OF 1

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1012155 E

REQUIREMENTS

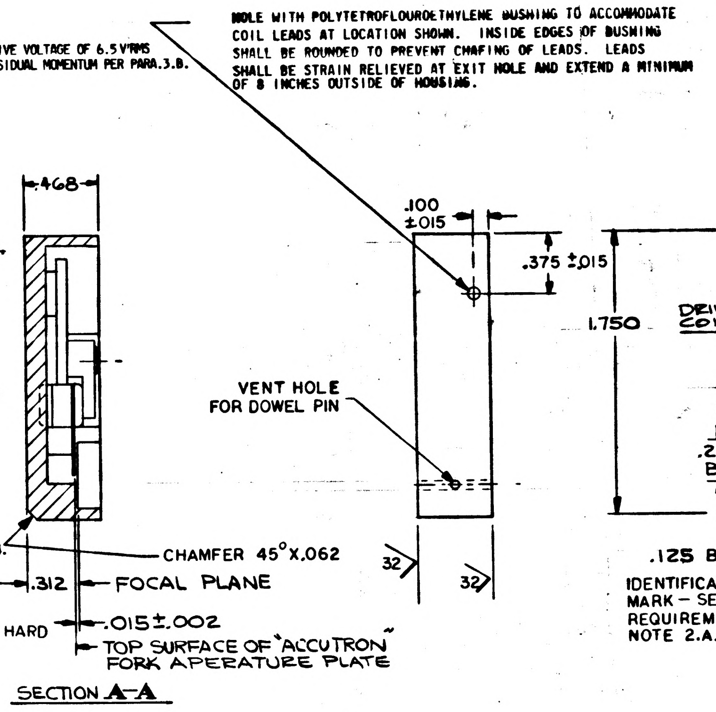
1. GENERAL
   - A. INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS I.
   - C. PRESERVATION, PACKAGING, PACKING AND SHIPPING SHALL BE IN ACCORDANCE WITH ND 1002215.

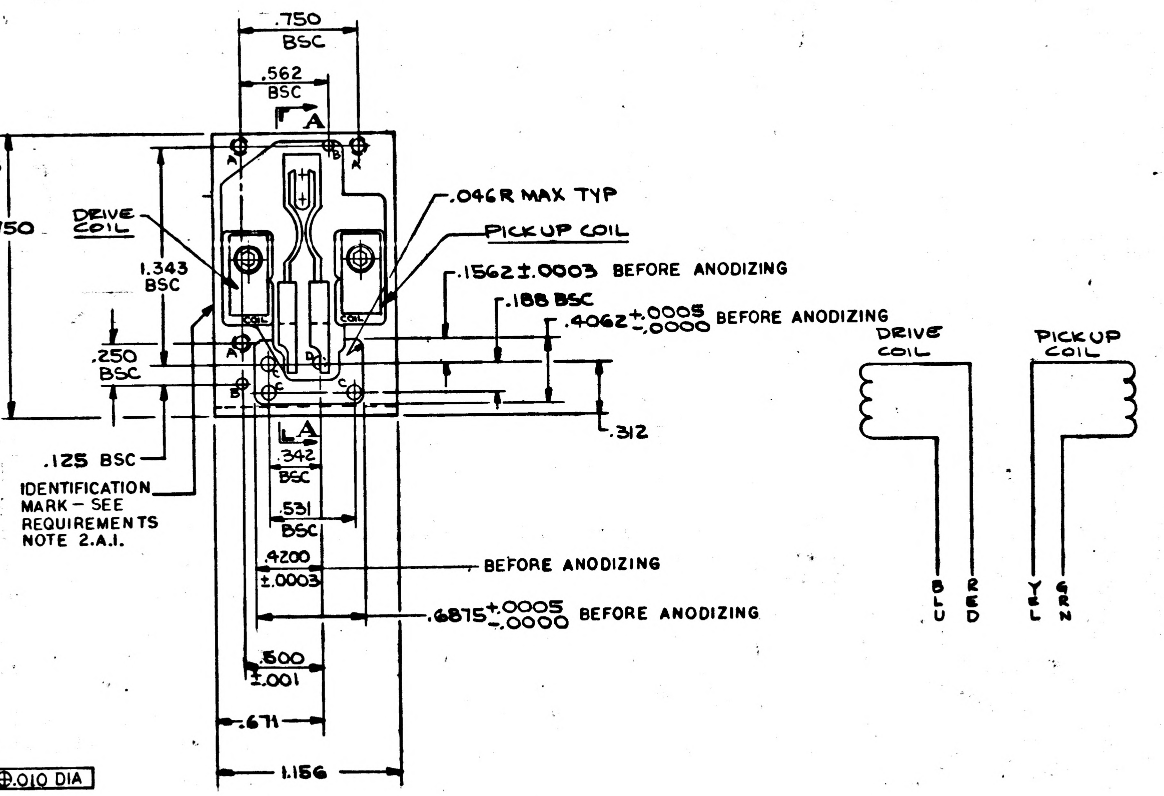
2. INSPECTION AND ACCEPTANCE AT 70°F ± 5°F-
   - A. MECHANICAL REQUIREMENTS
     1. ITEMS SHALL BE MARKED WITH NASA DRAWING NUMBER, LATEST REVISION LETTER AND MANUFACTURER'S IDENTIFICATION IN ACCORDANCE WITH:
        UNITS - PER ND 1002019
        PACKAGE AND SHIPPING CONTAINER - PER MIL-STD-129
     2. DIMENSIONS AS SHOWN
     3. RESONANT FREQUENCY: 550 CPS ± 1 CPS
     4. MECHANICAL SWING, AS MEASURED AT APERTURE - .034 INCH DOUBLE AMPLITUDE AT A DRIVE VOLTAGE OF 6.5 V RMS MAX. WITHOUT MECHANICAL INTERFERENCE AT RESONANT FREQ. PER PARA. 2.A.3 AND A MIN. OF RESIDUAL MOMENTUM PER PARA. 3.B.
     5. MODULATING EDGE OF APERTURE PLATE SHALL BE LOCATED WITHIN .0005 FROM CENTER OF HOLE "D".
     6. LEADS: ET-26 PER MIL-W-16878/ 6
   - B. ELECTRICAL REQUIREMENTS
     1. COIL RESISTANCE
        A. DRIVE COIL: 2155 OHMS ± 42 OHMS } AT 70°F, A TEMPERATURE COEFF. OF +22
        B. PICK-UP COIL: 985 OHMS ± 20 OHMS } PERCENT PER DEGREE F SHALL APPLY
     2. OUTPUT, PICK-UP COIL: 70MV ± 10 MV RMS WITH INPUT VOLTAGE DRIVE COIL 2.0 ± .2 V RMS, AT .015 ± .001 INCH DOUBLE AMPLITUDE AT RESONANT FREQUENCY PER PARA. 2.A.3.
     3. DIELECTRIC WITHSTANDING VOLTAGE: 500 VOLTS RMS, COIL TO COIL AND COIL TO FRAME PER MIL-STD-202, METHOD 301
     4. INSULATION RESISTANCE: 10 MEGOHMS MIN AT 100 VOLTS MIN, COIL TO COIL AND COIL TO GROUND PER MIL-STD 202, METHOD 302

3. DESIGN REQUIREMENTS
   - A. INPUT VOLTAGE, DRIVE COIL: 2.0 ± .2 VOLTS RMS, AT A RESONANT FREQUENCY, 550 CPS ± 1 CPS.
   - B. BALANCE: THE FORKS SHALL BE BALANCED FOR A MINIMUM OF RESIDUAL MOMENTUM. THE MANUFACTURER SHALL PRESENT A PROCEDURE FOR BALANCING AND MEASURING THE RESIDUAL MOMENTUM OF THE FORKS TO THE CUSTOMER FOR APPROVAL PRIOR TO IMPLEMENTATION. BALANCE SHALL BE OBTAINED BY REMOVAL OF EXCESS MATERIAL. NO MATERIAL SHALL BE ADDED TO OBTAIN BALANCE WHICH WOULD PROTRUDE ABOVE SURFACE OF BALANCE WEIGHT.
   - C. APERTURE PLATES SHALL BE PERMANENTLY BONDED TO FORK TINE WEIGHT.
   - D. MATERIALS + PROCESS
     1. HOUSING - BERYLLIUM PER ND1002125-HEAT TREAT(STABILIZE & PRESS RELIEVE) PER ND1002114.
     2. COIL CLAMPS - ALUMINUM ALLOY IN ACCORDANCE WITH QQ-A-225/6-TEMPER T4 BLACK ANODIZE IN ACCORDANCE WITH MIL-A-8625 TYPE II.
     3. COIL CLAMP SCREWS - CRES, TO MEET THE REQUIREMENTS SPECIFIED IN NASA DRAWING 1011625.
     4. APERTURE PLATES - BERYLLIUM COPPER IN ACCORDANCE WITH QQ-C-533 HALF HARD
     5. SOLDERING SHALL BE IN ACCORDANCE WITH ND 1002071.
   - E. ENVIRONMENTAL REQUIREMENTS- THE UNIT SHALL BE CAPABLE OF MEETING ALL REQUIREMENTS BEFORE, DURING (EXCEPT NON-OPERATING), AND AFTER THE FOLLOWING EXPOSURES:
     1. HIGH TEMPERATURE (OPERATING): 167°F ± 5°F
     2. LOW TEMPERATURE (OPERATING): 0°F ± 5°F
     3. VIBRATION, RANDOM (NON-OPERATING): 10 TO 2000 CPS AT 0.1 g^2/CPS
        (3 ORTHOGONAL MOUNT AXES) 15 MINUTES/AXIS
     4. VIBRATION, SINUSOIDAL(NON OPERATING): 10 TO 2000 CPS AT 1g
        (3 ORTHOGONAL MOUNT AXES) 15 MINUTES/AXIS W/LOG SWEEP
     5. SHOCK (NON-OPERATING): 30g PEAK 6 ± 1 MILLISECOND RISE TIME
        1 ± 1 MILLISECOND DECAY TIME
     6. HUMIDITY (NON-OPERATING): MIL-STD-810 METHOD 507 EXCEPT UNIT WILL UNDERGO 5 CYCLES IN LIEU OF 10 CYCLES SPECIFIED THEREIN.
     7. EXCEPT THAT DURING OPERATING EXPOSURES THE PERCENT CHANGE FROM INITIAL VOLTAGES SHALL, NOT EXCEED ±15% WHILE MAINTAING THE DOUBLE AMPLITUDE REQUIREMETN OF PARA. 2.B.2.

4. SPECIAL CONDITIONING (100% BY MANUFACTURER) - UNIT SHALL BE OPERATED DURING TEMPERATURE CYCLING FOR 5 CONSECUTIVE CYCLES. EACH CYCLE IS AS FOLLOWS:
   2 1/2 HOURS AT 210°F ± 5°F
   2 1/2 HOURS AT ROOM TEMPERATURE (77°F REF)
   2 1/2 HOURS AT 0°F ± 5°F
   2 1/2 HOURS AT ROOM TEMPERATURE (77°F REF)
   THE MANUFACTURER SHALL SUPPLY TO CUSTOMER INSPECTION AND ACCEPTANCE REQUIREMENT DATA BEFORE AND AFTER SPECIAL CONDITIONING.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034
FOR THIS DRAWING


HOLE WITH POLYTETROFLOUROETHYLENE BUSHING TO ACCOMMODATE COIL LEADS AT LOCATION SHOWN. INSIDE EDGES OF BUSHING SHALL BE ROUNDED TO PREVENT CHAFING OF LEADS. LEADS SHALL BE STRAIN RELIEVED AT EXIT HOLE AND EXTEND A MINIMUM OF 8 INCHES OUTSIDE OF HOUSING.
.468
.100 ±.015
.375 ±.015
VENT HOLE FOR DOWEL PIN
CHAMFER 45° X .062
.312
FOCAL PLANE
.015±.002
TOP SURFACE OF "ACCUTRON" FORK APERATURE PLATE
32
32
SECTION A-A


.750 BSC
.562 BSC
A
1.750
DRIVE COIL
1.343 BSC
.250 BSC
.125 BSC
IDENTIFICATION MARK – SEE REQUIREMENTS NOTE 2.A.I.
.046R MAX TYP
PICKUP COIL
.1562±.0003 BEFORE ANODIZING
.188 BSC
.4062+.0005 -.0000 BEFORE ANODIZING
.312
A
.342 BSC
.531 BSC
.4200 ±.0003 BEFORE ANODIZING
.6875+.0005 -.0000 BEFORE ANODIZING
.500 ±.001
.671
1.156
A B C D
COIL
DRIVE COIL
PICKUP COIL
BLU
RED
YEL
GRN

HOLE CHART			
HOLE	DESCRIPTION	QUANTITY	
A	DR NO. 44 (.086) THRU C SINK 90° +0°-5° TO .120 DIA (OPP SIDE) NO. 3-48 NC-3B THRU	3	⊕.010 DIA
B	1/16 DR THRU	2	⊕.004 DIA
C	DR NO 43 (.089) THRU C'BORE .190 DIA (OPP SIDE) X .094 DEEP	3	⊕.004 DIA
D	.078 DIA THRU (SEE NOTE 1)	1	

NOTES:
1. HOUSING AND "D" HOLE TO BE BLACK ANODIZED ALL OVER IN ACCORDANCE WITH ND1002127 TYPE I. "A" & "B" HOLES SHALL NOT BE ANODIZED. ANODIZING "C" HOLES OPTIONAL.
2. BLACKEN BOTH SURFACES OF THE TWO APERTURE PLATES IN ACCORDANCE WITH MIL-F-495.
3. UNLESS OTHERWISE SPECIFIED:
   a. 63 FINISH ALL OVER
   b. BREAK CORNERS IN ACCORDANCE WITH ND1002078.

MASTER

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 14631			12-1-64	WK
A		REVISED PER TDRR 17495				WK
B		REVISED PER TDRR 18784			5/18/65	WK
C		REVISED PER TDRR 21258			8/17/65	WK
Ⓜ D		REVISED PER TDRR 23567	KCH		8 Nov 65	WK
E		REVISED PER TDRR 24798			12/3/65	WK

KIC NO 68258001001

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
2011701	2011000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± – DECIMALS ±.005 ANGLES ± –
DO NOT SCALE THIS DRAWING

MATERIAL
SEE REQUIREMENTS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN R. BRUNELLE 6-15-64
CHECKED 9-16-64
APPROVED 11-1-64
APPROVED
APPROVED MIT
APPROVED MSC 12-1-64 DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESONATOR, TUNING FORK
ASSY OF (PHOTOMETER)

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE D
DRAWING NO. 1012155
SCALE 2/1
SHEET 1 OF 1

—	1012155

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 14631			12-1-64	WK

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REQUIREMENTS

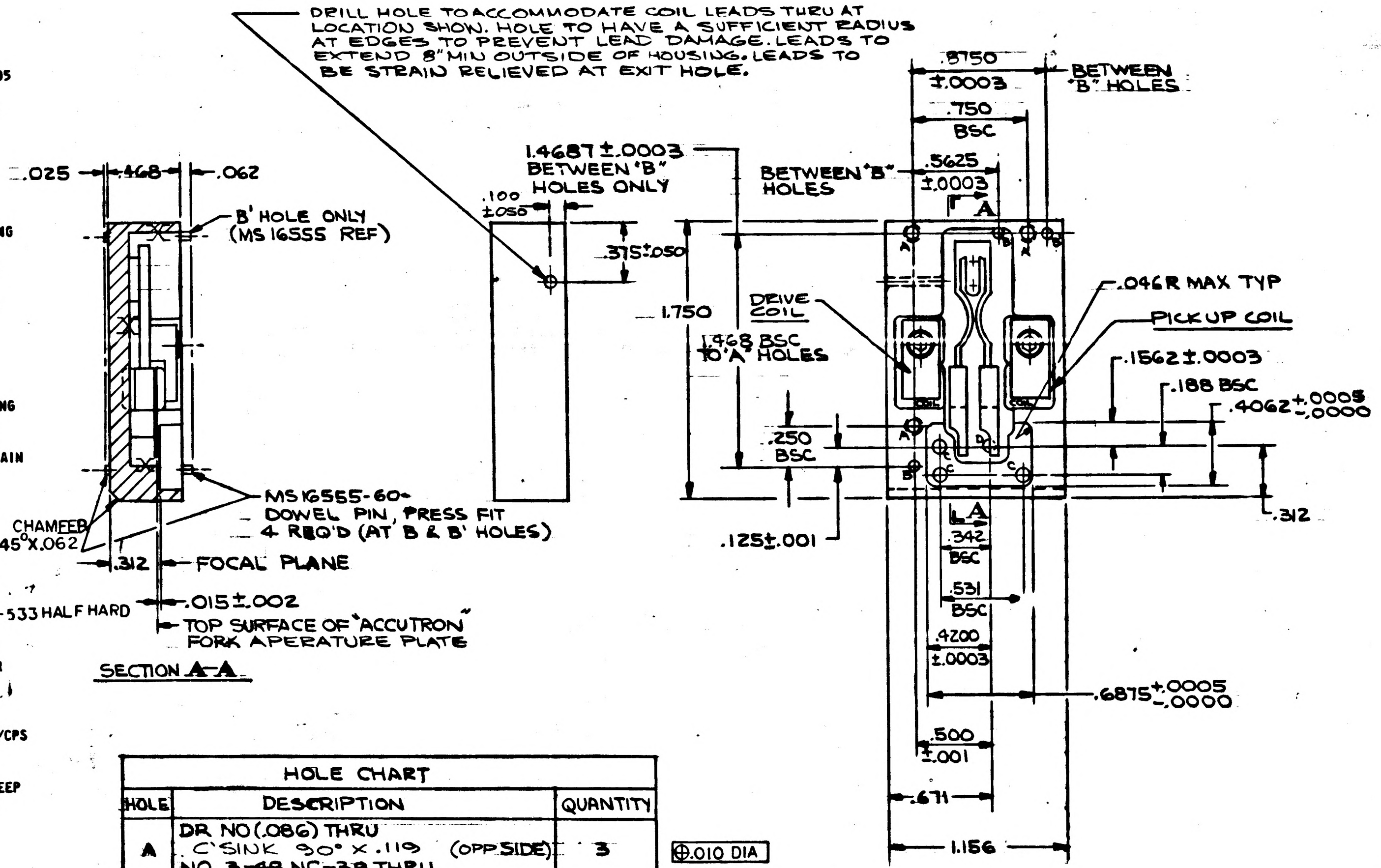
1. GENERAL
   - A. INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS I.
   - C. PRESERVATION, PACKAGING, PACKING AND SHIPPING SHALL BE IN ACCORDANCE WITH ND 1002215.

2. INSPECTION AND ACCEPTANCE
   - A. MECHANICAL REQUIREMENTS
     1. ITEMS SHALL BE MARKED WITH NASA DRAWING NUMBER, LATEST REVISION LETTER AND MANUFACTURER'S IDENTIFICATION IN ACCORDANCE WITH:
        UNITS - PER ND 1002019
        PACKAGE AND SHIPPING CONTAINER - PER MIL-STD-129
     2. DIMENSIONS AS SHOWN
     3. RESONANT FREQUENCY: 550 CPS ± 1 CPS
     4. MECHANICAL SWING, AS MEASURED AT APERTURE - .010 INCH MIN DOUBLE AMPLITUDE AT RATED DRIVE VOLTAGE + FREQUENCY
     5. MODULATING EDGE OF APERTURE PLATE SHALL BE LOCATED WITHIN .0005 FROM CENTER OF HOLE "D".
     6. LEADS: TE-32 PER MIL-W-16878
   - B. ELECTRICAL REQUIREMENTS
     1. COIL RESISTANCE
        - A. DRIVE COIL: 2155 OHMS ± 42 OHMS
        - B. PICK-UP COIL: 965 OHMS ± 20 OHMS
     2. OUTPUT, PICK-UP COIL: 195 MV ± 25 MV RMS IN PHASE WITH DRIVING VOLTAGE AT .010 INCH DOUBLE AMPLITUDE AT RESONANT FREQUENCY
     3. DIELECTRIC WITHSTANDING VOLTAGE: 500 VOLTS RMS, COIL TO COIL AND COIL TO FRAME PER MIL-STD-202, METHOD 301
     4. INSULATION RESISTANCE: 10 MEGOHMS MIN AT 100 VOLTS MIN, COIL TO COIL AND COIL TO GROUND PER MIL-STD 202, METHOD 302

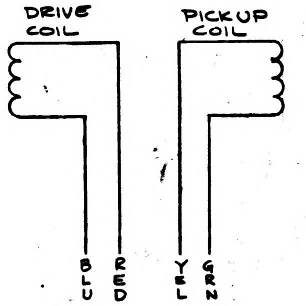
3. DESIGN REQUIREMENTS
   - A. INPUT VOLTAGE, DRIVE COIL: 3.2 ± .2 VOLTS RMS + FREQUENCY
   - B. BALANCE: THE FORKS SHALL BE BALANCED FOR A MINIMUM OF RESIDUAL MOMENTUM. THE MANUFACTURER SHALL PRESENT A PROCEDURE FOR BALANCING AND MEASURING THE RESIDUAL MOMENTUM OF THE FORKS TO THE CUSTOMER FOR APPROVAL PRIOR TO IMPLEMENTATION. BALANCE SHALL BE OBTAINED BY REMOVAL OF EXCESS MATERIAL. NO MATERIAL SHALL BE ADDED TO OBTAIN BALANCE WHICH WOULD PROTRUDE ABOVE SURFACE OF BALANCE WEIGHT.
   - C. APERTURE PLATES SHALL BE PERMANENTLY BONDED TO FORK TINE WEIGHT.
   - D. MATERIALS + PROCESS
     1. HOUSING - BERYLLIUM PER ND 1002125
     2. COIL CLAMPS - CRES IN ACCORDANCE WITH QQ-S-763, CLASS 416, COND. A.
     3. COIL CLAMP SCREWS - CRES, TO MEET THE REQUIREMENTS SPECIFIED IN NASA DRAWING 1011625.
     4. APERTURE SHADES - BERYLLIUM COPPER IN ACCORDANCE WITH QQ-C-533 HALF HARD
     5. SOLDERING SHALL BE IN ACCORDANCE WITH ND 1002071.
   - E. ENVIRONMENTAL REQUIREMENTS- THE UNIT SHALL BE CAPABLE OF MEETING ALL REQUIREMENTS BEFORE, DURING (EXCEPT NON-OPERATING), AND AFTER THE FOLLOWING EXPOSURES:
     1. HIGH TEMPERATURE (OPERATING): 210°F ± 5°F
     2. LOW TEMPERATURE (OPERATING): 0°F ± 5°F
     3. VIBRATION, RANDOM (NON-OPERATING): 10 TO 2000 CPS AT 0.1 g^2/CPS
        (3 ORTHOGONAL MOUNT AXES) 15 MINUTES/AXIS
     4. VIBRATION, SINUSOIDAL (OPERATING): 10 TO 2000 CPS AT 1g
        (3 ORTHOGONAL MOUNT AXES) 15 MINUTES/AXIS W/LOG SWEEP
     5. SHOCK (NON-OPERATING): 30g PEAK 6 ± 1 MILLISECOND RISE TIME
        1 ± 1 MILLISECOND DECAY TIME
     6. HUMIDITY (NON-OPERATING): MIL-STD-810 METHOD 507 EXCEPT UNIT WILL UNDERGO 5 CYCLES IN LIEU OF 10 CYCLES SPECIFIED THEREIN.

4. SPECIAL CONDITIONING (100% BY MANUFACTURER) - UNIT SHALL BE OPERATED DURING TEMPERATURE CYCLING FOR 5 CONSECUTIVE CYCLES. EACH CYCLE IS AS FOLLOWS:
   2 1/2 HOURS AT 210°F ± 5°F
   2 1/2 HOURS AT ROOM TEMPERATURE (77°F REF)
   2 1/2 HOURS AT 0°F ± 5°F
   2 1/2 HOURS AT ROOM TEMPERATURE (77°F REF)
   THE MANUFACTURER SHALL SUPPLY TO CUSTOMER INSPECTION AND ACCEPTANCE REQUIREMENT DATA BEFORE AND AFTER SPECIAL CONDITIONING.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING


DRILL HOLE TO ACCOMMODATE COIL LEADS THRU AT LOCATION SHOWN. HOLE TO HAVE A SUFFICIENT RADIUS AT EDGES TO PREVENT LEAD DAMAGE. LEADS TO EXTEND 8" MIN OUTSIDE OF HOUSING. LEADS TO BE STRAIN RELIEVED AT EXIT HOLE.
.025
.468
.062
B' HOLE ONLY (MS 16555 REF)
MS16555-60- DOWEL PIN, PRESS FIT 4 REQ'D (AT B & B' HOLES)
CHAMFER 45° X .062
.312
FOCAL PLANE
.015 ± .002
TOP SURFACE OF "ACCUTRON" FORK APERATURE PLATE
1.4687 ± .0003 BETWEEN 'B' HOLES ONLY
.100 ±.050
.375 ±.050
1.750
.8750 ±.0003
BETWEEN "B" HOLES
.750 BSC
.5625 ±.0003
BETWEEN "B" HOLES
A
DRIVE COIL
1.468 BSC TO 'A' HOLES
.046R MAX TYP
PICKUP COIL
.1562 ±.0003
.188 BSC
.4062 +.0005 -.0000
.250 BSC
.125 ±.001
.312
A
.342 BSC
.531 BSC
.4200 ±.0003
.6875 +.0005 -.0000
.500 ±.001
.671
1.156

SECTION A-A


DRIVE COIL
PICKUP COIL
BLU
RED
YEL
GRN

HOLE CHART			
HOLE	DESCRIPTION	QUANTITY	
A	DR NO (.086) THRU C'SINK 90° X .119 (OPP SIDE) NO. 3-48 NC-3B THRU	3	⊕.010 DIA
B	.0622 +.0003 -.0000 DIA THRU	3	
C	DR NO 43 (.089) THRU C'BORE .140 DIA (OPP SIDE) X .083 DEEP	3	⊕.004 DIA
D	.078 DIA THRU (SEE NOTE 2)	1	

NOTES:
1. SURFACES MARKED "X" TO BE VAPOR BLASTED THEN BLACK ANODIZED IN ACCORDANCE WITH ND 1002127.
2. BLACK ANODIZE HOLE "D" IN ACCORDANCE WITH ND 1002127.
3. BLACKEN BOTH SURFACES OF THE TWO APERTURE SHADES IN ACCORDANCE WITH MIL-F-495.

MASTER

KIC NO 68258001001

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

2011701	2011000
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± - DECIMALS ±.005 ANGLES ± -
DO NOT SCALE THIS DRAWING

MATERIAL
SEE REQUIREMENTS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN R. BRUNELLE 6-15-64
CHECKED 9-16-64
APPROVED 11-1-64
APPROVED
APPROVED MIT
APPROVED MSC 12-1-64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESONATOR, TUNING FORK
ASSY OF (PHOTOMETER)

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. | SIZE D | DRAWING NO. 1012155
SCALE 2/1 | SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1012156 | A

REVISIONS 11517			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 11517	8/14/64	WR.
A	REVISED PER TDRR 16369	2/17/65	WR

NOTES:

1. GENERAL REQUIREMENTS:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. UNITS SHALL MEET THE GENERAL REQUIREMENT OF ND 1002016.
   - C. MANUFACTURER SHALL COMPLY WITH THE QUALITY ASSURANCE PROVISIONS OF ND 1015404, CLASS 1.
   - D. UNITS SHALL BE CAPABLE OF METTING THE QUALIFICATION REQUIREMENTS OF ND 1002053.
   - E. PACKAGING: PER ND1002215, CLASS I, CODE 1 (SEALED CONTAINERS)
   - F. MANUFACTURER'S NAME AND/OR SYMBOL, PART NUMBER, NASA DWG. NO. AND REV. LETTER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE REAR OF THE END CAP, THE OUTSIDE CASE DIAMETER BEING CLEAR OF MARKING. EACH CONTAINER SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION PER ND 1002019.

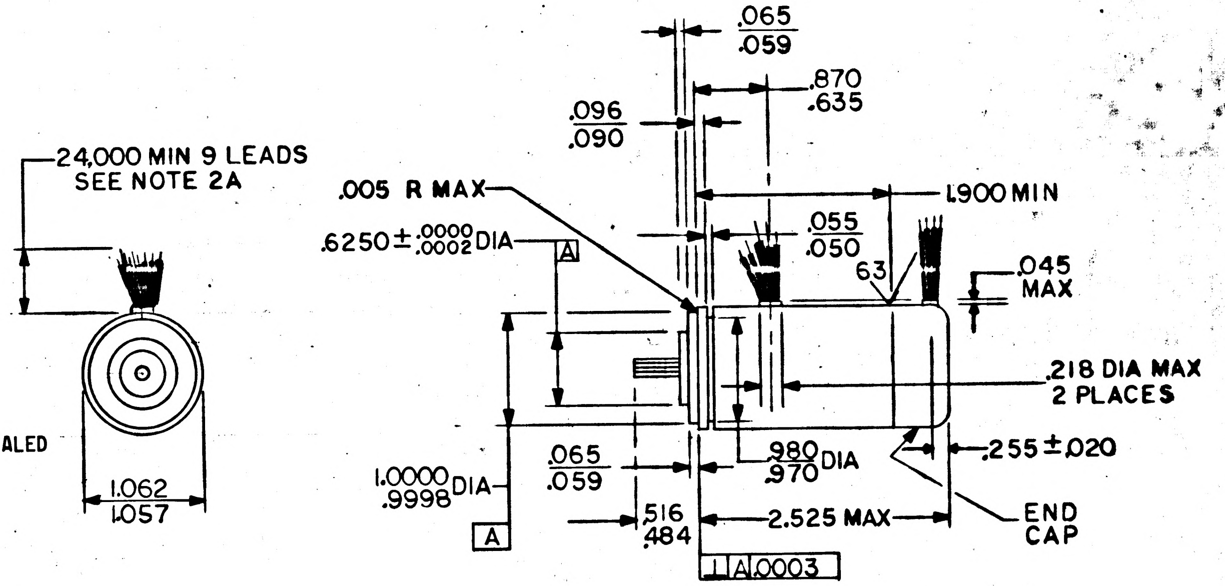
2. ACCEPTANCE AND INSPECTION REQUIREMENTS (100%):
   - A. MECHANICAL PROPERTIES:
     - (1) LEADS: EXIT HOLES IN LINE WITHIN 5° OF EACH OTHER. LEADS SHALL BE POLYTETRAFLUOROETHYLENE (TFE) INSULATED AND COLOR CODED PER MIL-W-16878, E26 EXCEPT THE BLUE HI-OUTPUT GENERATOR LEAD SHALL BE SHIELDED ONE-CONDUCTOR WITH A BLUE TFE JACKET. SHIELD SHALL BE GROUNDED TO SERVO MOTOR FRAME RESISTANCE BETWEEN FRAME AND SHIELD TERMINATION SHALL BE 1/2 OHM MAX.
     - (2) SHAFT TOLERANCES, DYNAMIC: RUNOUT OF DIAMETER A SHALL BE .0005 TIR MAXIMUM WHEN UNIT IS IN THE VERTICAL POSITION SUSPENDED BY THE SHAFT. SHAFT END PLAY SHALL BE BETWEEN .0010 AND .0030 UNDER A 16 ± 1 OUNCE REVERSING GAUGE LOAD. SHAFT RADIAL PLAY SHALL BE .0007 TIR MAXIMUM AT A POINT .125 MAXIMUM FROM THE CASE UNDER AN 8.0 ± 0.5 OUNCE REVERSING GAUGE LOAD APPLIED TO A POINT .250 MAXIMUM FROM THE CASE.
       - A. FOR PLAIN SHAFT MOTORS: "THE SHAFT RUNOUT SHALL BE 0.0004 TIR MAX. WHEN THE UNIT IS IN THE VERTICAL POSITION SUPPORTED BY THE CASE."
     - (3) GEAR DESIGN DATA:

NUMBER OF TEETH	13
DIAMETRAL PITCH	120
PRESSURE ANGLE	20°
STANDARD PITCH DIAMETER	.1083°
AGMA QUALITY CLASS	PREC. 1
OUTSIDE DIAMETER	.1247 +.0000 -.0010
GEAR TEETH FINISH	32

   - B. ELECTRICAL TEST:
     - (1) UNITS SHALL MEET THE REQUIREMENTS OF ND 1012156. EXCEPT FOR AXIS ERROR (¶ 3.5.B.b.2b) SHALL BE PER TABLE I

3. DESIGN REQUIREMENTS:
   - A. OPERATING LIFE: 2000 HRS PER ND 1002016.
   - B. STORAGE LIFE: 2 YEARS WITH NO DETERIORATION OF THE INSULATION OR LUBRICANT. WHEN PACKAGED IN SEALED CONTAINERS.
   - C. CONSTRUCTION:
     - (1) MATERIAL: CASE AND SHAFT SHALL BE CORROSION-RESISTING STEEL IN ACCORDANCE WITH QQ-S-763, CLASS 416, COND T.
     - (2) FINISH: PASSIVATED IN ACCORDANCE WITH MIL-F-14072, E 300.
     - (3) LUBRICATION: BEARINGS SHALL BE LUBRICATED AS SPECIFIED IN ND 1002077.
     - (4) ROTOR INERTIA: THE ROTOR INERTIA SHALL BE 5.5 $gm\text{-}cm^2$ ± 20%.
   - D. ENVIRONMENTAL
     - (1) REQUIREMENTS ABOVE AT 25°C AMBIENT TEMPERATURE.
     - (2) GENERATOR OUTPUT WINDING SHALL NOT EXCEED +165°C AS MEASURED PER ND 1002016.

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND1002034 FOR THIS DRAWING.



MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL: SEE NOTES
HEAT TREATMENT: NONE
FINAL FINISH: NONE

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT

DRAWN A. Addario Jr. DATE 6 Aug 64
CHECKED W.M. Lauman 12 Aug 64
APPROVAL R. J. Therrien 8-12-64
APPROVAL
NASA APPROVAL 8/14/64
MIT APPROVAL 18 Aug 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SERVO MOTOR–
TACHOMETER, GENERATOR

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
—	C	1012156

SCALE NONE | WT .438 LBS MAX | SHEET 1 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		THIS SHEET ADDED PER TDRR 16369			2/17/66	WK

4. SPECIAL CONDITIONING (BY VENDOR):

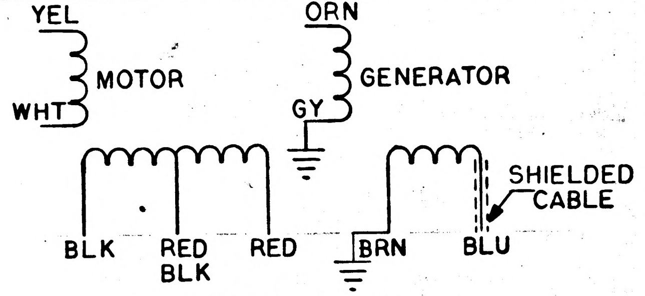
A. PRIOR TO SHIPMENT EACH UNIT SHALL BE PROPERLY ENERGIZED UNDER ROOM AMBIENT CONDITIONS (25°C) AND RUN-IN FOR TEN 30 MINUTE PERIODS IN THE FOLLOWING SEQUENCE. (RPM)(TOL ±2%)

1 - 1000 rpm (CW): 2 - 1000 rpm (CCW)
3 - 6000 rpm (CW): 4 - 6000 rpm (CCW)
5 -10,000 rpm min (CW): 6 - 10,000 rpm min (CCW)
7 - 6,000 rpm (CW): 8 - 6,000 rpm (CCW)
9 - 1,000 rpm (CW): 10 - 1,000 rpm (CCW)

EACH UNIT SHALL MEET ALL ACCEPTANCE AND INSPECTION REQUIREMENTS AFTER THIS BURN-IN CYCLE.

B. SUPPLIER FINAL INSPECTION DETAIL PERFORMANCE DATA SHALL BE SUPPLIED WITH THE PRODUCT.

5. IN ADDITION TO THE QUALIFICATION REQUIREMENTS OF ND1002053 THE UNIT SHALL BE CAPABLE OF MEETING A SALT FOG TEST PER METHOD 509.1 OF MIL-STD-810 EXCEPT THE SALT SOLUTION SHALL BE 1% BY WEIGHT. SHAFT END OF UNIT WILL BE PROTECTED DURING EXPOSURE.



WIRING DIAGRAM

TABLE I

PART NO.	AXIS ERROR	SHAFT DETAIL	SPECIAL REQUIREMENTS
1012156-1	2MV MAX	PINION	NOTE 4
1012156-2	4MV MAX	PINION	NOTE 4
1012156-3	2MV MAX	PLAIN $\frac{.1200}{.1198}$ O.D.	NOTE 4 & 5

(A) THIS SHEET ADDED

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN A. Addario Jr. 15 Feb 65
CHECKED A. Marto 2-17-65
APPROVED R. J. Therrien 2-17-65
APPROVED
APPROVED MIT W. Trageser 15 Feb 65
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SERVO MOTOR —
TACHOMETER, GENERATOR

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. —— SIZE C DRAWING NO. 1012156

SCALE NONE SHEET 2 OF 2

MASTER

APOLLO G&N Specification
PS 1012156
12 Aug 64
Class A
TDRR 11535

PROCUREMENT SPECIFICATION
SERVO MOTOR-GENERATOR
TYPE 28V11SMG8a

Record of Revisions

Revision Letter	TDRR No.	Pages Revised	Approvals		DATE
			MIT	NASA	
A	23718	3	WR.	A. C. METZGER	

This specification consists of pages i through iii and 1 to 6 inclusive.

3.4.2.1 Impedance, Generator Output. $(3000 \pm 2000) + j\,(7000 \pm 2500)$

3.4.2.2 Current (Tuned) (Rotor Stalled)

a) Motor Reference Winding	128 ± 30ma
b) Motor Control Winding	105 ± 30ma
c) Generator Reference Winding	61 ± 20ma

3.4.2.3 Temperature Rise 60°C.

3.4.3.1 General. After each environmental test, the motor generator shall, under normal ambient conditions, exhibit characteristics as specified in 35Ac1, 35Ac2, 35Ac3, 35Bb2, 35Bb3, 35Bb4 of this specification.

3.4.3.2 Temperature and Vacuum Tests. During the following test, the unit shall be cycled as follows: Step 1 - 1 hour with rated voltage on reference windings; Step 2, - 10 minutes with rated voltage on all windings, however, limit speed to 10,000 rpm (vary control winding); Step 3, - repeat Step 1; Step 4, - Repeat Step 2 with opposite polarity on control winding. The following characteristics shall be exhibited at least once each 16 hours.

a)	The motor shall at no time single phase	
b)	Motor Starting Voltage	2.0 V max.
c)	Motor No-Load Speed	9000 rpm, min.
d)	Generator Fundamental Quadrature Voltage (at no load speed)	150 mv, max.
e)	Generator Axis Error	0 ± 10 mv
f)	Generator Total Null	40 mv, max.

3.4.3.3 Acceleration and Vibration Tests. During Acceleration and Vibration Tests, rated voltage shall be applied to all windings and the motor shall be allowed to run at no-load speed. No-load speed as indicated by the tachometer voltage shall be 9000 rpm minimum throughout the tests.

3.4.3.4 Shock Test. During the Shock Test, rated voltage shall be applied to all windings and the motor shall be allowed to run at no-load speed.

3.4.3.5 Endurance Test. During the "operating" portion of the Endurance Test, the 4 step cycling profile of Paragraph 3.4.3.2 shall be applicable. During the "non-operating" portions of the test, rated voltage shall be applied only to motor and generation section reference windings.

3.4.3.5.1 Low Temperature. -40°C.

3.4.3.5.2 High Temperature. +150°F.

3.5 DETAILED PERFORMANCE CHARACTERISTICS. The motor-generator shall have the following specific characteristic requirements when tested at the applicable ambient conditions specified in Specification ND 1002016. All values not toleranced are for information only and testing is not required.

1012156 B

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 11517			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 11517	8/12/64	WL
A	REVISED PER TDRR 16369	2/17/65	WR
B	REVISED PER TDRR 16611	18 May 66	WR

NOTES:

1. GENERAL REQUIREMENTS:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. UNITS SHALL MEET THE GENERAL REQUIREMENT OF ND 1002016.
   - C. MANUFACTURER SHALL COMPLY WITH THE QUALITY ASSURANCE PROVISIONS OF ND 1015404, CLASS 1.
   - D. UNITS SHALL BE CAPABLE OF METTING THE QUALIFICATION REQUIREMENTS OF ND 1002053.
   - E. PACKAGING: PER ND1002215, CLASS 1, CODE 1 (SEALED CONTAINERS)
   - F. MANUFACTURER'S NAME AND/OR SYMBOL, PART NUMBER, NASA DWG. NO. AND REV. LETTER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE REAR OF THE END CAP, THE OUTSIDE CASE DIAMETER BEING CLEAR OF MARKING. EACH CONTAINER SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION PER ND 1002019.

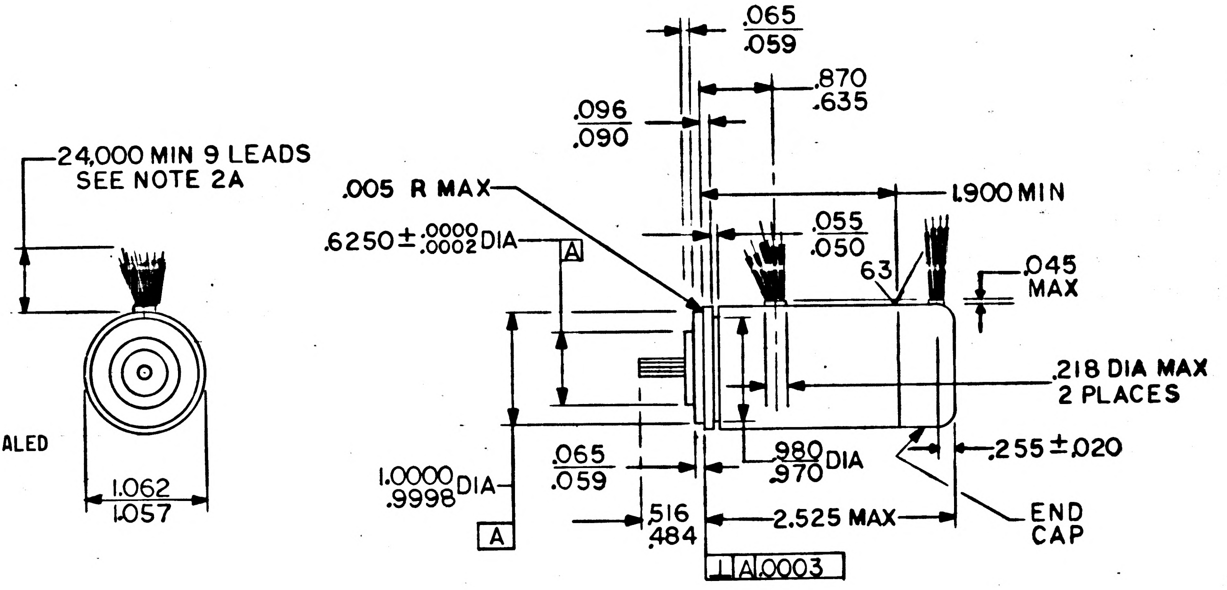
2. ACCEPTANCE AND INSPECTION REQUIREMENTS (100%):
   - A. MECHANICAL PROPERTIES:
     - (1) LEADS: EXIT HOLES IN LINE WITHIN 5° OF EACH OTHER. LEADS SHALL BE POLYTETRAFLUOROETHYLENE (TFE) INSULATED AND COLOR CODED PER MIL-W-16878, E26 EXCEPT THE BLUE HI-OUTPUT GENERATOR LEAD SHALL BE SHIELDED ONE-CONDUCTOR WITH A BLUE TFE JACKET. SHIELD SHALL BE GROUNDED TO SERVO MOTOR FRAME. RESISTANCE BETWEEN FRAME AND SHIELD TERMINATION SHALL BE 1/2 OHM MAX.
     - (2) SHAFT TOLERANCES, DYNAMIC: RUNOUT OF DIAMETER A SHALL BE .0005 TIR MAXIMUM WHEN UNIT IS IN THE VERTICAL POSITION SUSPENDED BY THE SHAFT. SHAFT END PLAY SHALL BE BETWEEN .0010 AND .0030 UNDER A 16 ± 1 OUNCE REVERSING GAUGE LOAD. SHAFT RADIAL PLAY SHALL BE .0007 TIR MAXIMUM AT A POINT .125 MAXIMUM FROM THE CASE UNDER AN 8.0 ± 0.5 OUNCE REVERSING GAUGE LOAD APPLIED TO A POINT .250 MAXIMUM FROM THE CASE.
       - A. FOR PLAIN SHAFT MOTORS: "THE SHAFT RUNOUT SHALL BE 0.0004 TIR MAX. WHEN THE UNIT IS IN THE VERTICAL POSITION SUPPORTED BY THE CASE."
     - (3) GEAR DESIGN DATA:

NUMBER OF TEETH	13
DIAMETRAL PITCH	120
PRESSURE ANGLE	20°
~~STANDARD PITCH~~ DIAMETER	.1083°
AGMA QUALITY CLASS	PREC. 1
OUTSIDE DIAMETER	.1247 +.0000 -.0010
GEAR TEETH FINISH	32

   - B. ELECTRICAL TEST:
     - (1) UNITS SHALL MEET THE REQUIREMENTS OF ND 1012156. EXCEPT FOR AXIS ERROR (¶ 3.5.B.b.2b) SHALL BE PER TABLE I

3. DESIGN REQUIREMENTS:
   - A. OPERATING LIFE: 2000 HRS PER ND 1002016.
   - B. STORAGE LIFE: 2 YEARS WITH NO DETERIORATION OF THE INSULATION OR LUBRICANT. WHEN PACKAGED IN SEALED CONTAINERS.
   - C. CONSTRUCTION:
     - (1) MATERIAL: CASE AND SHAFT SHALL BE CORROSION-RESISTING STEEL IN ACCORDANCE WITH QQ-S-763, CLASS 416, COND T.
     - (2) FINISH: PASSIVATED IN ACCORDANCE WITH MIL-F-14072, E 300.
     - (3) LUBRICATION: BEARINGS SHALL BE LUBRICATED AS SPECIFIED IN ND 1002077.
     - (4) ROTOR INERTIA: THE ROTOR INERTIA SHALL BE 5.5 gm-cm^2 ± 20%.
   - D. ENVIRONMENTAL
     - (1) REQUIREMENTS ABOVE AT 25°C AMBIENT TEMPERATURE.
     - (2) GENERATOR OUTPUT WINDING SHALL NOT EXCEED +165°C AS MEASURED PER ND 1002016.

4. PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND1002034 FOR THIS DRAWING.



MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL: SEE NOTES
HEAT TREATMENT: NONE
FINAL FINISH: NONE

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT

DRAWN A. Addario Jr. DATE 6 Aug 64
CHECKED W.W. Tramm 12 Aug 64
APPROVAL R. J. Thomas 8-12-64
APPROVAL
NASA APPROVAL 8/12/64
MIT APPROVAL 12 Aug 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SERVO MOTOR-TACHOMETER, GENERATOR
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. —
SIZE C
NASA DRAWING NO. 1012156
SCALE NONE
WT .438 LBS MAX
SHEET 1 OF 2

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REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		THIS SHEET ADDED PER TDRR 16369			2/17/65	WK
B		REVISED PER TDRR 16611			18May65	WK

4. SPECIAL CONDITIONING (BY VENDOR):

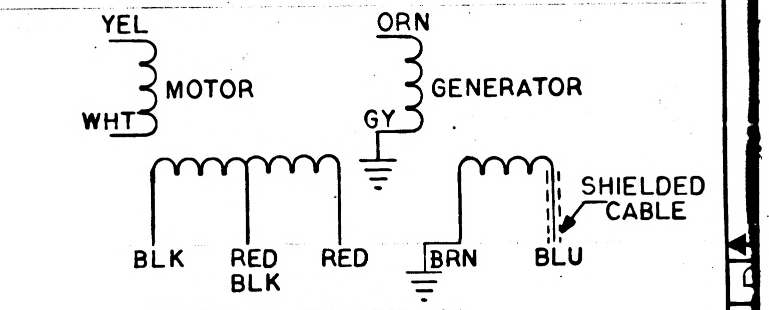
A. PRIOR TO SHIPMENT EACH UNIT SHALL BE PROPERLY ENERGIZED UNDER ROOM AMBIENT CONDITIONS (25°C) AND RUN-IN FOR TEN PERIODS, CONSISTING OF PERIODS 1 THROUGH 4 AT 30 MINUTES EACH, 5 & 6 AT 5 MINUTES EACH, & 7 THROUGH 10 AT 30 MINUTES EACH FOR A TOTAL OF 250 MINUTES, IN THE FOLLOWING SEQUENCE. (RPM) (TOL ±2%)

1 - 1000 rpm (CW):	2 - 1000 rpm (CCW)
3 - 6000 rpm (CW):	4 - 6000 rpm (CCW)
5 -10,000 rpm min (CW):	6 - 10,000 rpm min (CCW)
7 - 6,000 rpm (CW):	8 - 6,000 rpm (CCW)
9 - 1,000 rpm (CW):	10 - 1,000 rpm (CCW)

EACH UNIT SHALL MEET ALL ACCEPTANCE AND INSPECTION REQUIREMENTS AFTER THIS BURN-IN CYCLE.

B. SUPPLIER FINAL INSPECTION DETAIL PERFORMANCE DATA SHALL BE SUPPLIED WITH THE PRODUCT.

5. IN ADDITION TO THE QUALIFICATION REQUIREMENTS OF ND1002053 THE UNIT SHALL BE CAPABLE OF MEETING A SALT FOG TEST PER METHOD 509.1 OF MIL-STD-810 EXCEPT THE SALT SOLUTION SHALL BE 1% BY WEIGHT. SHAFT END OF UNIT WILL BE PROTECTED DURING EXPOSURE.



WIRING DIAGRAM

TABLE I

PART NO.	AXIS ERROR	SHAFT DETAIL	SPECIAL REQUIREMENTS
1012156-1	2 MV MAX	PINION	NOTE 4
1012156-2	4 MV MAX	PINION	NOTE 4
1012156-3	2 MV MAX	PLAIN $\frac{.1200}{.1198}$ O.D.	NOTE 4 & 5

(A) THIS SHEET ADDED

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN a. addario Jr. 15Feb65
CHECKED a. Marto 2-17-65
APPROVED R. J. Therrien 2-17-65
APPROVED
APPROVED MIT 15Feb65
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SERVO MOTOR —
TACHOMETER, GENERATOR

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. —
SIZE C
DRAWING NO. 1012156
SCALE NONE
SHEET 2 OF 2

MASTER

APOLLO G&N Specification
PS 1012156 B 12 Aug 64

Class A
TDRR 11535

PROCUREMENT SPECIFICATION
SERVO MOTOR-GENERATOR
TYPE 28V11SMG8a

Record of Revisions

Revision Letter	TDRR No.	Pages Revised	Approvals MIT	 NASA	DATE
A	23718	3	WK.	A. C. METZGER	
Ⓜ B	28003	3, 5	WK	--	4/12/66

This specification consists of pages i through iii and 1 to 6 inclusive.

APOLLO G&N Specification
PS 1012156 B 12 Aug 64
Class A
TDRR 11535

PROCUREMENT SPECIFICATION
SERVO MOTOR-GENERATOR
TYPE 28V11SMG8a

Record of Revisions

Revision Letter	TDRR No.	Pages Revised	Approvals MIT	NASA	DATE
A	23718	3	WK.	A. C. METZGER	
B	28003	3,5	WK	--	4/12/66

This specification consists of pages i through iii and 1 to 6 inclusive.

3.4.2.1 Impedance, Generator Output. (3000±2000) +j (7000±2500)

3.4.2.2 Current (Tuned) (Rotor Stalled)

a.	Motor Reference Winding	128±30 ma
b.	Motor Control Winding	105±30 ma
c.	Generator Reference Winding	61±20 ma

3.4.2.3 Temperature Rise 60°C.

3.4.3.1 General. After each environmental test, the motor generator shall, under normal ambient conditions, exhibit characteristics as specified in 35Ac1, 35Ac2, 35Ac3, 35Bb2, 35Bb3, 35Bb4 of this specification, except that the limits of 3.5.A.c.2 shall be 2.0 volts max; limits of 3.5.B.b2 (e) shall be ±6 mv max; limits of 3.5.B.b.4 shall be 60 mv max; and limits of 3.5.B.b.2(d) shall be 12 mv max. For the parameters of 3.5.1 requiring sample inspection the limits of 3.5.1.c shall be 0.5% from 0-3600 rpm and 1.5% from 3600 to 7200 rpm and the limits of 3.5.1.d shall be 90 mv max.

3.4.3.2 Temperature and Vacuum Tests. During the following test, the unit shall be cycled as follows: Step 1-1 hour with rated voltage on reference windings; Step 2, -10 minutes with rated voltage on all windings, however, limit speed to 10,000 rpm (vary control winding); Step 3, - repeat Step 1; Step 4, - Repeat Step 2 with opposite polarity on control winding. The following characteristics shall be exhibited at least once each 16 hours.

a)	The motor shall at not time single phase	
b)	Motor Starting Voltage	2.0V max.
c)	Motor No-Load Speed	9000 rpm, min.
d)	Generator Fundamental Quadrature Voltage (at no load speed)	150 mv, max.
e)	Generator Axis Error	0±10 mv.
f)	Generator Total Null	40 mv, max.

3.4.3.3 Acceleration and Vibration Tests. During Acceleration and Vibration Tests, rated voltage shall be applied to all windings and the motor shall be allowed to run at no-load speed. No-load speed as indicated by the tachometer voltage shall be 9000 rpm minimum throughout the tests.

3.4.3.4 Shock Test. During the Shock Test, rated voltage shall be applied to all windings and the motor shall be allowed to run at no-load speed.

3.4.3.5 Endurance Test. During the "operating" portion of the Endurance Test, the 4 step cycling profile of Paragraph 3.4.3.2 shall be applicable. During the "non-operating" portions of the test, rated voltage shall be applied only to motor and generation section reference windings.

3.4.3.5.1 Low Temperature. -40°C.

3.4.3.5.2 High Temperature. +150°F.

3.5 DETAILED PERFORMANCE CHARACTERISTICS. The motor-generator shall have the following specific characteristic requirements when tested at the applicable ambient conditions specified in Specification ND1002016. All values not toleranced are for information only and testing is not required.

3.4.2.1 Impedance, Generator Output. (3000±2000) +j (7000±2500)

3.4.2.2 Current (Tuned) (Rotor Stalled)

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b.	Motor Control Winding	105±30 ma
c.	Generator Reference Winding	61±20 ma

3.4.2.3 Temperature Rise 60°C.

3.4.3.1 General. After each environmental test, the motor generator shall, under normal ambient conditions, exhibit characteristics as specified in 35Ac1, 35Ac2, 35Ac3, 35Bb2, 35Bb3, 35Bb4 of this specification, except that the limits of 3.5.A.c.3 shall be 2.0 volts max; limits of 3.5.B.b2 (c) shall be ±6 mv max; limits of 3.5.B.b.4 shall be 60 mv max; and limits of 3.5.B.b.2(d) shall be 12 mv max. For the parameters of 3.5.1 requiring sample inspection the limits of 3.5.1.c shall be 0.5% from 0-3600 rpm and 1.5% from 3600 to 7200 rpm and the limits of 3.5.1.d shall be 90 mv max.

3.4.3.2 Temperature and Vacuum Tests. During the following test, the unit shall be cycled as follows: Step 1-1 hour with rated voltage on reference windings; Step 2, -10 minutes with rated voltage on all windings, however, limit speed to 10,000 rpm (vary control winding); Step 3, - repeat Step 1; Step 4, - Repeat Step 2 with opposite polarity on control winding. The following characteristics shall be exhibited at least once each 16 hours.

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c)	Motor No-Load Speed	9000 rpm, min.
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3.4.3.3 Acceleration and Vibration Tests. During Acceleration and Vibration Tests, rated voltage shall be applied to all windings and the motor shall be allowed to run at no-load speed. No-load speed as indicated by the tachometer voltage shall be 9000 rpm minimum throughout the tests.

3.4.3.4 Shock Test. During the Shock Test, rated voltage shall be applied to all windings and the motor shall be allowed to run at no-load speed.

3.4.3.5 Endurance Test. During the "operating" portion of the Endurance Test, the 4 step cycling profile of Paragraph 3.4.3.2 shall be applicable. During the "non-operating" portions of the test, rated voltage shall be applied only to motor and generation section reference windings.

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3.4.3.5.2 High Temperature. +150°F.

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3.4.2.1 Impedance, Generator Output. (3000±2000) +j (7000±2500)

3.4.2.2 Current (Tuned) (Rotor Stalled)

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b.	Motor Control Winding	105±30 ma
c.	Generator Reference Winding	61±20 ma

3.4.2.3 Temperature Rise 60°C.

3.4.3.1 General. After each environmental test, the motor generator shall, under normal ambient conditions, exhibit characteristics as specified in 35Ac1, 35Ac2, 35Ac3, 35Bb2, 35Bb3, 35Bb4 of this specification, except that the limits of 3.5.A.c.3 shall be 2.0 volts max; limits of 3.5.B.b2 (c) shall be ±6 mv max; limits of 3.5.B.b.4 shall be 60 mv max; and limits of 3.5.B.b.2(d) shall be 12 mv max. For the parameters of 3.5.1 requiring sample inspection the limits of 3.5.1.c shall be 0.5% from 0-3600 rpm and 1.5% from 3600 to 7200 rpm and the limits of 3.5.1.d shall be 90 mv max.

3.4.3.2 Temperature and Vacuum Tests. During the following test, the unit shall be cycled as follows: Step 1-1 hour with rated voltage on reference windings; Step 2, -10 minutes with rated voltage on all windings, however, limit speed to 10,000 rpm (vary control winding); Step 3, - repeat Step 1; Step 4, - Repeat Step 2 with opposite polarity on control winding. The following characteristics shall be exhibited at least once each 16 hours.

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e)	Generator Axis Error	0±10 mv.
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3.4.3.4 Shock Test. During the Shock Test, rated voltage shall be applied to all windings and the motor shall be allowed to run at no-load speed.

3.4.3.5 Endurance Test. During the "operating" portion of the Endurance Test, the 4 step cycling profile of Paragraph 3.4.3.2 shall be applicable. During the "non-operating" portions of the test, rated voltage shall be applied only to motor and generation section reference windings.

3.4.3.5.1 Low Temperature. -40°C.

3.4.3.5.2 High Temperature. +150°F.

3.5 DETAILED PERFORMANCE CHARACTERISTICS. The motor-generator shall have the following specific characteristic requirements when tested at the applicable ambient conditions specified in Specification ND1002016. All values not toleranced are for information only and testing is not required.

5. Temperature Sensitivity (-25°C to +75°C).	
(a) In-Phase Speed Sensitive Output Voltage (variation from ambient). (At 3600 rpm)	±0.5% max.
(b) Fundamental Quadrature Voltage (At 3600 rpm)	60 mv, max.
6. Temperature Sensitivity (-25°C to +93.3°C).	
(a) Axis Error (In-phase) Deviation from ambient	±10 mv, max.
(b) Total rms, Null	20 mv, max.
7. Rated Load	150K ohms ±1%
8. DC Resistance	1000 ohms, nominal
9. Memory Build-up (In-phase axis error change at 80°C due to memory)	4 mv. max.

Values obtained with the rotor stalled.

3.5.1 Sampling. The motor-generator shall exhibit the following specific characteristic requirements when tested on a sample basis at the applicable conditions specified in Specification ND-1002016. The samples shall consist of 10 percent of each order lot rounded to the next highest number.

a. Motor Performance Characteristics.	Motor performance characteristics as specified in 3.5Ac1, 3.5Ac2, and 3.5Ac3 shall be met with a total dc current of 0.25 amps in the control winding balanced in each half winding and unbalanced in each half winding by ±20 percent of the total.
b. Stall Torque Linearity	10%
c. Generator Linearity	
0 to 3600 rpm	0.15%
3600 to 7200 rpm	1%
Test Speeds: 1200, 1800, 3600, 4800 and 7200 rpm	
d. Fundamental Quadrature Voltage. (at 1800, 4800, and 7200 rpm)	37 mv max.

5.	Temperature Sensitivity (-25°C to +75°C).	
	(a) In-Phase Speed Sensitive Output Voltage (variation from ambient). (At 3600 rpm)	±0.5% max.
	(b) Fundamental Quadrature Voltage (At 3600 rpm)	60 mv, max.
6.	Temperature Sensitivity (-25°C to +93.3°C).	
	(a) Axis Error (In-phase) Deviation from ambient	±10 mv, max.
	(b) Total rms, Null	20 mv, max.
7.	Rated Load	150K ohms ±1%
8.	DC Resistance	1000 ohms, nominal
9.	Memory Build-up (In-phase axis error change at 80°C due to memory)	4 mv. max.

Values obtained with the rotor stalled.

3.5.1 **Sampling.** **The motor-generator shall exhibit the following specific characteristic requirements when tested on a sample basis at the applicable conditions specified in Specification ND-1002016. The samples shall consist of 10 percent of each order lot rounded to the next highest number.**

a.	Motor Performance Characteristics.	Motor performance characteristics as specified in 3.5Ac1, 3.5Ac2, and 3.5Ac3 shall be met with a total dc current of 0.25 amps in the control winding balanced **in each half winding and unbalanced in each half winding by ±20 percent of the total.**
b.	Stall Torque Linearity	10%
c.	Generator Linearity	
	0 to 3600 rpm	0.15%
	3600 to 7200 rpm	1%
	Test Speeds: 1200, 1800, 3600, 4800 and 7200 rpm	
d.	Fundamental Quadrature Voltage. (at 1800, 4800, and 7200 rpm)	37 mv max.

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REVISIONS 11517

SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 11517	8/12/64	WR.
A	REVISED PER TDRR 16369	2/17/65	WR
B	REVISED PER TDRR 16611	18 May 66	WR
C	REVISED PER TDRR 18009		WR

NOTES:

1. GENERAL REQUIREMENTS:
   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   B. UNITS SHALL MEET THE GENERAL REQUIREMENT OF ND 1002016.
   C. MANUFACTURER SHALL COMPLY WITH THE QUALITY ASSURANCE PROVISIONS OF ND 1015404, CLASS 1.
   D. UNITS SHALL BE CAPABLE OF METTING THE QUALIFICATION REQUIREMENTS OF ND 1002053.
   E. PACKAGING: PER ND1002215, CLASS I, CODE 1 (SEALED CONTAINERS)
   F. MANUFACTURER'S NAME AND/OR SYMBOL, PART NUMBER, NASA DWG. NO. AND REV. LETTER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE REAR OF THE END CAP, THE OUTSIDE CASE DIAMETER BEING CLEAR OF MARKING. EACH CONTAINER SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION PER ND 1002019.

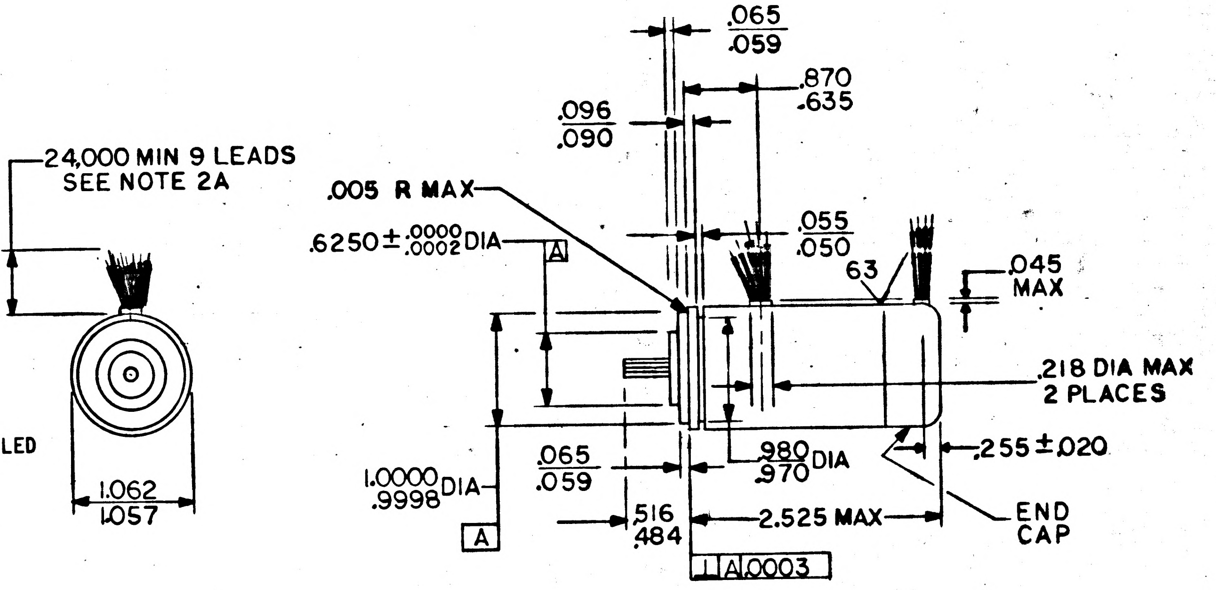
2. ACCEPTANCE AND INSPECTION REQUIREMENTS (100%):
   A. MECHANICAL PROPERTIES:
      (1) LEADS: EXIT HOLES IN LINE WITHIN 5° OF EACH OTHER. LEADS SHALL BE POLYTETRAFLUOROETHYLENE (TFE) INSULATED AND COLOR CODED PER MIL-W-16878, E26 EXCEPT THE BLUE HI-OUTPUT GENERATOR LEAD SHALL BE SHIELDED ONE-CONDUCTOR WITH A BLUE TFE JACKET. SHIELD SHALL BE GROUNDED TO SERVO MOTOR FRAME.RESISTANCE BETWEEN FRAME AND SHIELD TERMINATION SHALL BE 1/2 OHM MAX.
      (2) SHAFT TOLERANCES, DYNAMIC: RUNOUT OF DIAMETER A SHALL BE .0005 TIR MAXIMUM WHEN UNIT IS IN THE VERTICAL POSITION SUSPENDED BY THE SHAFT. SHAFT END PLAY SHALL BE BETWEEN .0010 AND .0030 UNDER A 16 ± 1 OUNCE REVERSING GAUGE LOAD. SHAFT RADIAL PLAY SHALL BE .0007 TIR MAXIMUM AT A POINT .125 MAXIMUM FROM THE CASE UNDER AN 8.0 ± 0.5 OUNCE REVERSING GAUGE LOAD APPLIED TO A POINT .250 MAXIMUM FROM THE CASE.
         A. FOR PLAIN SHAFT MOTORS: "THE SHAFT RUNOUT SHALL BE 0.0004 TIR MAX. WHEN THE UNIT IS IN THE VERTICAL POSITION SUPPORTED BY THE CASE."
      (3) GEAR DESIGN DATA:

NUMBER OF TEETH	13
DIAMETRAL PITCH	120
PRESSURE ANGLE	20°
~~STANDARD PITCH DIAMETER~~	.1083°
AGMA QUALITY CLASS	PREC. 1
OUTSIDE DIAMETER	.1247 +.0000 −.0010
GEAR TEETH FINISH	32

   B. ELECTRICAL TEST:
      (1) UNITS SHALL MEET THE REQUIREMENTS OF ND 1012156. EXCEPT FOR AXIS ERROR (¶ 3.5.B.b.2b) SHALL BE PER TABLE I

3. DESIGN REQUIREMENTS:
   A. OPERATING LIFE: 2000 HRS PER ND 1002016.
   B. STORAGE LIFE: 2 YEARS WITH NO DETERIORATION OF THE INSULATION OR LUBRICANT. WHEN PACKAGED IN SEALED CONTAINERS.
   C. CONSTRUCTION:
      (1) MATERIAL: CASE AND SHAFT SHALL BE CORROSION-RESISTING STEEL IN ACCORDANCE WITH QQ-S-763, CLASS 416, COND T.
      (2) FINISH: PASSIVATED IN ACCORDANCE WITH MIL-F-14072, E 300.
      (3) LUBRICATION: BEARINGS SHALL BE LUBRICATED AS SPECIFIED IN ND 1002077.
      (4) ROTOR INERTIA: THE ROTOR INERTIA SHALL BE 5.5 gm-cm^2 ± 20%.
   D. ENVIRONMENTAL
      (1) REQUIREMENTS ABOVE AT 25°C AMBIENT TEMPERATURE.
      (2) GENERATOR OUTPUT WINDING SHALL NOT EXCEED +165°C AS MEASURED PER ND 1002016.

. PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND1002034 FOR THIS DRAWING.



MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTES
HEAT TREATMENT NONE
FINAL FINISH NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN A. Addario Jr. DATE 6 Aug 64
CHECKED M.M. Lerman 12 Aug 64
APPROVAL R. J. Thies 9-12-64
APPROVAL
NASA APPROVAL 8/12/64
MIT APPROVAL 12 Aug 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SERVO MOTOR-TACHOMETER, GENERATOR

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1012156

SCALE NONE | WT .438 LBS MAX | SHEET 1 OF 2

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		THIS SHEET ADDED PER TDRR 16369			7/17/65	WK
B		REVISED PER TDRR 16611			18 Aug 65	WK
C		REVISED PER TDRR 18009				WK

4. SPECIAL CONDITIONING (BY VENDOR):

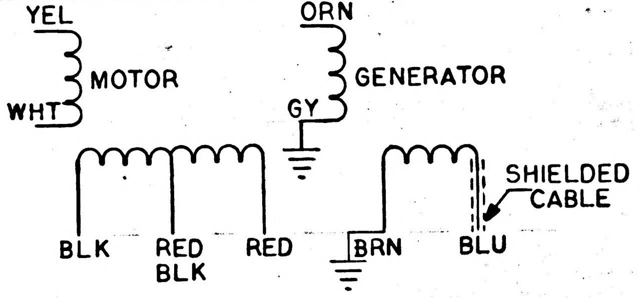
A. PRIOR TO SHIPMENT EACH UNIT SHALL BE PROPERLY ENERGIZED UNDER ROOM AMBIENT CONDITIONS (25°C) AND RUN-IN FOR TEN PERIODS, CONSISTING OF PERIODS 1 THROUGH 4 AT 30 MINUTES EACH, 5 & 6 AT 5 MINUTES EACH, & 7 THROUGH 10 AT 30 MINUTES EACH FOR A TOTAL OF 250 MINUTES, IN THE FOLLOWING SEQUENCE. (RPM) (TOL ±2%)

1 - 1000 rpm (CW):	2 - 1000 rpm (CCW)
3 - 6000 rpm (CW):	4 - 6000 rpm (CCW)
5 -10,000 rpm min (CW):	6 - 10,000 rpm min (CCW)
7 - 6,000 rpm (CW):	8 - 6,000 rpm (CCW)
9 - 1,000 rpm (CW):	10 - 1,000 rpm (CCW)

EACH UNIT SHALL MEET ALL ACCEPTANCE AND INSPECTION REQUIREMENTS AFTER THIS BURN-IN CYCLE.

B. SUPPLIER FINAL INSPECTION DETAIL PERFORMANCE DATA SHALL BE SUPPLIED WITH THE PRODUCT.

5. IN ADDITION TO THE QUALIFICATION REQUIREMENTS OF ND1002053 THE UNIT SHALL BE CAPABLE OF MEETING A SALT FOG TEST PER METHOD 509.1 OF MIL-STD-810 EXCEPT THE SALT SOLUTION SHALL BE 1% BY WEIGHT. SHAFT END OF UNIT WILL BE PROTECTED DURING EXPOSURE.



WIRING DIAGRAM

TABLE I

PART NO.	AXIS ERROR	SHAFT DETAIL	SPECIAL REQUIREMENTS
1012156-1	2 MV MAX	PINION	NOTE 4
1012156-2	4 MV MAX	PINION	NOTE 4
1012156-3	2 MV MAX	PLAIN $\frac{.1200}{.1198}$ O.D.	NOTE 4 & 5

(A) THIS SHEET ADDED

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

NEXT ASSY	USED ON
APPLICATION	

MASTER

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN	A. Addario Jr.	15 Feb 65
CHECKED	A. Marto	2-17-65
APPROVED	R. J. Therrien	2-17-65
APPROVED		
APPROVED MIT	W Tupper	17 Feb 65
APPROVED MSC		DATE

SERVO MOTOR —
TACHOMETER, GENERATOR

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1012156

SCALE NONE

SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 11517			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 11517	8/12/64	WL.
A	REVISED PER TDRR 16369	2/17/65	WR
B	REVISED PER TDRR 16611	18 Mar 65	WR
C	REVISED PER TDRR 18009		WR
D	REVISED PER TDRR 24275	11/30/65	WR

NOTES:

1. GENERAL REQUIREMENTS:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. UNITS SHALL MEET THE GENERAL REQUIREMENT OF ND 1002016.
   - C. MANUFACTURER SHALL COMPLY WITH THE QUALITY ASSURANCE PROVISIONS OF ND 1015404, CLASS 1.
   - D. UNITS SHALL BE CAPABLE OF METTING THE QUALIFICATION REQUIREMENTS OF ND 1002053.
   - E. PACKAGING: PER ND1002215, CLASS I, CODE 1 (SEALED CONTAINERS)
   - F. MANUFACTURER'S NAME AND/OR SYMBOL, PART NUMBER, NASA DWG. NO. AND REV. LETTER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE REAR OF THE END CAP, THE OUTSIDE CASE DIAMETER BEING CLEAR OF MARKING. EACH CONTAINER SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION PER ND 1002019.

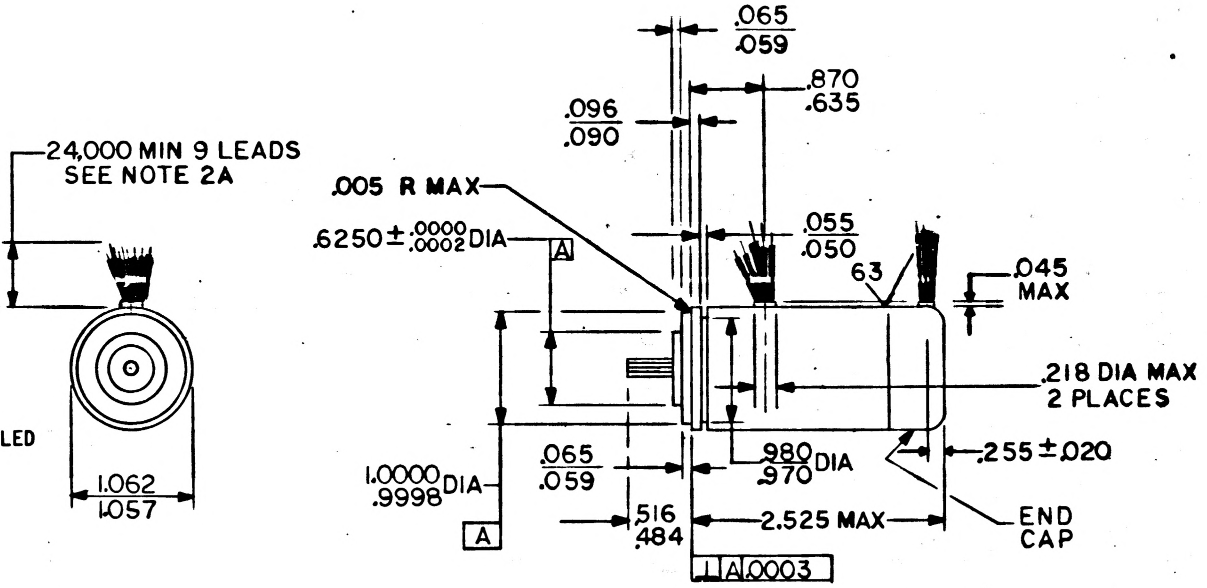
2. ACCEPTANCE AND INSPECTION REQUIREMENTS (100%):
   - A. MECHANICAL PROPERTIES:
     - (1) LEADS: EXIT HOLES IN LINE WITHIN 5° OF EACH OTHER. LEADS SHALL BE POLYTETRAFLUOROETHYLENE (TFE) INSULATED AND COLOR CODED PER MIL-W-16878, E26 EXCEPT THE BLUE HI-OUTPUT GENERATOR LEAD SHALL BE SHIELDED ONE-CONDUCTOR WITH A BLUE TFE JACKET. SHIELD SHALL BE GROUNDED TO SERVO MOTOR FRAME. RESISTANCE BETWEEN FRAME AND SHIELD TERMINATION SHALL BE 1/2 OHM MAX.
     - (2) SHAFT TOLERANCES, DYNAMIC: RUNOUT OF DIAMETER A SHALL BE .0005 TIR MAXIMUM WHEN UNIT IS IN THE VERTICAL POSITION SUSPENDED BY THE SHAFT. SHAFT END PLAY SHALL BE BETWEEN .0010 AND .0030 UNDER A 16 ± 1 OUNCE REVERSING GAUGE LOAD. SHAFT RADIAL PLAY SHALL BE .0007 TIR MAXIMUM AT A POINT .125 MAXIMUM FROM THE CASE UNDER AN 8.0 ± 0.5 OUNCE REVERSING GAUGE LOAD APPLIED TO A POINT .250 MAXIMUM FROM THE CASE.
       - A. FOR PLAIN SHAFT MOTORS: "THE SHAFT RUNOUT SHALL BE 0.0004 TIR MAX. WHEN THE UNIT IS IN THE VERTICAL POSITION SUPPORTED BY THE CASE."
     - (3) GEAR DESIGN DATA:

NUMBER OF TEETH	13
DIAMETRAL PITCH	120
PRESSURE ANGLE	20°
STANDARD PITCH DIAMETER	.1083°
AGMA QUALITY CLASS	PREC. 1
OUTSIDE DIAMETER	.1247 +.0000 -.0010
GEAR TEETH FINISH	32

   - B. ELECTRICAL TEST:
     - (1) UNITS SHALL MEET THE REQUIREMENTS OF ND 1012156. EXCEPT FOR AXIS ERROR (¶ 3.5.B.b.2b) SHALL BE PER TABLE I

3. DESIGN REQUIREMENTS:
   - A. OPERATING LIFE: 2000 HRS PER ND 1002016.
   - B. STORAGE LIFE: 2 YEARS WITH NO DETERIORATION OF THE INSULATION OR LUBRICANT. WHEN PACKAGED IN SEALED CONTAINERS.
   - C. CONSTRUCTION:
     - (1) MATERIAL: CASE AND SHAFT SHALL BE CORROSION-RESISTING STEEL IN ACCORDANCE WITH QQ-S-763, CLASS 416, COND T. CONDITION A MAY BE USED ON THE CASE
     - (2) FINISH: PASSIVATED IN ACCORDANCE WITH MIL-F-14072, E 300.
     - (3) LUBRICATION: BEARINGS SHALL BE LUBRICATED AS SPECIFIED IN ND 1002077.
     - (4) ROTOR INERTIA: THE ROTOR INERTIA SHALL BE 5.5 gm-cm² ± 20%.
   - D. ENVIRONMENTAL
     - (1) REQUIREMENTS ABOVE AT 25°C AMBIENT TEMPERATURE.
     - (2) GENERATOR OUTPUT WINDING SHALL NOT EXCEED +165°C AS MEASURED PER ND 1002016.

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND1002034 FOR THIS DRAWING.



MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTES
HEAT TREATMENT
NONE
FINAL FINISH
NONE

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN G. Adderney Jr DATE 6 Aug 64
CHECKED M.W. [illegible] 12 Aug 64
APPROVAL R. J. Therrien 8-12-64
APPROVAL
NASA APPROVAL [illegible] 8/12/64
MIT APPROVAL [illegible] 12 Aug 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SERVO MOTOR-
TACHOMETER, GENERATOR

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1012156
SCALE NONE
WT 438 LBS MAX
SHEET 1 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		THIS SHEET ADDED PER TDRR 16369			2/17/65	WK
B		REVISED PER TDRR 16611			18 May 65	WK
C		REVISED PER TDRR 18009				WK
D		REVISED PER TDRR 24275			11/30/65	WK

4. SPECIAL CONDITIONING (BY VENDOR):

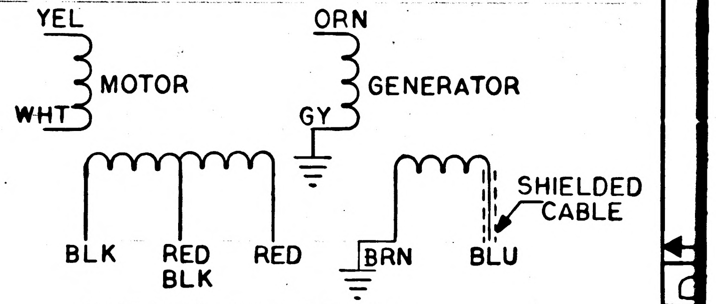
A. PRIOR TO SHIPMENT EACH UNIT SHALL BE PROPERLY ENERGIZED UNDER ROOM AMBIENT CONDITIONS (25°C) AND RUN-IN FOR TEN PERIODS, CONSISTING OF PERIODS 1 THROUGH 4 AT 30 MINUTES EACH, 5 & 6 AT 5 MINUTES EACH, & 7 THROUGH 10 AT 30 MINUTES EACH FOR A TOTAL OF 250 MINUTES, IN THE FOLLOWING SEQUENCE. (RPM) (TOL ±2%)

1 - 1000 rpm (CW):	2 - 1000 rpm (CCW)
3 - 6000 rpm (CW):	4 - 6000 rpm (CCW)
5 -10,000 rpm min (CW):	6 - 10,000 rpm min (CCW)
7 - 6,000 rpm (CW):	8 - 6,000 rpm (CCW)
9 - 1,000 rpm (CW):	10 - 1,000 rpm (CCW)

EACH UNIT SHALL MEET ALL ACCEPTANCE AND INSPECTION REQUIREMENTS AFTER THIS BURN-IN CYCLE.

B. SUPPLIER FINAL INSPECTION DETAIL PERFORMANCE DATA SHALL BE SUPPLIED WITH THE PRODUCT.

5. IN ADDITION TO THE QUALIFICATION REQUIREMENTS OF ND1002053 THE UNIT SHALL BE CAPABLE OF MEETING A SALT FOG TEST PER METHOD 509.1 OF MIL-STD-810 EXCEPT THE SALT SOLUTION SHALL BE 1% BY WEIGHT. SHAFT END OF UNIT WILL BE PROTECTED DURING EXPOSURE.



WIRING DIAGRAM

TABLE I

PART NO.	AXIS ERROR	SHAFT DETAIL	SPECIAL REQUIREMENTS
1012156-1	2 MV MAX	PINION	NOTE 4
1012156-2	4 MV MAX	PINION	NOTE 4
1012156-3	2 MV MAX	PLAIN $\frac{.1200}{.1198}$ O.D.	NOTE 4 & 5

MASTER

(A) THIS SHEET ADDED

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN A. Addario Jr. 15 Feb 65
CHECKED A. Marto 2-17-65
APPROVED R. J. Therrien 2-17-65
APPROVED
APPROVED MIT W Tupper
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SERVO MOTOR —
TACHOMETER, GENERATOR

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1012156

SCALE NONE
SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1012156 E

REVISIONS 11517

SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 11517	8/12/64	WK
A	REVISED PER TDRR 16369	2/17/65	WK
B	REVISED PER TDRR 16611	18 May 65	WK
C	REVISED PER TDRR 18009		WK
D	REVISED PER TDRR 24275	11/30/66	WK
E	REVISED PER TDRR 30916	12 SEPT 66	WK

NOTES:

1. GENERAL REQUIREMENTS:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. UNITS SHALL MEET THE GENERAL REQUIREMENT OF ND 1002016.
   - C. MANUFACTURER SHALL COMPLY WITH THE QUALITY ASSURANCE PROVISIONS OF ND 1015404, CLASS 1.
   - D. UNITS SHALL BE CAPABLE OF METTING THE QUALIFICATION REQUIREMENTS OF ND 1002053.
   - E. PACKAGING: PER ND1002215, CLASS I, CODE 1 (SEALED CONTAINERS)
   - F. MANUFACTURER'S NAME AND/OR SYMBOL, PART NUMBER, NASA DWG. NO. AND REV. LETTER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE REAR OF THE END CAP, THE OUTSIDE CASE DIAMETER BEING CLEAR OF MARKING. EACH CONTAINER SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION PER ND 1002019.

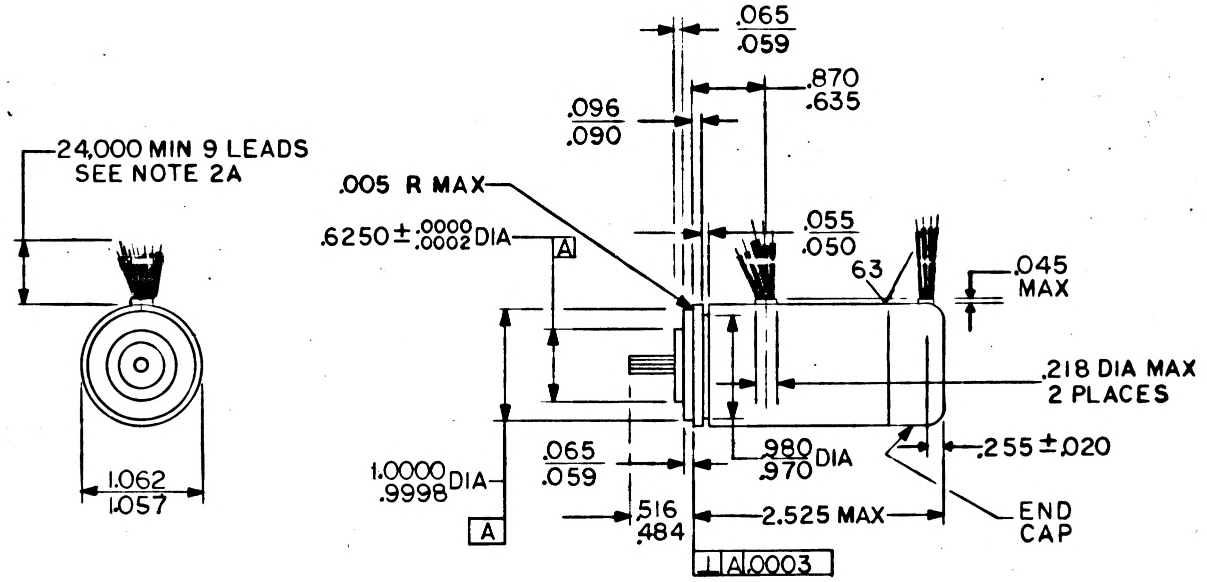
2. ACCEPTANCE AND INSPECTION REQUIREMENTS (100%):
   - A. MECHANICAL PROPERTIES:
     - (1) LEADS: EXIT HOLES IN LINE WITHIN 5° OF EACH OTHER. LEADS SHALL BE POLYTETRAFLUOROETHYLENE (TFE) INSULATED AND COLOR CODED PER MIL-W-16878, E26 EXCEPT THE BLUE HI-OUTPUT GENERATOR LEAD SHALL BE SHIELDED ONE-CONDUCTOR WITH A BLUE TFE JACKET. SHIELD SHALL BE GROUNDED TO SERVO MOTOR FRAME. RESISTANCE BETWEEN FRAME AND SHIELD TERMINATION SHALL BE 1/2 OHM MAX.
     - (2) SHAFT TOLERANCES, DYNAMIC: RUNOUT OF DIAMETER A SHALL BE .0005 TIR MAXIMUM WHEN UNIT IS IN THE VERTICAL POSITION SUSPENDED BY THE SHAFT. SHAFT END PLAY SHALL BE BETWEEN .0010 AND .0080 UNDER A 16 ± 1 OUNCE REVERSING GAUGE LOAD. SHAFT RADIAL PLAY SHALL BE .0015 TIR MAXIMUM AT A POINT .125 MAXIMUM FROM THE CASE UNDER AN 8.0 ± 0.5 OUNCE REVERSING GAUGE LOAD APPLIED TO A POINT .250 MAXIMUM FROM THE CASE.
       - A. FOR PLAIN SHAFT MOTORS: "THE SHAFT RUNOUT SHALL BE 0.0004 TIR MAX. WHEN THE UNIT IS IN THE VERTICAL POSITION SUPPORTED BY THE CASE."
     - (3) GEAR DESIGN DATA:

NUMBER OF TEETH	13
DIAMETRAL PITCH	120
PRESSURE ANGLE	20°
STANDARD PITCH DIAMETER	.1083
AGMA QUALITY CLASS	PREC. 1
OUTSIDE DIAMETER	.1247 +.0000 -.0010
GEAR TEETH FINISH	32

   - B. ELECTRICAL TEST:
     - (1) UNITS SHALL MEET THE REQUIREMENTS OF PS 1012156. EXCEPT FOR AXIS ERROR (¶ 3.5.B.b.2.c) SHALL BE PER TABLE I

3. DESIGN REQUIREMENTS:
   - A. OPERATING LIFE: 2000 HRS PER ND 1002016.
   - B. STORAGE LIFE: 5 YEARS, EXCEPT FOR THE LUBRICANT WHEN STORED AT +77°F ±20°F IN SEALED CONTAINERS.
   - C. CONSTRUCTION:
     - (1) MATERIAL: CASE AND SHAFT SHALL BE CORROSION-RESISTING STEEL IN ACCORDANCE WITH QQ-S-763, CLASS 416, COND T. CONDITION A MAY BE USED ON THE CASE. PINION SHAFT SHALL HAVE MINIMUM HARDNESS OF R_C28 AND MAY BE CONDITION H. END CAP MAY BE CLASS 303 IF ATTACHED WITH SCREW (s).
     - (2) FINISH: PASSIVATED IN ACCORDANCE WITH MIL-F-14072, E300.
     - (3) LUBRICATION: BEARINGS SHALL BE LUBRICATED AS SPECIFIED IN ND1002077 EXCEPT THAT IF THE ALTERNATE PROCEDURE FOR RIBBON RETAINERS IS USED THE AMOUNT OF LUBRICATION SHALL BE BETWEEN 6 AND 8 MILLIGRAMS.
     - (4) ROTOR INERTIA: THE ROTOR INERTIA SHALL BE 5.5 gm-cm^2 ±20%.

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND1002034 FOR THIS DRAWING.



QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTES
HEAT TREATMENT NONE
FINAL FINISH NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN A. Addario Jr. DATE 6 Aug 64
CHECKED M. N. Truman 12 Aug 64
APPROVAL R. J. Thenin 8-12-64
APPROVAL
NASA APPROVAL 8/12/64
MIT APPROVAL 12 Aug 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SERVO MOTOR-TACHOMETER, GENERATOR

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230 SIZE C NASA DRAWING NO. 1012156
SCALE NONE WT .438 LBS MAX SHEET 1 OF 2

1012156 E

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED	
A		THIS SHEET ADDED PER TDRR 16369			2/17/65	WK	
B		REVISED PER TDRR 16611			18May65	WK	
C		REVISED PER TDRR 18009					
Ⓦ D		REVISED PER TDRR 24275			11/30/65	WK	
E		REVISED PER TDRR 30916			12 SEP. 66	WK	

REQUIREMENTS: (CONTINUED)

D. ENVIRONMENTAL:

(1) REQUIREMENTS ABOVE AT 25°C AMBIENT TEMPERATURE.

(2) MATERIALS SHALL BE CAPABLE OF WITHSTANDING +165°C, EXCEPT AS OTHERWISE SPECIFIED HEREIN.

(3) MAXIMUM AMBIENT TEMPERATURE: +150°F.

4. SPECIAL CONDITIONING (BY VENDOR):

A. PRIOR TO SHIPMENT EACH UNIT SHALL BE CYCLED 10 TIMES WITH THE THERMOCOUPLE TEMPERATURE AT +150° ± 10°F FOR THE FIRST 5 CYCLES AND AT -40° ± 10°F FOR THE LAST 5 CYCLES FOR A TOTAL OF 23 HOURS AT 10^{-5}mm OF HG OR HIGHER VACUUM USING 4 STEP CYCLE BELOW:

STEP 1: 1 HOUR WITH RATED VOLTAGE ON REFERENCE WINDINGS.

STEP 2: 10 MINUTES WITH RATED VOLTAGES ON ALL WINDINGS, HOWEVER, LIMIT SPEED TO 10,000 RPM (BY MODIFYING CONTROL WINDING).

STEP 3: REPEAT STEP 1.

STEP 4: REPEAT STEP 2 WITH OPPOSITE POLARITY ON CONTROL WINDING.

B. SUPPLIER FINAL INSPECTION DETAIL PERFORMANCE DATA SHALL BE SUPPLIED WITH THE PRODUCT.

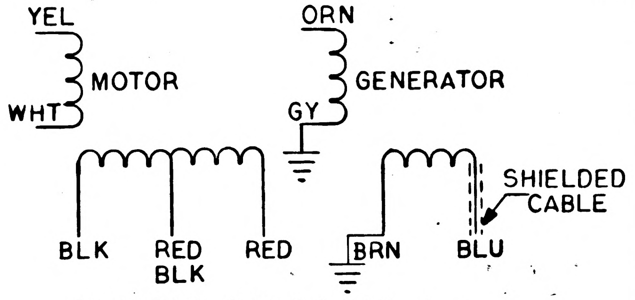
C. EACH UNIT SHALL MEET ALL ACCEPTANCE AND INSPECTION REQUIREMENTS AFTER THIS BURN-IN CYCLE.

D. CHECK STARTING VOLTAGE AT THE END OF STEP 1 DURING EACH CYCLE. UNIT SHALL CONTINUE RUNNING FOR 30 SECONDS MINIMUM.

E. THERMOCOUPLE TEMPERATURE MEASUREMENT: A NO. 30 (.010) AWG DIA COPPER CONSTANTINE WIRE SHALL BE SOLDERED TO A 0.02 SQUARE INCH COPPER DISC WHICH SHALL BE FIRMLY CLAMPED TO THE CASE "3/16 ± 1/16" FROM THE MOUNTING FACE END AND THERMALLY INSULATED FROM SURROUNDING AMBIENT CONDITIONS.

F. TEMPERATURE OF GENERATOR WINDING SHALL NOT EXCEED +260°F DURING TEST.

5. IN ADDITION TO THE QUALIFICATION REQUIREMENTS OF ND 1002053 THE UNIT SHALL BE CAPABLE OF MEETING A SALT FOG TEST PER METHOD 509.1 OF MIL-STD-810 EXCEPT THE SALT SOLUTION SHALL BE 1% BY WEIGHT. SHAFT END OF UNIT WILL BE PROTECTED DURING EXPOSURE.



WIRING DIAGRAM

TABLE I

PART NO.	AXIS ERROR	SHAFT DETAIL	SPECIAL REQUIREMENTS
1012156-1	2 MV MAX	PINION	NOTE 4
1012156-2	4 MV MAX	PINION	NOTE 4
1012156-3	2 MV MAX	PLAIN $\frac{.1200}{.1198}$ O.D.	NOTE 4 & 5

(A) THIS SHEET ADDED

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN	A. Addario Jr.	15Feb65
CHECKED	A. Marto	2-17-65
APPROVED	R. J. Therrien	2-17-65
APPROVED		
APPROVED MIT	W. Kupfer	17Feb65
APPROVED MSC		DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SERVO MOTOR —
TACHOMETER, GENERATOR

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1012156

SCALE NONE SHEET 2 OF 2

1012156 F

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 11517			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 11517	8/12/64	
A	REVISED PER TDRR 16369	2/17/65	WR
B	REVISED PER TDRR 16611	18 May 65	WR
C	REVISED PER TDRR 18009		WR
D	REVISED PER TDRR 24275	1/30/66	WK
E	REVISED PER TDRR 30916	12 SEPT 66	WK
F	REVISION STATUS CHANGED	13 OCT 66	JJB

NOTES:

1. GENERAL REQUIREMENTS:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. UNITS SHALL MEET THE GENERAL REQUIREMENT OF ND 1002016.
   - C. MANUFACTURER SHALL COMPLY WITH THE QUALITY ASSURANCE PROVISIONS OF ND 1015404, CLASS 1.
   - D. UNITS SHALL BE CAPABLE OF METTING THE QUALIFICATION REQUIREMENTS OF ND 1002053.
   - E. PACKAGING: PER ND1002215, CLASS I, CODE 1 (SEALED CONTAINERS)
   - F. MANUFACTURER'S NAME AND/OR SYMBOL, PART NUMBER, NASA DWG. NO. AND REV. LETTER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE REAR OF THE END CAP, THE OUTSIDE CASE DIAMETER BEING CLEAR OF MARKING. EACH CONTAINER SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION PER ND 1002019.

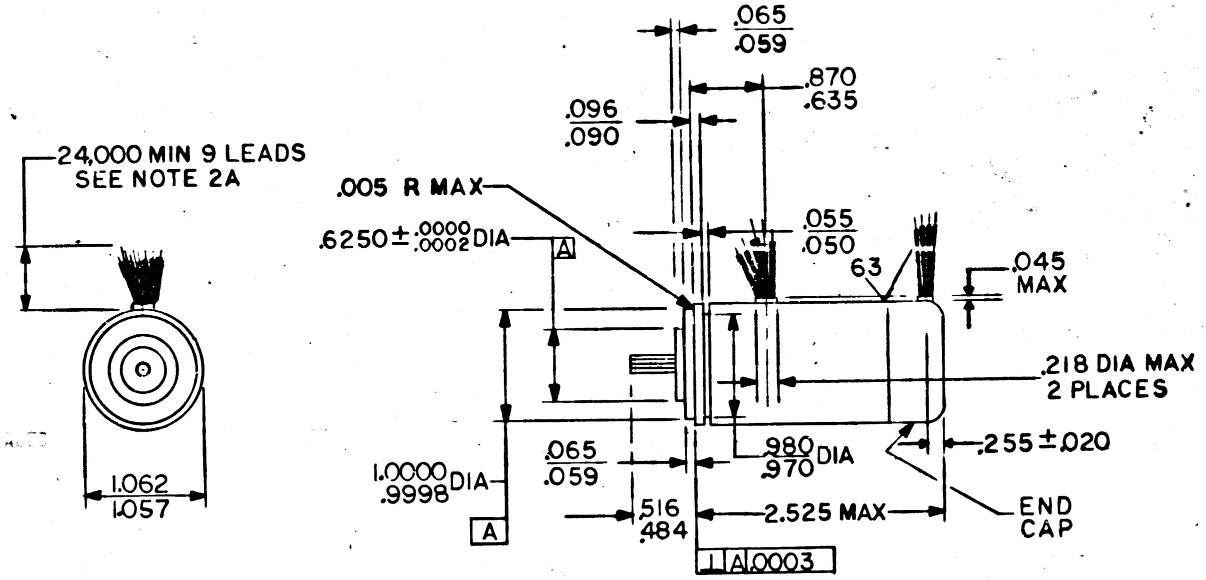
2. ACCEPTANCE AND INSPECTION REQUIREMENTS (100%):
   - A. MECHANICAL PROPERTIES:
     - (1) LEADS: EXIT HOLES IN LINE WITHIN 5° OF EACH OTHER. LEADS SHALL BE POLYTETRAFLUOROETHYLENE (TFE) INSULATED AND COLOR CODED PER MIL-W-16878, E26 EXCEPT THE BLUE HI-OUTPUT GENERATOR LEAD SHALL BE SHIELDED ONE-CONDUCTOR WITH A BLUE TFE JACKET. SHIELD SHALL BE GROUNDED TO SERVO MOTOR FRAME.RESISTANCE BETWEEN FRAME AND SHIELD TERMINATION SHALL BE 1/2 OHM MAX.
     - (2) SHAFT TOLERANCES, DYNAMIC: RUNOUT OF DIAMETER A SHALL BE .0005 TIR MAXIMUM WHEN UNIT IS IN THE VERTICAL POSITION SUSPENDED BY THE SHAFT. SHAFT END PLAY SHALL BE BETWEEN .0010 AND .0080 UNDER A 16 ± 1 OUNCE REVERSING GAUGE LOAD. SHAFT RADIAL PLAY SHALL BE .0015 TIR MAXIMUM AT A POINT .125 MAXIMUM FROM THE CASE UNDER AN 8.0 ± 0.5 OUNCE REVERSING GAUGE LOAD APPLIED TO A POINT .250 MAXIMUM FROM THE CASE.
       - A. FOR PLAIN SHAFT MOTORS: "THE SHAFT RUNOUT SHALL BE 0.0004 TIR MAX. WHEN THE UNIT IS IN THE VERTICAL POSITION SUPPORTED BY THE CASE."
     - (3) GEAR DESIGN DATA:

NUMBER OF TEETH	13
DIAMETRAL PITCH	120
PRESSURE ANGLE	20°
STANDARD PITCH DIAMETER	.1083
AGMA QUALITY CLASS	PREC. 1
OUTSIDE DIAMETER	.1247 +.0000 -.0010
GEAR TEETH FINISH	32

   - B. ELECTRICAL TEST:
     - (1) UNITS SHALL MEET THE REQUIREMENTS OF PS 1012156. EXCEPT FOR AXIS ERROR (¶ 3.5.B.b.2.c) SHALL BE PER TABLE I

3. DESIGN REQUIREMENTS:
   - A. OPERATING LIFE: 2000 HRS PER ND 1002016.
   - B. STORAGE LIFE: 5 YEARS, EXCEPT FOR THE LUBRICANT WHEN STORED AT +77°F ±20°F IN SEALED CONTAINERS.
   - C. CONSTRUCTION:
     - (1) MATERIAL: CASE AND SHAFT SHALL BE CORROSION-RESISTING STEEL IN ACCORDANCE WITH QQ-S-763, CLASS 416, COND T. CONDITION A MAY BE USED ON THE CASE. PINION SHAFT SHALL HAVE MINIMUM HARDNESS OF R_C28 AND MAY BE CONDITION H. END CAP MAY BE CLASS 303 IF ATTACHED WITH SCREW (s).
     - (2) FINISH: PASSIVATED IN ACCORDANCE WITH MIL-F-14072, E300.
     - (3) LUBRICATION: BEARINGS SHALL BE LUBRICATED AS SPECIFIED IN ND1002077 EXCEPT THAT IF THE ALTERNATE PROCEDURE FOR RIBBON RETAINERS IS USED THE AMOUNT OF LUBRICATION SHALL BE BETWEEN 6 AND 8 MILLIGRAMS.
     - (4) ROTOR INERTIA: THE ROTOR INERTIA SHALL BE 5.5 $gm\text{-}cm^2$ ±20%.

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND1002034 FOR THIS DRAWING.



QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTES
HEAT TREATMENT NONE
FINAL FINISH NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN A. Addario Jr DATE 6 Aug 64
CHECKED W.A. Lamman 12 Aug 64
APPROVAL R. J. Therrien 8-12-64
APPROVAL
NASA APPROVAL 8/12/64
MIT APPROVAL 12 Aug 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SERVO MOTOR-TACHOMETER, GENERATOR

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1012156
SCALE NONE
WT 438 LBS MAX
SHEET 1 OF 2

1012156 F

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS							
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED	
A		THIS SHEET ADDED PER TDRR 16369			2/17/65	WK	
B		REVISED PER TDRR 16611			18May65	WK	
C		REVISED PER TDRR 18009				WK	
D		REVISED PER TDRR 24275			11/30/65	WK	
E		REVISED PER TDRR 30916			12 SEP. 66	WK	
F		REVISED PER TDRR 31477	JJB	RW	13OCT 66		

REQUIREMENTS: (CONTINUED)

D. ENVIRONMENTAL:

(1) REQUIREMENTS ABOVE AT 25°C AMBIENT TEMPERATURE.

(2) MATERIALS SHALL BE CAPABLE OF WITHSTANDING +165°C, EXCEPT AS OTHERWISE SPECIFIED HEREIN.

(3) MAXIMUM AMBIENT TEMPERATURE: +150°F.

4. SPECIAL CONDITIONING (BY VENDOR OR USER)

A. PRIOR TO SHIPMENT EACH UNIT SHALL BE CYCLED 10 TIMES WITH THE THERMOCOUPLE TEMPERATURE AT +150° ± 10°F FOR THE FIRST 5 CYCLES AND AT 0° ± 10°F FOR THE LAST 5 CYCLES FOR A TOTAL OF 23 HOURS AT 10^{-5} mm OF HG OR HIGHER VACUUM USING 4 STEP CYCLE BELOW:

STEP 1: 1 HOUR WITH RATED VOLTAGE ON REFERENCE WINDINGS.

STEP 2: 10 MINUTES WITH RATED VOLTAGES ON ALL WINDINGS, HOWEVER, LIMIT SPEED TO 10,000 RPM (BY MODIFYING CONTROL WINDING).

STEP 3: REPEAT STEP 1.

STEP 4: REPEAT STEP 2 WITH OPPOSITE POLARITY ON CONTROL WINDING.

B. SUPPLIER FINAL INSPECTION DETAIL PERFORMANCE DATA SHALL BE SUPPLIED WITH THE PRODUCT.

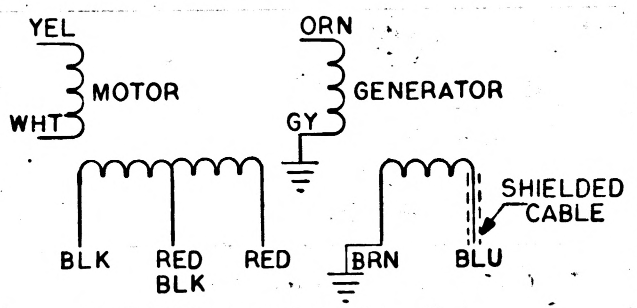
C. EACH UNIT SHALL MEET ALL ACCEPTANCE AND INSPECTION REQUIREMENTS AFTER THIS BURN-IN CYCLE.

D. CHECK STARTING VOLTAGE AT THE END OF STEP 1 DURING EACH CYCLE. UNIT SHALL CONTINUE RUNNING FOR 30 SECONDS MINIMUM.

E. THERMOCOUPLE TEMPERATURE MEASUREMENT: A NO. 30 (.010) AWG DIA COPPER CONSTANTINE WIRE SHALL BE SOLDERED TO A 0.02 SQUARE INCH COPPER DISC WHICH SHALL BE FIRMLY CLAMPED TO THE CASE "3/16 ± 1/16" FROM THE MOUNTING FACE END AND THERMALLY INSULATED FROM SURROUNDING AMBIENT CONDITIONS.

F. TEMPERATURE OF GENERATOR WINDING SHALL NOT EXCEED +260°F DURING TEST.

5. IN ADDITION TO THE QUALIFICATION REQUIREMENTS OF ND 1002053 THE UNIT SHALL BE CAPABLE OF MEETING A SALT FOG TEST PER METHOD 509.1 OF MIL-STD-810 EXCEPT THE SALT SOLUTION SHALL BE 1% BY WEIGHT. SHAFT END OF UNIT WILL BE PROTECTED DURING EXPOSURE.



WIRING DIAGRAM

TABLE I

PART NO.	AXIS ERROR	SHAFT DETAIL	SPECIAL REQUIREMENTS
1012156-1	2 MV MAX	PINION	NOTE 4
1012156-2	4 MV MAX	PINION	NOTE 4
1012156-3	2 MV MAX	PLAIN $\frac{.1200}{.1198}$ O.D.	NOTE 4 & 5

(A) THIS SHEET ADDED

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN A. Addario Jr. 15Feb65
CHECKED A. Martz 2-17-65
APPROVED R. J. Therrien 2-17-65
APPROVED
APPROVED MIT W Kupfer 17Feb65
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SERVO MOTOR —
TACHOMETER, GENERATOR

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
DRAWING NO. 1012156
SCALE NONE
SHEET 2 OF 2

1012156 J

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 11517			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 11517	8/12/64	WH
A	REVISED PER TDRR 16369	2/17/65	WK
B	REVISED PER TDRR 16611	18 May 65	WK
C	REVISED PER TDRR 18009		WK
D	REVISED PER TDRR 24275	11/30/66	WK
E	REVISED PER TDRR 30916	12 SEPT 66	WK
F	REVISION STATUS CHANGED	13 OCT 66	JJB / RW
G	REVISED PER TDRR 32822	15 FEB '67	JAG / PJ
H	REVISED PER TDRR 38245	21 SEP 70	JJJ
J	REVISED PER TDRR 38333	15 FEB 71	GW / CP

NOTES:

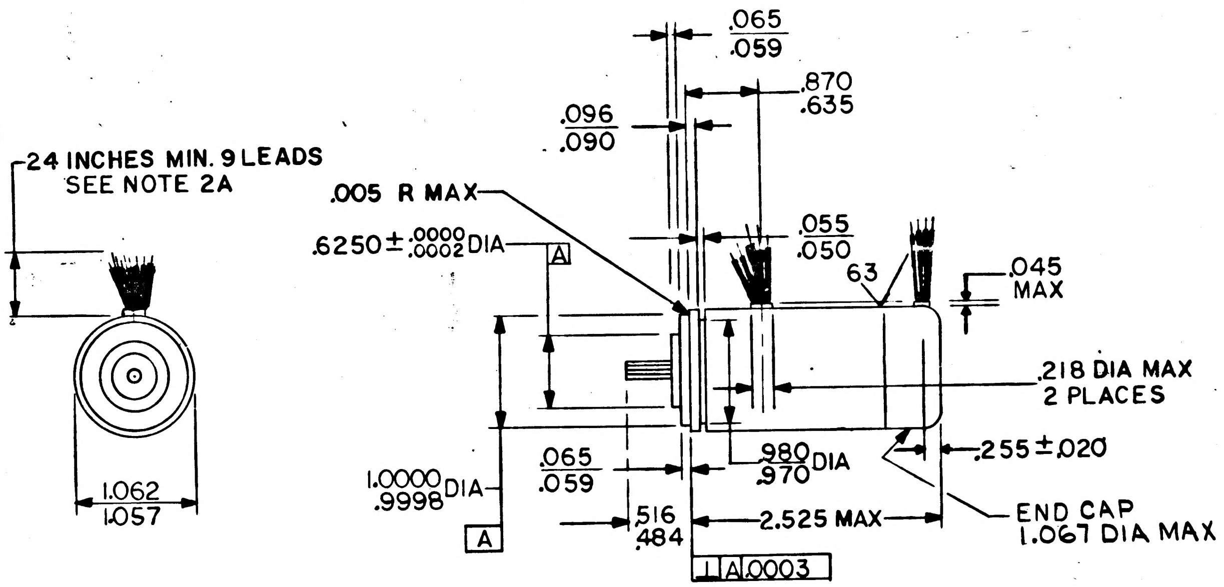
1. GENERAL REQUIREMENTS:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. UNITS SHALL MEET THE GENERAL REQUIREMENT OF ND 1002016.
   - C. MANUFACTURER SHALL COMPLY WITH THE QUALITY ASSURANCE PROVISIONS OF ND 1015404, CLASS 1.
   - D. UNITS SHALL BE CAPABLE OF METTING THE QUALIFICATION REQUIREMENTS OF ND 1002053.
   - E. PACKAGING: PER ND1002215, CLASS I, CODE 1 (SEALED CONTAINERS)
   - F. MANUFACTURER'S NAME AND/OR SYMBOL, PART NUMBER, NASA DWG. NO. AND REV. LETTER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE REAR OF THE END CAP, THE OUTSIDE CASE DIAMETER BEING CLEAR OF MARKING. EACH CONTAINER SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION PER ND 1002019.

2. ACCEPTANCE AND INSPECTION REQUIREMENTS (100%):
   - A. MECHANICAL PROPERTIES:
     - (1) LEADS: EXIT HOLES IN LINE WITHIN 5° OF EACH OTHER. LEADS SHALL BE POLYTETRAFLUOROETHYLENE (TFE) INSULATED AND COLOR CODED PER MIL-W-16878, E26 EXCEPT THE BLUE HI-OUTPUT GENERATOR LEAD SHALL BE SHIELDED ONE-CONDUCTOR WITH A BLUE TFE JACKET. SHIELD SHALL BE GROUNDED TO SERVO MOTOR FRAME.RESISTANCE BETWEEN FRAME AND SHIELD TERMINATION SHALL BE 1/2 OHM MAX.
     - (2) SHAFT TOLERANCES, DYNAMIC: RUNOUT OF DIAMETER A SHALL BE .0005 TIR MAXIMUM WHEN UNIT IS IN THE VERTICAL POSITION SUSPENDED BY THE SHAFT. SHAFT END PLAY SHALL BE BETWEEN .0010 AND .0080 UNDER A 16 ± 1 OUNCE REVERSING GAUGE LOAD. SHAFT RADIAL PLAY SHALL BE .0015 TIR MAXIMUM AT A POINT .125 MAXIMUM FROM THE CASE UNDER AN 8.0 ± 0.5 OUNCE REVERSING GAUGE LOAD APPLIED TO A POINT .250 MAXIMUM FROM THE CASE.
       - A. FOR PLAIN SHAFT MOTORS: "THE SHAFT RUNOUT SHALL BE 0.0004 TIR MAX. WHEN THE UNIT IS IN THE VERTICAL POSITION SUPPORTED BY THE CASE."
     - (3) GEAR DESIGN DATA:

NUMBER OF TEETH	13
DIAMETRAL PITCH	120
PRESSURE ANGLE	20°
STANDARD PITCH DIAMETER	.1083
AGMA QUALITY CLASS	PREC. 1
OUTSIDE DIAMETER	.1247 +.0000 -.0010
GEAR TEETH FINISH	32

   - B. ELECTRICAL TEST:
     - (1) UNITS SHALL MEET THE REQUIREMENTS OF PS 1012156. EXCEPT FOR AXIS ERROR (¶ 3.5.B.b.2.c) SHALL BE PER TABLE I

3. DESIGN REQUIREMENTS:
   - A. OPERATING LIFE: 2000 HRS PER ND 1002016.
   - B. STORAGE LIFE:
     - (1) 5 YEARS, EXCEPT FOR THE LUBRICANT WHEN STORED AT +77°F ± 20°F IN SEALED CONTAINERS.
     - (2) THE 1012156-5 CONFIGURATION SHALL BE DESIGNED TO MEET A 5 YEAR STORAGE LIFE.
   - C. CONSTRUCTION:
     - (1) MATERIAL: CASE AND SHAFT SHALL BE CORROSION-RESISTING STEEL IN ACCORDANCE WITH QQ-S-763, CLASS 416, COND T. CONDITION A MAY BE USED ON THE CASE. PINION SHAFT SHALL HAVE MINIMUM HARDNESS OF R_C28 AND MAY BE CONDITION H. END CAP MAY BE CLASS 303 IF ATTACHED WITH SCREW(s).
     - (2) FINISH: PASSIVATED IN ACCORDANCE WITH MIL-F-14072, E300.
     - (3) LUBRICATION:
       - a. BEARINGS SHALL BE LUBRICATED AS SPECIFIED IN ND1002077.
       - b. BEARINGS SHALL BE LUBRICATED AS SPECIFIED IN ND 1002077, PARA. 3.4.3 (ALTERNATE OILING FOR BEARINGS WITH RIBBON RETAINERS). THE AMOUNT OF LUBRICATION SHALL BE BETWEEN 6 AND 10 MILLIGRAMS.
       - c. BEARINGS SHALL BE LUBRICATED AS SPECIFIED IN ND1002077, PARA. 3.4.3 (ALTERNATE OILING FOR BEARINGS WITH RIBBON RETAINERS). THE AMOUNT OF LUBRICATION SHALL BE BETWEEN 13-18 MILLIGRAMS.



QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL: SEE NOTES
HEAT TREATMENT: NONE
FINAL FINISH: NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN A. Addario Jr. DATE 6 Aug 64
CHECKED M. A. Lamuro 12 Aug 64
APPROVAL R. J. Therrien 8-12-64
APPROVAL
NASA APPROVAL 8/12/64
MIT APPROVAL 12 Aug 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SERVO MOTOR-TACHOMETER, GENERATOR

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230 | SIZE C | NASA DRAWING NO. 1012156
SCALE NONE | WT .438 LBS MAX | SHEET 1 OF 2

1012156 J

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED	
A		THIS SHEET ADDED PER TDRR 16369			2/17/65	WK	
B		REVISED PER TDRR 16611			[illegible] 65	WK	
C		REVISED PER TDRR 18009				WK	
D		REVISED PER TDRR 24275			11/30/65	WK	
E		REVISED PER TDRR 30916			12 SEP. 66	WK	
F		REVISED PER TDRR 31477	JJB	RW	13 OCT 66		
G		REVISED PER TDRR 32822	JAG	PJ	15 FEB '67		
H		REVISED PER TDRR 38245	JJJ	JK	21 SEP 70		
J		REVISION STATUS CHANGED	JW	CP	15 FEB 71		

REQUIREMENTS: (CONTINUED)

d. BEARINGS SHALL BE LUBRICATED AS SPECIFIED IN ND1002443.

(4) ROTOR INERTIA: THE ROTOR INERTIA SHALL BE 5.5 gm-cm^2 ±20%.

D. ENVIRONMENTAL:

(1) REQUIREMENTS ABOVE AT 25°C AMBIENT TEMPERATURE.

(2) MATERIALS SHALL BE CAPABLE OF WITHSTANDING +165°C, EXCEPT AS OTHERWISE SPECIFIED HEREIN.

(3) MAXIMUM AMBIENT TEMPERATURE: +150°F.

4. SPECIAL CONDITIONING (BY VENDOR OR USER)

A. PRIOR TO SHIPMENT EACH UNIT SHALL BE CYCLED 7 TIMES WITH THE THERMOCOUPLE TEMPERATURE AT +150° ± 10°F FOR THE FIRST 2 CYCLES AND AT 0° ± 10°F FOR THE LAST 5 CYCLES FOR A TOTAL OF 16 HOURS AT 10^{-5}mm OF HG OR HIGHER VACUUM USING 4 STEP CYCLE BELOW:

STEP 1: 1 HOUR WITH RATED VOLTAGE ON REFERENCE WINDINGS.

STEP 2: 10 MINUTES WITH RATED VOLTAGES ON ALL WINDINGS, HOWEVER, LIMIT SPEED TO 9,000 RPM MIN. (BY MODIFYING CONTROL VOLTAGE).

STEP 3: REPEAT STEP 1.

STEP 4: REPEAT STEP 2 WITH OPPOSITE POLARITY ON CONTROL WINDING.

B. SUPPLIER FINAL INSPECTION DETAIL PERFORMANCE DATA SHALL BE SUPPLIED WITH THE PRODUCT.

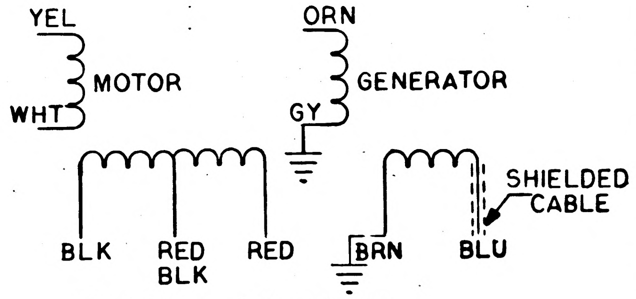
C. EACH UNIT SHALL MEET ALL ACCEPTANCE AND INSPECTION REQUIREMENTS AFTER THIS BURN-IN CYCLE.

D. CHECK STARTING VOLTAGE AT THE END OF STEP 1 DURING EACH CYCLE. UNIT SHALL CONTINUE RUNNING FOR 30 SECONDS MINIMUM.

E. THERMOCOUPLE TEMPERATURE MEASUREMENT: A NO. 30 (.010) AWG DIA COPPER CONSTANTINE WIRE SHALL BE SOLDERED TO A 0.02 SQUARE INCH COPPER DISC WHICH SHALL BE FIRMLY CLAMPED TO THE CASE "3/16 ± 1/16" FROM THE MOUNTING FACE END AND THERMALLY INSULATED FROM SURROUNDING AMBIENT CONDITIONS.

F. TEMPERATURE OF GENERATOR WINDING SHALL NOT EXCEED +260°F DURING TEST.

5. IN ADDITION TO THE QUALIFICATION REQUIREMENTS OF ND 1002053 THE UNIT SHALL BE CAPABLE OF MEETING A SALT FOG TEST PER METHOD 509.1 OF MIL-STD-810 EXCEPT THE SALT SOLUTION SHALL BE 1% BY WEIGHT. SHAFT END OF UNIT WILL BE PROTECTED DURING EXPOSURE.



WIRING DIAGRAM

TABLE I

PART NO.	AXIS ERROR	SHAFT DETAIL	SPECIAL REQUIREMENTS	LUBRICATION
1012156-1	2 MV MAX.	PINION	NOTE 4	NOTE 3.c. (3) a
1012156-2	4 MV MAX.	PINION	NOTE 4	NOTE 3.c. (3) a
1012156-3	2 MV MAX.	PLAIN .1200 O.D. .1198	NOTE 4 & 5	NOTE 3.c. (3) c
1012156-4	2 MV MAX.	PINION	NOTE 4	NOTE 3.c. (3) b
1012156-5	2 MV MAX.	PINION	NOTES 4 & 3.B(2)	NOTE 3.c. (3) d

(A) THIS SHEET ADDED

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN	A. Addario Jr.	15 Feb 65
CHECKED	A. Marto	2-17-65
APPROVED	R. J. Therrien	2-17-65
APPROVED		
APPROVED MIT		17 Feb 65
APPROVED MSC		
		DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SERVO MOTOR — TACHOMETER, GENERATOR

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1012156

SCALE NONE SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

—	1012156

REVISIONS 11517			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 11517	8/14/64	W.L.

NOTES:

1. GENERAL REQUIREMENTS:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. UNITS SHALL MEET THE GENERAL REQUIREMENT OF ND 1002016.
   - C. MANUFACTURER SHALL COMPLY WITH THE QUALITY ASSURANCE PROVISIONS OF ND 1015404, CLASS 1.
   - D. UNITS SHALL BE CAPABLE OF METTING THE QUALIFICATION REQUIREMENTS OF ND 1002053.
   - E. MANUFACTURER'S NAME AND/OR SYMBOL, PART NUMBER, NASA DWG. NO. AND REV. LETTER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE REAR OF THE END CAP, THE OUTSIDE CASE DIAMETER BEING CLEAR OF MARKING. EACH CONTAINER SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION PER ND 1002019.

2. ACCEPTANCE AND INSPECTION REQUIREMENTS (100%):
   - A. MECHANICAL PROPERTIES:
     - (1) LEADS: EXIT HOLES IN LINE WITHIN 5° OF EACH OTHER. LEADS SHALL BE POLYTETRAFLUOROETHYLENE (TFE) INSULATED AND COLOR CODED PER MIL-W-16878, E26 EXCEPT THE BLUE HI-OUTPUT GENERATOR LEAD SHALL BE SHIELDED ONE-CONDUCTOR WITH A BLUE TFE JACKET. SHIELD SHALL BE GROUNDED TO SERVO MOTOR FRAME.
     - (2) SHAFT TOLERANCES, DYNAMIC: RUNOUT OF DIAMETER A SHALL BE .0005 TIR MAXIMUM WHEN UNIT IS IN THE VERTICAL POSITION SUSPENDED BY THE SHAFT. SHAFT END PLAY SHALL BE BETWEEN .0010 AND .0030 UNDER A 16 ± 1 OUNCE REVERSING GAUGE LOAD. SHAFT RADIAL PLAY SHALL BE .0007 TIR MAXIMUM AT A POINT .125 MAXIMUM FROM THE CASE UNDER AN 8.0 ± 0.5 OUNCE REVERSING GAUGE LOAD APPLIED TO A POINT .250 MAXIMUM FROM THE CASE.
     - (3) GEAR DESIGN DATA:

NUMBER OF TEETH	13
DIAMETRAL PITCH	120
PRESSURE ANGLE	20°
STANDARD PITCH DIAMETER	.1083
AGMA QUALITY CLASS	PREC. 1
OUTSIDE DIAMETER	$.1247 \begin{smallmatrix} + .0000 \\ - .0010 \end{smallmatrix}$
GEAR TEETH FINISH	32

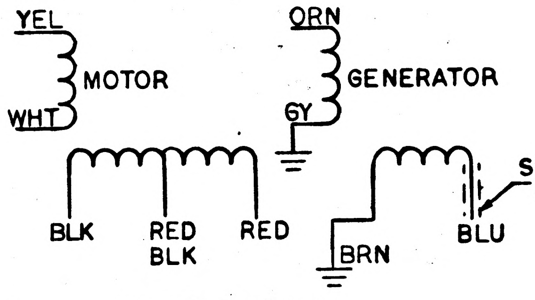
   - B. ELECTRICAL TEST:
     - (1) UNITS SHALL MEET THE REQUIREMENTS OF ND 1012156. EXCEPT FOR AXIS ERROR (¶ 3.5.B.b.2b) SHALL BE PER TABLE I

3. DESIGN REQUIREMENTS:
   - A. OPERATING LIFE: 2000 HRS PER ND 1002016.
   - B. STORAGE LIFE: 5 YEARS WITH NO DETERIORATION OF THE INSULATION OR LUBRICANT.
   - C. CONSTRUCTION:
     - (1) MATERIAL: CASE AND SHAFT SHALL BE CORROSION-RESISTING STEEL IN ACCORDANCE WITH QQ-S-763, CLASS 416, COND T.
     - (2) FINISH: PASSIVATED IN ACCORDANCE WITH MIL-F-14072, E 300.
     - (3) LUBRICATION: BEATINGS SHALL BE LUBRICATED WITH LUBRICANT SPECIFIED IN ND 1002077.
     - (4) ROTOR INERTIA: THE ROTOR INERTIA SHALL BE 5.5 gm-cm^2 ± 20%.
   - D. ENVIRONMENTAL
     - (1) REQUIREMENTS ABOVE AT 25°C AMBIENT TEMPERATURE.
     - (2) GENERATOR OUTPUT WINDING SHALL NOT EXCEED +165°C AS MEASURED PER ND 1002016.

4. SPECIAL REQUIREMENTS: A. EACH UNIT SHALL BE ENERGIZED AT RATED VOLTAGE AND ROTATED AT NO LOAD SPEED WITH A LOAD RESISTANCE OF 150K ±1% ACROSS THE GENERATOR OUTPUT WINDING AND OPERATED AT 80°C ± 5°C FOR A MINIMUM OF 50 HOURS REVERSING DIRECTION OF ROTATION EVERY 5 HRS. EACH UNIT SHALL MEET ALL ACCEPTANCE AND INSPECTION REQUIREMENTS AFTER THIS BURN-IN CYCLE

B. SUPPLIERS FINAL INSPECTION DETAIL PERFORMANCE DATA SHALL BE SUPPLIED WITH THE PRODUCT.

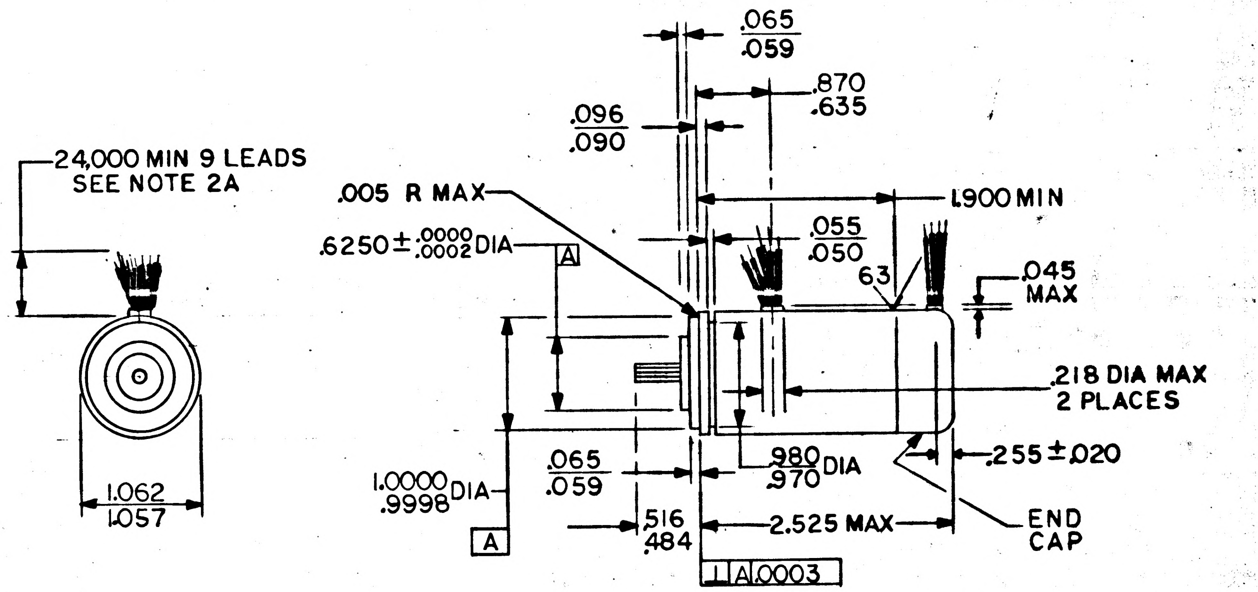
PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND1002034 FOR THIS DRAWING.



WIRING DIAGRAM

TABLE I

PART NO.	AXIS ERROR
1012156-1	2MV MAX
1012156-2	4MV MAX



MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

HEAT TREATMENT
NONE

FINAL FINISH
NONE

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN G. Addario Jr. DATE 6 Aug 64
CHECKED M.A. Lamm 12 Aug 64
APPROVAL R. J. Therrien 9-12-64
APPROVAL
NASA APPROVAL 8/12/64
MIT APPROVAL 12 Aug 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SERVO MOTOR-
TACHOMETER, GENERATOR

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. —
SIZE C
NASA DRAWING NO. 1012156
SCALE NONE
WT .438 LBS MAX
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

SERVO MOTOR GENERATOR

The purpose of this document is to establish the manufacturing and test requirements for procurement. The servo motor generator is intended for use in the APOLLO Guidance and Navigation Equipment program.

12 Aug 64
MIT INSTRUMENTATION LABORATORY

8/12/64
NASA/MSC APPROVAL

PREPARED BY	ORGANIZATION	DATE
E. P. Armstrong	MIT	8-12-64
EXAMINED BY	ORGANIZATION	DATE
Maurice Lanman	MIT	12 Aug 1964
APPROVED BY	ORGANIZATION	DATE
Robert J. Therrien	MIT	12 Aug 1964
APPROVED BY	ORGANIZATION	DATE
John E. Miller	Dep. Asst. Dir.	12 Aug 64
APPROVED BY	ORGANIZATION	DATE
APPROVED BY	ORGANIZATION	DATE
	ICCB	12 Aug 64

12 Aug 64

Class A
TDRR 11535

PROCUREMENT SPECIFICATION
SERVO MOTOR-GENERATOR
TYPE 28V11SMG8a

Record of Revisions

Revision Letter	TDRR No.	Pages Revised	Approvals		DATE
			MIT	NASA	

This specification consists of pages i through iii and 1 to 6 inclusive.

SERVO MOTOR GENERATOR

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12 Aug 64
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NASA/MSC APPROVAL

PROCUREMENT SPECIFICATION
SERVO MOTOR-GENERATOR
TYPE 28V11SMG8a

1. SCOPE

1.1 This specification establishes the requirements for the procurement of the Servo Motor-Generator, Type 28V11SMG8a, hereinafter called motor-generator.

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on the date of invitation for bids form a part of this specification to the extent specified herein.

SPECIFICATION

APOLLO G&N

ND-1002016	Servo Motor-Generator, General Specification for

DRAWINGS

APOLLO G&N

1012156	Servo Motor-Generator, Size 11, Specification Control Drawing

(Copies of specifications and drawings required by contractors in connection with specific procurement functions should be obtained from the procuring agency or as directed by the contracting officer.)

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

PROCUREMENT SPECIFICATION

SERVO MOTOR-GENERATOR

TYPE 28V11SMG8a

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DRAWINGS

APOLLO G&N

1012156	Servo Motor-Generator, Size 11, Specification Control Drawing

(Copies of specifications and drawings required by contractors in connection with specific procurement functions should be obtained from the procuring agency or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 GENERAL. The motor-generator shall conform to the requirements of Specification ND-1002016 with the following exceptions or additions:

a. The following acceptance tests of Specification ND-1002016 are not applicable:

1. Voltage Sensitivity - Motor
2. Frequency Sensitivity - Motor
3. Temperature Sensitivity - Motor
4. Fundamental Null
5. Harmonic Content
6. Coupling
7. Motor-Generator Coupling
8. Voltage Sensitivy - Generator
9. Frequency Sensitivity - Generator
10. Generator Phase Shift

b. In the test titled Position and Axes Errors, only axis error quadrature voltage shall not be measured.

c. The Effective Resistance values shall be calculated.

d. The test titled Insulation Resistance, shall be performed at 93° ± 5°C for the high temperature resistance measurement, with values as specified in Specification ND 1002016.

e. In the Temperature Sensitivity-Generator test, the fundamental output voltage phase shift and the quadrature axis error voltage shall not be measured.

3.2 DESIGN AND CONSTRUCTION. The motor-generator shall be of the design, construction, and physical dimensions shown on the applicable drawing. The manufacture, materials, and mechanical and electrical construction of the motor-generator shall be in accordance with the requirements of Specification ND-1002016.

3.3 FINISHES AND PROTECTIVE TREATMENT. The motor-generator finishes, protective treatment, and moisture, fungus, and corrosion treatments shall be in accordance with the requirements of Specification ND-1002016 and the applicable drawing.

3.4 QUALIFICATION PERFORMANCE CHARACTERISTICS AND CONDITIONS.

3.4.1 General. The qualification testing shall conform to the requirements of Specification ND-1002016 with the following exceptions or additions.

3.4.2.1 Functional Characteristics. The motor generator shall have passed all acceptance tests as called out in 3.5 of this specification and shall exhibit the following characteristics when tested according to Specification ND 1002016 under ambient conditions.

3. REQUIREMENTS

3.1 GENERAL. The motor-generator shall conform to the requirements of Specification ND-1002016 with the following exceptions or additions:

a. The following acceptance tests of Specification ND-1002016 are not applicable:

1. Voltage Sensitivity - Motor
2. Frequency Sensitivity - Motor
3. Temperature Sensitivity - Motor
4. Fundamental Null
5. Harmonic Content
6. Coupling
7. Motor-Generator Coupling
8. Voltage Sensitivy - Generator
9. Frequency Sensitivity - Generator
10. Generator Phase Shift

b. In the test titled Position and Axes Errors, only axis error quadrature voltage shall not be measured.

c. The Effective Resistance values shall be calculated.

d. The test titled Insulation Resistance, shall be performed at 93° ± 5°C for the high temperature resistance measurement, with values as specified in Specification ND 1002016.

e. In the Temperature Sensitivity-Generator test, the fundamental output voltage phase shift and the quadrature axis error voltage shall not be measured.

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3.4.1 General. The qualification testing shall conform to the requirements of Specification ND-1002016 with the following exceptions or additions.

3.4.2.1 Functional Characteristics. The motor generator shall have passed all acceptance tests as called out in 3.5 of this specification and shall exhibit the following characteristics when tested according to Specification ND 1002016 under ambient conditions.

A. Motor Section

a. Reference (Phase 1)

1. Connections	Yellow and white
2. Voltage	28 V rms ± 5%
3. Frequency	800 cps ± 1%
4. Current (tuned load)*	128 ma, nominal
5. Power Input*	3.8 watts, maximum
6. Effective Resistance*	217 ohms nominal
7. DC Resistance	13 ohms, nominal

b. Control (Phase 2)

1. Connections	Power to red and black; center-tap red-black
2. Voltage	35 V rms ± 1%
3. Frequency	800 cps ± 1%
4. Current (tuned load)*	105 ma, nominal
5. Power Input*	3.8 watts, maximum
6. Effective Resistance*	333 ohms nominal
7. DC Resistance	20 ohms, nominal

c. Mechanical Data

1. No-load Speed	10,000 rpm, min 15,000 rpm, max.
2. Stall Torque	0.32 oz. in., minimum 0.42 oz. in., maximum
3. Starting Voltage	0.9 V rms, maximum
4. Theoretical Acceleration	4,950 rad/sec^2, nominal

B. Generator Section

a. Excitation

1. Connections	Orange and gray
2. Voltage	28 V rms ± 1%
3. Frequency	800 cps ± 1%
4. Current (tuned load)*	61 ma, nominal
5. Power Input*	2.0 watts, maximum
6. Effective Resistance*	460 ohms, nominal
7. DC Resistance	105 ohms, nominal

b. Output

1. Connections	Blue and brown
2. Residual Data	
(a) Position Error (In phase)	1 mv. max.
(b) Position Error (Quadrature)	3 mv. max.
(c) Axis Error (In phase)	±2 mv. max.
(d) Total rms Null	8 mv. max.
3. Scale Factor (at 3600 rpm)	1.0 volts/1000 rpm ± 1%
4. Fund. Quadrature Voltage (at 3600 rpm)	21 mv, maximum

A. Motor Section

a. Reference (Phase 1)

1.	Connections	Yellow and white
2.	Voltage	28 V rms ± 5%
3.	Frequency	800 cps ± 1%
4.	Current (tuned load)*	128 ma, nominal
5.	Power Input*	3.8 watts, maximum
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6.	Effective Resistance*	333 ohms nominal
7.	DC Resistance	20 ohms, nominal

c. Mechanical Data

1.	No-load Speed	10,000 rpm, min 15,000 rpm, max.
2.	Stall Torque	0.32 oz. in., minimum
		0.42 oz. in., maximum
3.	Starting Voltage	0.9 V rms, maximum
4.	Theoretical Acceleration	4,950 rad/sec^2, nominal

B. Generator Section

a. Excitation

1.	Connections	Orange and gray
2.	Voltage	28 V rms ± 1%
3.	Frequency	800 cps ± 1%
4.	Current (tuned load)*	61 ma, nominal
5.	Power Input*	2.0 watts, maximum
6.	Effective Resistance*	460 ohms, nominal
7.	DC Resistance	105 ohms, nominal

b. Output

1.	Connections	Blue and brown
2.	Residual Data	
	(a) Position Error (In phase)	1 mv. max.
	(b) Position Error (Quadrature)	3 mv. max.
	(c) Axis Error (In phase)	±2 mv. max.
	(d) Total rms Null	8 mv. max.
3.	Scale Factor (at 3600 rpm)	1.0 volts/1000 rpm ± 1%
4.	Fund. Quadrature Voltage (at 3600 rpm)	21 mv, maximum